1963

A Flora of San Clemente Island, California

Peter H. Raven

Follow this and additional works at: <https://scholarship.claremont.edu/aliso>

Part of the [Botany Commons](#)

Recommended Citation

Raven, Peter H. (1963) "A Flora of San Clemente Island, California," *Aliso: A Journal of Systematic and Floristic Botany*: Vol. 5: Iss. 3, Article 8.

Available at: <https://scholarship.claremont.edu/aliso/vol5/iss3/8>

A FLORA OF SAN CLEMENTE ISLAND, CALIFORNIA

PETER H. RAVEN¹

INTRODUCTION

San Clemente Island is the southernmost of the Channel Islands of California, its center lying at about 32° 50' N. latitude, 118° 30' W. longitude. It is about 64 statute miles west-northwest of San Diego and about 50 miles south-southwest of San Pedro, the nearest mainland point (Fig. 1). The nearest point of Santa Catalina Island, the closest land, is about 21 miles to the north; Catalina is thus interposed between San Clemente Island and the mainland. Santa Barbara Island lies about 40 miles northwest; San Nicolas Island about 48 miles west-northwest. Almost due south 240 miles away is Guadalupe Island, some 165 miles from the mainland of Baja California (Fig. 4). San Clemente Island is long and narrow, being nearly 21 miles long and from about 1½ miles wide near the north end to about 4 miles wide near the south end; its long axis runs approximately northwest. For convenience, I will refer to the northeast side as the east side and the southwest side as the west side. The area of the island is about 56 square miles, and its high point, Thirst (1965 feet elevation), is near its center.

The geology of San Clemente Island has been reviewed most recently by F. H. Olmsted in his "Geologic reconnaissance of San Clemente Island, California" (Geol. Surv. Bull. 1071-B: 55-68. 1958). The island is the upper part of a tilted and gently arched block of earth's crust, with a steep east slope and a more gentle west slope. Obvious, particularly on the western, relatively gentle slopes, are about 20 distinct wave-cut terraces extending up to a level of about 1500 feet, which suggests that the portion of the island below that elevation was submerged and rose intermittently, probably, as will be seen, during the Pleistocene and more recently. The island is everywhere dissected by deep, geologically young canyons, those on the east coast dropping precipitously to the sea (Fig. 2). It is in these canyons and on their rocky cliffs that many of the most interesting plants occur; probably the area about their heads has been continuously above sea level during the Pleistocene. Most of the island is composed of volcanic rocks of Miocene age, primarily andesite with a large block of dacite in the area just north of Middle Ranch and Seal Cove and smaller amounts elsewhere. Patches of rhyolite occur near the north end. Local deposits of overlying sedimentaries of various ages are scattered here and there. In the younger sand deposits (Recent) such as the dunes at West Cove and the large dune near the northwestern end, and also in deposits near China Point (Murbarger, pers. comm.), there are sand molds of tree trunks and plant roots and stems, which suggest a much moister climate on the island in the very recent past. In any event, the island is not older than the Miocene and may be younger. Geologic evidence suggests that it has never been connected with any other body of land.

Most of San Clemente Island is covered with grassland dominated at present by introduced Mediterranean annual herbs such as *Avena barbata*, *A. fatua*, *Bromus diandrus*, *B. rubens*, *Medicago polymorpha*, *Erodium cicutarium*, and *E. moschatum*, together with such

¹Present address: Division of Systematic Biology, Stanford University, Stanford, California.

natives as *Lycium californicum*, a low spiny shrub, and scattered clumps of *Opuntia littoralis*. *Opuntia prolifera* is abundant and forms thickets near the south end and is rarer northward. *Mesembryanthemum crystallinum* and *M. nodiflorum*, two species of "ice plant" native to South Africa, are also abundant in the grassland throughout, the latter species being the more frequent. *Convolvulus macrostegius* commonly sprawls over the slopes. Deep within

Fig. 1. A portion of the coast of southern California, showing the California Channel Islands.

the canyons are groves of trees, especially *Prunus ilicifolia* subsp. *lyonii*, but also *Lyonothamnus*, *Quercus tomentella*, *Sambucus*, *Heteromeles*, and *Rhus integrifolia* (Fig. 3). Long trailing plants of the snake cactus, *Bergerocactus emoryi*, sprawl down the rocky canyon walls. Coastal sage is very limited in area, being confined to dry canyon walls; but it seems probable that it formerly may have occupied large areas on the clayey benches, and have mostly been destroyed by animals.

Although weather data are scant, the east side of the island is apparently moister than the west, and it is likely that the main tracks of the storms from north to south are often deflected down along the east side of the island. Generally the wind is from the sea, over the island and onto the mainland; but during the Santa Ana cycles of winter, violent and

Fig. 2. Canyon below Lemon Tank with the characteristic abrupt drop to the sea of east-side canyons. *Opuntia littoralis* on upper cliffs, *Bergerocactus emoryi* in center, and shrubs of *Eriophyllum nevinii* scattered below. Official photograph, U. S. Navy.

sustained winds blow off the mainland and from Santa Catalina Island toward the east side of San Clemente. These Santa Ana winds may obviously be of importance in transporting seeds to the island.

HISTORICAL CHANGES

San Clemente Island was discovered by Juan Rodríguez Cabrillo on October 7, 1542. At this time it, like the other Channel Islands, supported a fairly large Indian population, which was gradually reduced to nothing in the succeeding two and a half centuries. Unfortunately goats were liberated on the Channel Islands at a very early date, not later than 1827 on Santa Catalina Island (Dunkle, Allan Hancock Pac. Exped. 13: 261. 1950). By 1840 San Clemente, San Nicolas, and Santa Barbara islands were said to be densely populated with goats (Farnham, J. T., *Travels in California*. Oakland: Biobooks. 1947). Some trees were cut on San Clemente Island in the nineteenth century, and starting with 1877, large numbers of sheep were grazed there (Dunkle, loc. cit.). The island has been owned continuously by the United States Government, but was leased to the San Clemente Sheep and Wool Company from 1877 to about 1934, when it was transferred to the Navy and sheep grazing discontinued.

As we will see, the first botanists did not reach the island until 1885, and one can only assume that the flora they observed had already been profoundly altered. By that time, it is highly likely that certain species, some of them perhaps endemics, had already become extinct. It was not until 1894 that a reasonably thorough botanical search of even the south end was carried out, and it was 1903 before the whole island was explored botanically, after at least 65 years of intensive exploitation by feral goats and 25 years of heavy use as a sheep ranch. Lyon visiting the south end in 1885, noted great dead masses of *Dudleya* ("*Cotyledon*") that formerly covered the ground throughout the entire island and had been eaten by the sheep in a season of drought, persisting only on "wholly inaccessible rocks" (Botan. Gaz. 11: 198. 1886). This suggests, as mentioned above in connection with the coastal sage, that many plants which may have once grown freely all over the island in the absence of grazing animals have survived since only on steep walls. One can only speculate, for example, about whether the endemic tree dandelion, *Munzothamnus blairii*, grew on the flats formerly; but it seems certain that such components of the coastal sage as the endemic *Castilleja grisea* and the more widespread *Eriophyllum confertiflorum* and *Artemisia californica*, for example, did so. It was reported to Lyon (Botan. Gaz. 11: 204. 1886) that *Lavatera assurgentiflora* in about 1873 "constituted an unbroken forest, extending for miles upon the high plateaus." By 1885, and subsequently, it has been reduced to no more than a few dozen individuals, although the report of Trask (Bull. So. Calif. Acad. Sci. 3: 95. 1904) suggests that at the time of Lyon's visit there may still have been some groves on the island which Lyon did not reach. The drastic reduction of *Lavatera* probably parallels that of many other species that simply were not adapted to life on the cliffs (among them perhaps *Dissantheium californicum*) and tends to support the above-mentioned contention that some species may have become extinct on the island within historical times.

The aggressive spread of naturalized weeds, especially under the influence of severe grazing pressure on communities of plants poorly adapted to it, has doubtless also done much to decimate the native flora of the island. Among the 81 species listed by Lyon in 1885, 10 introduced ones are included.

BOTANICAL EXPLORATION

In April, 1885, two enthusiastic amateur botanists of Los Angeles, William Scrugham

Lyon and the Rev. Joseph C. Nevin, made the first collections of plants on San Clemente Island. They remained four days, apparently landing at Pyramid Cove near the south end, and obtained 81 species, including the types of *Gilia nevinii*, *Eriophyllum nevinii*, *Astragalus nevinii*, *Malacothrix foliosa*, *Senecio lyonii*, and *Baeria palmeri* var. *clementina*, all but the last still regarded as valid. These were sent to and described by Asa Gray, and the first set is deposited in the Gray Herbarium of Harvard University. Duplicates were distributed and are well represented in the Parish Herbarium, now incorporated in the Dudley Herbarium,

Fig. 3. Tangle of vegetation in floor of canyon below Lemon Tank; *Quercus tomentella* on left, *Heteromeles arbutifolia* near center. Official photograph, U. S. Navy.

Stanford University. Among this Stanford material was found a specimen of *Batis maritima* collected by Nevin, and not included in the account of the plants published by Lyon under the title "Flora of our southwestern archipelago" (Botan. Gaz. 11: 197-205, 330-336. 1886). The only species listed and not since collected (*Hordeum nodosum*, *Phalaris canariensis*, *Chenopodium album*) are probably misidentified.

Five years later, T. S. Brandegee published his "Flora of the California islands" (Zoe 1: 129-148. 1890), the first comparative list of the plants of the different islands. Brandegee's account of San Clemente Island was based entirely on that of Lyon, with a single addition (*Platystemon californicus*), apparently in error; unfortunately the species has been recorded

from this island ever since. In 1894, Brandegee himself visited San Clemente Island with the biological section of the International Boundary Commission. Also included in the party were Edgar A. Mearns of the United States National Museum, Ludwig Schoenefeldt (said to have collected plants), and the ornithologist A. W. Anthony (U. S. Nat. Mus. Bull. 56, especially p. 139-142. 1907). The group, travelling on the revenue cutter *Wolcott* from San Diego, landed at Pyramid Cove on August 23 and remained until August 29, exploring the south end and the shore from China Point to the southeast corner. Mearns, primarily a vertebrate zoologist, collected plants, his numbers going from at least 4049 to at least 4063; some of the collections are incorrectly labelled as obtained in June, but all were gathered in August on the trip mentioned. His collections are in the United States National Museum, with duplicates well distributed, whereas Brandegee's are in the Herbarium of the University of California, Berkeley. I have studied Brandegee's collections whenever it has been possible to find them, but he had no notes and did not publish on them. *Lyonothamnus* and *Prunus ilicifolia* subsp. *lyonii* were among the notable plants discovered on the island by this expedition.

Jepsonia malvifolia and *Galvezia speciosa* (UC²) were collected on San Clemente Island by C. A. Purpus in 1897, but I have seen no other evidence that he reached the island.

Mrs. Blanche Trask, tireless explorer of the Channel Islands, first visited San Clemente in October, 1896, walking the length of the island and discovering *Quercus tomentella* (Erythea 5: 30. 1897). She apparently also was there for a short time in October, 1902; and she returned in 1903, living on the island for three months in late spring and publishing a narrative "Flora of San Clemente Island" (Bull. So. Calif. Acad. Sci. 3: 76-78, 90-95. 1904. The first set of her plants, at the California Academy of Sciences, was destroyed in the San Francisco earthquake and fire of 1906 (with the exception of a few sheets). But she apparently also sold sets of San Clemente plants, however, and they are represented at the Gray Herbarium, New York Botanical Garden, United States National Museum, and several European herbaria, including Edinburgh. In studying Mrs. Trask's account of her labels, it is important to remember that her "north coast" is our east coast, "south coast" the west coast, "east end" the south end, and "west end" the north end. Very few of these collections have been seen in the preparation of this flora. Mrs. Trask was the discoverer of San Clemente's endemic genus, *Munzothamnus*, although it was not described until later.

Barton Warren Evermann, then director of the California Academy of Sciences, was on the island March 25, 1918, and collected a few plants, mostly ferns (CAS).

Herman Knoche, author of the *Flora Balearica*, visited several of the Channel Islands in 1919, collecting on San Clemente Island on July 4 (numbers from at least A990 to at least A1015; DS) around Mosquito Cove (which he called "Camp Mesquite") and Pyramid Cove.

Philip A. Munz, then of Pomona College, made a notable visit to the island from April 8-12, 1923, accompanied by F. W. Peirson, D. D. Keck (at that time a student at Pomona), Dr. J. G. Needham (Munz's professor at Cornell, then on a visit to California), and five others. Dr. Munz obtained no. 6600-6789 on the island (including cryptogams), Peirson no. 3416-3487; the others apparently did not collect. Nearly all of Munz's (POM) and Peirson's (RSA) collections are cited here. The party landed at Wilson Cove, circled the north end dunes, and the next day set out by wagon for the south, camping near Lemon Tank and then working the canyons on both sides of the island to the vicinity of Middle

²Abbreviations for herbaria those of Lanjouw and Stafleu, Reg. Veg. 15: 1-249. 1959.

Ranch and Thirst. They were materially aided in their efforts by Mr. E. G. Blair, in charge of the sheep company operations at the time; he even gathered flowering material of *Munzothamnus* for them the following autumn. In citing the collections of Munz and Peirson, I have tried to give the most accurate localities possible, using their field notes (RSA). They exchanged some collections on the trip, recording them under their respective numbers, and often both collected the same thing at the same time and place. Dr. Munz published many of his records from the island in his *Manual of Southern California Botany* (Claremont, Calif., 1935). Included in this book also are three records for San Clemente Island for which I can find no other basis: *Adiantum capillus-veneris*, *Salvia mellifera* (not listed for the island by Epling, Ann. Mo. Botan. Gard. 25: 115. 1938), and *Coreopsis gigantea* ("all our islands," p. 552; cf. Ferris in Abrams & Ferris, Ill. Fl. Pac. St. 4: 132. 1960. Munz's statement probably the basis for the later reports by Eastwood and by Dunkle. No specimens from the island at CAS, DS, LAM, NY, POM, RSA, UC).

Marcus E. Jones collected a few plants on the island from Sept. 3-9, 1926 (POM). Those that I found are cited here.

House and Grumbles of the University of Southern California visited San Clemente Island from Aug. 5-13, 1930, making a few collections (two cited by Williams, Am. Midl. Nat. 58: 494-512. 1957).

On July 6, 1931, L. R. Abrams and I. L. Wiggins of Stanford University obtained 59 numbers (339-396 and 420) around Mosquito Cove and up the canyon to the summit of the mesa. They were on a cruise from Point Mugu in Chester Benson's yacht *Noname*, which visited all the Channel Islands except San Miguel. All their collections (DS) are cited here.

Mrs. Nell S. Murbarger, author, of Costa Mesa, California, first visited San Clemente Island with her parents in 1926, obtaining permission from E. G. Blair. Then in 1935, she returned with her husband, Wilbur B. Murbarger, an archaeologist interested in obtaining Indian artifacts on the island; her parents; and a friend, Dora Tucker, of Las Vegas. They left Costa Mesa after the Thanksgiving holiday in 1935, and returned June 2, 1936. Fortunately, during this visit, Dr. Herbert L. Mason of the University of California, sent her a plant press, and she collected extensively, visiting all parts of the island by foot. These collections (UC) were numbered 1-242; nearly all are cited here. Her interesting collection contains a number of species not otherwise known from the island. In studying them, it is important to know that Mrs. Murbarger did not give localities in the usual sense, but instead on each specimen tried to give the range of that species as she knew it on the island. Mrs. Murbarger kindly loaned me two chapters of an unpublished manuscript on San Clemente Island from which I was able to extract additional information about the plants she observed.

Francis H. Elmore made 30 collections of vascular plants on the island (no. 312-341; AHFH) on Feb. 18-19, 1939, visiting the south end on the *Velero III* with a group from the Allan Hancock Foundation (Gentry, Allan Hancock Pac. Exped. 13: 17-42. 1949). A few of these specimens were borrowed and are cited here.

Meryl B. Dunkle, as botanist of the Los Angeles County Museum Biological Survey of the Channel Islands (Bull. So. Calif. Acad. Sci. 39: 133-134. 1940) visited San Clemente Island April 1-8, 1939 (from at least no. 7225 to at least 7337; 125 numbers in all) and Nov. 23-26, 1939 (from at least no. 7338 to at least 7347). I have studied many of these collections in the herbarium of the Los Angeles County Museum, with the kind permission of Miss Bonnie C. Templeton, Curator of the Botany Department. Dunkle described several new taxa from his collections and in 1950 published his "Plant ecology of the Channel Islands of California" (Allan Hancock Pac. Exped. 13: 247-386). He listed several species

in this work not otherwise known from the island; they are not represented in his collections and will therefore not be considered members of the flora here. They are *Pellaea mucronata*, *Polypodium scolieri*, *Stellaria nitens*, *Allophyllum glutinosum*, *Solanum wallacei*, and *Brickellia californica*.

Wilmatte P. Cockerell also made a few collections on San Clemente Island in 1939 (see *Delphinium variegatum* in annotated list), presumably together with her husband, the famous naturalist T. D. A. Cockerell.

Reid Moran acted as botanist for the Los Angeles County Museum Survey on a trip from Feb. 15–20, 1941 (collecting no. 568–601), in the vicinity of Middle Ranch and Middle Ranch Canyon. A duplicate set of nearly all of these specimens was sent to Stanford University, where I studied it. Moran later returned to San Clemente Island twice with various projects of Scripps Institute of Oceanography, once from Sept. 15–17, 1958 (no. 6820–6856; SD), once March 9, 1959 (no. 7156–7170; SD). Both visits were to the vicinity of Eel Point and in 1958, also to Wilson Cove. All of these collections are cited here.

The year 1941 likewise saw the publication of Alice Eastwood's "The islands of southern California and a list of the recorded plants" (Leaflet West. Botan. 3: 27–36, 54–78)—the first attempt since that of Brandegee to list the plants for all of the islands. Miss Eastwood made no attempt to evaluate published records or to check herbarium specimens, but merely recorded the published reports of others. Nevertheless, her list is of considerable value. Miss Eastwood had a manuscript list prepared by Wiggins and thus was able to include the collections of Abrams and Wiggins made in 1931. But it is very difficult to understand where she obtained records of *Festuca bromoides*, *Phalaris minor*, *Chenopodium murale*, *Lepidium latipes*, *Lotus bamatus*, and *Trifolium amplexens*, species known from the island but for which she seemed to have no material available. I have also been unable to find any specimens in California herbaria or published records of any of the following, listed for San Clemente Island by Miss Eastwood: *Koeleria cristata*, *Chorizanthe wheeleri*³, *Amaranthus blitoides* (confusion with *Aphanisma blitoides*?), *Clematis ligusticifolia*, *C. pauciflora*, *Rubus vitifolius*, *Prunus ilicifolia* subsp. *ilicifolia*, *Lotus subpinnatus*, *Lupinus albifrons*, *Galium californicum*, and *Taraxacum officinale*. Pending further investigation I have excluded all these species from the present flora. Probably they are due to errors that crept in during the preparation of the list, but there is also a possibility that Miss Eastwood had some manuscript notes from Mrs. Trask, the only conceivable source of the records, if they are correct. Mr. Rupert Barneby very kindly searched for collections of these species from the island in the herbarium of the New York Botanical Garden, where Mrs. Trask's San Clemente Island collections are well represented, and found none.

Ira L. Wiggins of Stanford University revisited the island Feb. 21–22, 1949, this time in company with John H. Thomas on Joseph Sefton's cutter *Orca*. The party landed at Wilson Cove and travelled around the northern end of the island, Wiggins obtaining 14 numbers (11954–11967), Thomas 7 (1–7). All Wiggins' specimens and *Thomas 1* (DS) are cited here.

In 1962, a Sierra Club trip visited the island on June 9 and 10, with E. R. Blakley and Martin A. Piehl of the Santa Barbara Botanic Garden collecting vascular plants. On the 9th both visited the southern end of the main ridge, China Point, China Canyon, and Wilson Cove; on the second day Blakley visited Eel Point, Seal Cove, and the north end, while Piehl collected near Thirst and in the canyon east of Thirst. Piehl obtained 99 numbers,

³Dr. George J. Goodman has kindly informed me that he also knows of no other report of this *Chorizanthe* for San Clemente Island.

Blakley 87; all of their collections (SBBG) are cited here.

My own visits to the island were in 1962, also, covering all main parts except the area south of China Point near the sea. They were during the following dates: April 9-12, 1962 (no. 17025-17348); May 7-11, 1962 (17574-17739); July 10-13, 1962 (no. 17948-18045). The first set of these collections is in the Rancho Santa Ana Botanic Garden Herbarium; the second at the University of California, Berkeley; third, Santa Barbara Botanic Garden; fourth, San Diego Natural History Museum.

RELATIONSHIPS OF THE FLORA

GENERAL REMARKS

A study of the general distributions of the plants in the flora of San Clemente Island reveals certain definite patterns which are of interest in understanding the flora not only of this one island, but of the Channel Islands as a whole, and indeed of islands in general. Much detailed study will be necessary before a definitive picture of the floristic history of the entire group becomes possible, but I nevertheless feel that certain deductions logically can be made at present. Before considering possible routes of plant migration in connection with the recent geologic history of the area, it is necessary to have the patterns of distribution of the plants well in mind. The 66 naturalized species recorded for the island are in general those of southern California and do not include any records of special interest. Since their distributions are very recent in origin, they are not considered further.

The number of native species and subspecies of vascular plants known from San Clemente Island is 233. A considerable number of these are also found on the northern group of islands: Anacapa, Santa Cruz, Santa Rosa, and San Miguel (which, for simplicity, will be considered a single unit here). For reasons that will become evident, Santa Barbara and San Nicolas islands will not be considered in detail when making floristic comparisons. Nearly two-thirds of the flora of San Clemente Island consists of species that are also found on the northern islands, and on Santa Catalina, and are generally distributed on the mainland opposite both these groups (at least as far north as Santa Monica and as far south as the San Pedro area). In the following list, and throughout the section on relationships of the flora, each taxon found on Guadalupe Island is indicated with an asterisk.

Selaginella bigelovii
Adiantum jordanii
Pellaea andromedifolia
*Pityrogramma triangularis**
Dryopteris arguta
*Polypodium californicum**
*Phyllospadix torreyi**
Agrostis diegoensis
*Aristida adscensionis**
Bromus carinatus
*Bromus trinitii**
Distichlis spicata var. *stolonifera*
Elymus condensatus
*Festuca megalura**
Festuca octoflora var. *hirtella**
Hordeum pusillum
*Melica imperfecta**

*Muhlenbergia microsperma**
*Phalaris lemmonii**
Poa scabrella
Polypogon interruptus
*Stipa lepida**
Stipa pulchra
Fleocharis palustris
*Juncus bufonius**
Allium praecox
*Dichelostemma pulchellum**
Anemopsis californica
*Hesperocnide tenella**
*Parietaria floridana**
*Pterostegia drymarioides**
Rumex salicifolius
*Aphanisma blitoides**
Arthrocnemum subterminale

*Santa Rosa Island (SBM; det. A. S. Hitchcock).

- Atriplex californica**
Atriplex coulteri
Atriplex lentiformis subsp. *breweri*
Atriplex leucophylla
Atriplex pacifica
Chenopodium californicum
Suaeda californica
Abronia maritima
*Abronia umbellata*⁵
*Mirabilis laevis**
Calandrinia ciliata var. *menziesii**
*Calandrinia maritima**
*Montia perfoliata**
Arenaria douglasii
*Silene antirrhina**
Spergularia macrotheca var. *macrotheca**
*Spergularia marina**⁶
Stylomecon heterophylla
Descurainia pinnata subsp. *menziesii**
Lepidium latipes
*Lepidium nitidum**
*Thelypodium lasiophyllum**
Thysanocarpus laciniatus
Isomeris arborea
*Oligomeris linifolia**
*Crassula erecta**
Adenostoma fasciculatum
*Heteromeles arbutifolia**
Astragalus didymocarpus var. *didymocarpus*
Lotus hamatus
Lotus strigosus
Lupinus bicolor subsp. *umbellatus*⁷
Lupinus concinnus var. *agardhianus*
Lupinus hirsutissimus
Lupinus succulentus
Lupinus truncatus
Trifolium amplexens var. *amplexens**
Trifolium fucatum var. *gambelii*
*Trifolium gracilentum**
*Trifolium microcephalum**
Trifolium tridentatum
*Vicia exigua**
Eremocarpus setigerus
*Rhus integrifolia**
Rhus ovata
Toxicodendron diversilobum
Ceanothus megacarpus subsp. *megacarpus*
Frankenia grandifolia var. *grandifolia**
Viola pedunculata
*Mentzelia micrantha**
Opuntia littoralis
*Opuntia prolifera**
Clarkia epilobioides
*Oenothera micrantha*⁸
Zauschneria californica subsp. *mexicana*
Apiastrum angustifolium
Caucalis microcarpa
*Daucus pusillus**
Sanicula arguta
Convolvulus soldanella
Cressa truxillensis var. *vallicola**
Cuscuta californica
*Emmenanthe penduliflora**
Ellisia chrysanthemifolia var. *chrysanthemifolia**
Phacelia distans
Pholistoma auritum var. *auritum*
*Pholistoma racemosum*⁹
Amsinckia intermedia
Cryptantha clevelandii
Cryptantha intermedia
Heliotropium spathulatum subsp. *oculatum*
Pectocarya linearis var. *ferocula**
Plagiobothrys californicus var. *gracilis**¹⁰
Plagiobothrys canescens
Salvia columbariae
*Lycium californicum*¹¹
*Solanum douglasii**
*Antirrhinum nuttallianum**
*Linaria canadensis**
Mimulus floribundus
Mimulus guttatus
Penstemon cordifolius
Plantago erecta
*Plantago insularis**
Lonicera hispidula
Sambucus mexicana
*Marah macrocarpus**
Achyrachaena mollis
*Amblyopappus pusillus**
*Artemisia californica**
Baccharis pilularis subsp. *consanguinea*
Baccharis viminea
Cirsium occidentale
Encelia californica var. *californica*
Erigeron discoideus
Eriophyllum confertiflorum var. *confertiflorum*
*Filago californica**
Franseria chamissonis subsp. *bipinnatisecta*
*Gnaphalium bicolor**
Gnaphalium palustre
Haplopappus venetus subsp. *vernonioides*
Hemizonia ramosissima
Heterotheca grandiflora
*Lasthenia chrysostoma**

⁵Santa Catalina Island, *Evermann in 1918* (CAS), acc. S. S. Tillett.

⁶Possibly introduced on Guadalupe Island.

⁷Subsp. *microphyllus* (S. Wats.) Dunn is on Guadalupe, Santa Catalina, and San Nicolas islands.

⁸Probably introduced on Guadalupe Island.

⁹Recently collected in the Santa Monica Mountains, *Raven 15330*.

¹⁰On basis of range for whole species; varieties poorly understood.

¹¹East Anacapa Island, *Blakley 2789* (SBBG, acc. Blakley).

Layia platyglossa subsp. *campestris*
Madia sativa
*Microseris heterocarpa**
*Microseris linearifolia**

*Perityle emoryi**
Psilocarphus tenellus var. *tenellus*
Rafinesquia californica
Stephanomeria virgata

Although the present distributions of these 146 species may have come about by an island route, it is at least equally likely that they reached the northern and southern islands independently by way of the mainland. Therefore, their distributions cannot be used to demonstrate anything about island paths of migration. Some of them, such as *Aphanisma blitoides* and *Calandrinia maritima*, have obvious southern distributions and barely qualify for the list; others, for example *Lonicera hispidula* and *Madia sativa*, reach the area from the north.

A second group of native plants found on San Clemente Island occurs also on Santa Catalina Island and on the adjacent mainland, but, although they may extend far to the north, have not yet been found on the northern Channel Islands. *Linanthus bicolor* on the mainland is not found south of San Luis Obispo County. They are:

Festuca reflexa
*Phalaris caroliniana**
Allium peninsulare
Atriplex watsonii
Dendromecon rigida subsp. *rigida*
Lepidium lasiocarpum var. *lasiocarpum**
*Dudleya virens**
Euphorbia spathulata

*Malosma laurina**
Eremalche exilis
Mentzelia affinis
Bergerocactus emoryi
Convolvulus simulans
Linanthus bicolor subsp. *bicolor*
Navarretia hamata
Microseris douglasii subsp. *platycarpa*

The simplest explanation for the distribution of these 16 additional species is that they reached San Clemente Island from the mainland through stepwise migration by way of Santa Catalina Island.

A few species are found on San Clemente Island and on the adjacent mainland, as well as on the northern islands, but have not yet been found on Santa Catalina Island, although they may actually be there or have been there at the time they reached San Clemente Island. The six species with this distribution are:

*Festuca pacifica**
Stipa cernua
Atriplex argentea subsp. *expansa*

Ribes malvaceum var. *malvaceum*
Collinsia heterophylla
Microseris elegans

These lists together total 166 of the 233 native species and subspecies found on the island, leaving 65 that either are confined to the Channel Islands or have a mainland distribution not adjacent to the islands they now inhabit. First may be mentioned those species found only on San Clemente Island of all the California group, but also found somewhere on the mainland:

Callitriche longipedunculata
Brodiaea filifolia
Batis maritima
Delphinium variegatum
Tropidocarpum gracile
Callitriche longipedunculata

Sida hederacea
Eriastrum filifolium
Verbena lasiostachys
Lycium brevipes
Achillea lanulosa
*Filago arizonica**

These 12 species have obviously had diverse histories. Noteworthy is the fact that several—*Cheilanthes*, *Brodiaea*, *Tropidocarpum*, *Sida*, *Eriastrum*, *Achillea*—have mostly interior distributions on the mainland, whereas others—the species of *Lycium* and *Filago*—are generally thought of as desert plants. Their distributions correspond with those of several other desert species, such as *Monolepis nuttalliana*, *Cryptantha maritima*, and *Plantago insularis*, which are found on the northern islands and thus included in other lists. *Delphinium variegatum*, the most interesting species included in this list, will be discussed below.

Four species—*Eriogonum latifolium* subsp. *grande*,¹² *Monolepis nuttalliana*, *Prunus ilicifolia* subsp. *lyonii*, and *Cryptantha maritima* var. *maritima*—reach the mainland of Baja California and extend to the northern group of islands, whereas three others—*Euphorbia misera**, *Haplopappus venetus* subsp. *furcaceus*, and *Senecio lyonii*—likewise reach the Baja California coast but occur no farther north than Santa Catalina Island.

A particularly significant group consists of species that are found on the northern islands and on San Clemente Island, but have mainland distributions to the north of their island stations. One of them, the *Dodecatheon*, is also found on Santa Catalina Island.

Carex tumulicola
*Juncus patens*¹³
Lathyrus laetiflorus subsp. *barbarae*
Oenothera cheiranthifolia var. *cheiranthifolia*

Dodecatheon clevelandii subsp. *insulare**
Franseria chamissonis subsp. *chamissonis*
Malacothrix incana

Ribes malvaceum var. *malvaceum* and *Collinsia heterophylla*, mentioned above, may have had a similar distributional history. An additional species that has to be taken into account in considering this northern influence in the flora of San Clemente Island is *Delphinium variegatum*, unknown on the other islands and on the mainland extending only as far south as northern San Luis Obispo County. In coastal southern California and on all the other islands, the only species present is *D. parryi*.

The remaining species, 39 in number, are all island endemics. Ten are endemic to San Clemente Island itself.

Triteleia clementina
Eriogonum giganteum subsp. *formosum*
Lithophragma maxima
Astragalus nevinii
Lotus argophyllus subsp. *adsurgens*

Lotus scoparius subsp. *traskiae*
Malacothamnus clementinus
Oenothera guadalupensis subsp. *clementina*
Castilleja grisea
Munzothamnus blairii

Several species on this impressive list—the *Triteleia*, for example—are most closely related to species which have present distributions lying north of the islands, as do, for example, *Eriophyllum nevinii*, endemic to Santa Catalina and San Clemente islands, and *Lupinus guadalupensis*, endemic to Guadalupe and San Clemente islands. No more than five species are endemic to any one of the other California islands.

Eighteen species are endemics of more than one island in the southern group. In the following list, the asterisk indicates occurrence on Guadalupe Island, as usual; "C," Catalina; "N" San Nicolas; and "B," Santa Barbara Island.

*Dissanthelium californicum** C
*Crossosoma californicum** C
Lotus argophyllus subsp. *ornithopus** CNB

Cryptantha traskiae N
Lycium hassei C
*Galvezia speciosa** C

¹²Mainland Baja California, Moran 8283 (SD).

¹³Also known from near Ensenada, Baja California, Wiggins & Gillespie 3983 (DS).

Lupinus guadalupensis*
 Trifolium palmeri* CN
 Gilia nevinii* C
 Linanthus pygmaeus subsp. pygmaeus*
 Phacelia floribunda* B
 Phacelia lyonii C

Scrophularia villosa* C
 Galium catalinense var. catalinense C
 Artemisia nesiotica NB
 Eriophyllum nevinii CB
 Haplopappus canus*
 Malacothrix foliosa B, Coronados

Eight species occur on San Clemente, on Catalina, and on one or more islands of the northern group.

Quercus tomentella*
 Eschscholzia ramosa*
 Iepsonia malvifolia*
 Rhamnus pirifolia*

Lavatera assurgentiflora
 Convolvulus macrostegius*
 Amsinckia spectabilis var. nicolai
 Hemizonia clementina

To these may be added logically *Lyonothamnus floribundus* subsp. *asplenifolius*, *Astragalus miguelensis*, and *Mimulus flemingii*, which have this distribution but are absent on Santa Catalina Island (*Lyonothamnus floribundus* subsp. *floribundus* grows there); the distribution of these last three entities recalls that of a number with differing floristic backgrounds, listed earlier, which are absent from Catalina.

COMPARISON OF THE FLORA OF SAN CLEMENTE ISLAND WITH THAT OF SANTA CATALINA ISLAND

Of the 233 native species on San Clemente, 49 have not been found on Santa Catalina Island, only 21 miles away. Even more impressive is the number of species on Catalina not known from San Clemente. The much richer flora of Santa Catalina Island probably comprises about 400 species of native vascular plants, of which fewer than half are found on San Clemente Island. Some of the more prominent Catalina species and genera not found on San Clemente Island are:

Equisetum
 Adiantum capillus-veneris
 Pellaea mucronata*
 Andropogon
 Elymus glaucus
 Elymus multisetus
 Elymus triticoides
 Monanthochloe
 Carex triquetra
 Scirpus
 Juncus acutus
 Juncus balticus
 Bloomeria crocea
 Calochortus
 Chlorogalum
 Sisyrinchium
 Habenaria
 Populus
 Salix
 Quercus dumosa
 Quercus macdonaldii
 Urtica
 Chorizanthe
 Sagina occidentalis
 Silene multinervia
 Stellaria nitens*

Clematis
 Ranunculus*
 Eschscholzia californica
 Platystemon
 Athysanus
 Dentaria
 Rorippa
 Lithophragma affinis
 Dudleya greenei
 Ribes viburnifolium
 Alchemilla*
 Cercocarpus
 Holodiscus
 Lyonothamnus floribundus subsp. floribundus
 Potentilla
 Rosa
 Rubus
 Astragalus gambellianus
 Astragalus leucopsis
 Astragalus trichopodus
 Lotus humistratus
 Lotus purshianus
 Lotus salsuginosus
 Lotus scoparius subsp. scoparius
 Lotus subpinnatus
 Lupinus albifrons

Trifolium macraei	Antirrhinum kelloggii
Euphorbia serpyllifolia	Castilleja affinis
Ceanothus arboreus	Castilleja foliolosa
Vitis	Mimulus cardinalis
Malacothamnus fasciculatus	Mimulus puniceus
Helianthemum	Mimulus traskiae
Clarkia purpurea	Orthocarpus
Epilobium	Orobanche
Oenothera bistorta	Galium angustifolium
Oenothera leptocarpa	Symphoricarpos
Sanicula crassicaulis	Specularia*
Cornus	Ambrosia
Arctostaphylos*	Artemisia douglasiana
Comarostaphylis	Artemisia dracunculus
Xylococcus	Baccharis douglasii
Centaureum	Brickellia
Sarcostemma	Chaetopappa lyonii
Dichondra	Coreopsis gigantea*
Eriodictyon traskiae	Corethrogyne
Nemophila	Erigeron foliosus
Phacelia cicutaria var. hispida	Gnaphalium californicum
Phacelia grandiflora	Gnaphalium chilense*
Phacelia viscida	Gnaphalium microcephalum
Allophylum*	Haplopappus squarrosus
Linanthus dianthiflorus	Helenium
Harpagonella*	Jaumea
Verbena robusta	Madia exigua
Lepechinia fragrans	Madia gracilis
Micromeria chamissonis	Malacothrix saxatilis
Salvia apiana	Perezia
Salvia mellifera	Pluchea
Datura	Solidago
Nicotiana*	Stylocline
Solanum wallacei	

This list is very incomplete, but serves to emphasize the tremendous differences between the flora of San Clemente Island and that of its nearest neighbor, Santa Catalina. Most of the species not found on San Clemente not only occur on the adjacent mainland but also on one or more of the northern islands. This includes many common southern California genera and even families, such as Ericaceae. Even *Coreopsis gigantea*, found on every other island, including Guadalupe, is absent from the flora of San Clemente Island. Of the 29 island endemics found on San Clemente Island but not restricted to it, 11 reach the northern islands; 19 reach Catalina, 21 miles away; and 16 reach Guadalupe Island, 240 miles away. Often within a single genus the common mainland form will be found on Santa Catalina, with some apparent relict on San Clemente. For example, *Delphinium variegatum* is on San Clemente, *D. parryi* on Catalina; *Lathyrus laetiflorus* subsp. *barbarae* is found on San Clemente, subsp. *alefeldii* on Catalina; *Verbena lasiostachys* is found on only one island of the whole group, San Clemente, whereas *V. robusta* is on all the others, including Catalina; *Mimulus flemingii* (*Diplacus parviflorus*) is found on San Clemente, *M. puniceus* on Catalina. These ranges are reminiscent of those of the several species of the northern islands which reach San Clemente Island but not Santa Catalina or the adjacent mainland (for example, *Carex tumulicola*). It is hardly possible to doubt, solely on floristic evidence, that Catalina has been more accessible to colonization from the mainland, and hence reflects the present mainland flora much more closely than does San Clemente.

Of the approximately 200 species found on Santa Catalina Island that do not extend to

San Clemente, only 12 are not present on the adjacent mainland. *Comarostaphylis* and *Lepechinia* are found on the northern islands but also in the mountains of the mainland; *Solanum wallacei*, *Mimulus traskiae* and *Lyonothamnus floribundus* subsp. *floribundus* are endemic; *Ribes viburnifolium* is shared with the mainland of Baja California; *Eriodictyon traskiae* is on the mainland from Ventura County to San Luis Obispo County; *Quercus macdonaldii* is apparently of hybrid origin between *Q. dumosa* and *Q. lobata* (C. H. Muller, pers. comm.) and therefore would not be expected on San Clemente Island; *Coreopsis gigantea* has been mentioned above; *Trifolium macraei* is found on the northern islands and northern mainland; and the remaining two—*Dudleya greenii* and *Ceanothus arboreus*—are common to the northern islands and Catalina, and do not reach the mainland. Thus it is clear that there are great differences between the floras of these two neighboring islands, and further that the flora of San Clemente Island has a greater affinity with the floras of the northern group (San Miguel, Santa Rosa, Santa Cruz, and Anacapa islands) than does the flora of Santa Catalina, although San Clemente Island is actually farther south.

COMPARISON OF THE FLORA OF SAN CLEMENTE ISLAND WITH THAT OF GUADALUPE ISLAND

Guadalupe Island, as mentioned above, is about 165 miles off the mainland of Baja California at its nearest point and 240 miles almost due south of San Clemente Island (Fig. 4). Dr. Reid Moran has very kindly given me some current information on its flora for comparison with that of San Clemente Island. There are 164 native species on Guadalupe Island, of which the impressive total of 31 (including two genera and two other groups that are sometimes accorded generic status) are endemic. Of the 164 species on Guadalupe Island, 81 are also found on San Clemente Island, leaving only 52 nonendemic species not found on San Clemente Island. Five of these are found in peninsular Baja California and not in California, and probably came to Guadalupe Island from that source. A number of the remaining 47 have obvious northern affinities, some of them not even being found on the mainland until well north of the northern Channel Islands. Among the plants with such distributions are *Polypodium scolieri*, *Polystichum munitum*, *Pinus radiata*, *Brodiaea lugens*, *Ribes sanguineum*, *Epilobium minutum*, and *Eriophyllum lanatum* var. *grandiflorum*. They are clearly in accord with the northern element noted in the flora of San Clemente Island and present, but not as conspicuous, in the flora of Santa Catalina Island. Of the 81 species common to San Clemente and Guadalupe islands, 64, including five island endemics, are also found on the northern group and 11 of the rest are endemic to the southern group of islands. Thus more than a third of the total flora of San Clemente Island is found on Guadalupe Island. That there is a fairly close relation between the floras of these two islands is further supported by the numbers of shared island endemics, given above, and especially by the fact that five taxa are restricted to this pair of islands (*Lupinus guadalupensis*, *Oenothera guadalupensis*, *Linanthus pygmaeus* subsp. *pygmaeus*, *Phacelia floribunda* [also on Santa Barbara Island], and *Haplopappus canus*), whereas only four are restricted to the much closer pair of Catalina and San Clemente (*Phacelia lyonii*, *Lycium hassei*, *Galium catalinense* var. *catalinense*, and *Eriophyllum nevinii* [also on Santa Barbara Island]) *Lomatium insulare* is endemic to San Nicolas and Guadalupe islands.

NORTHERN AFFINITIES OF CHANNEL ISLAND PLANTS

It should be clear from the foregoing that many of the most interesting plants of San Clemente and Guadalupe islands have rather obvious northern affinities. Some of these, like *Oenothera cheiranthifolia* var. *cheiranthifolia*, are found on the northern islands but

on the mainland only south to Point Conception; some, like *Carex tumulicola* and *Franseria chamissonis* subsp. *chamissonis*, occur on the northern islands but on the mainland south only to Monterey County; whereas others, like *Eriophyllum lanatum*, occur on San Clemente or Guadalupe Island and do not occur on the northern islands, reaching the mainland only farther north. *Juncus patens* is found as far south as the Santa Monica Mountains and northern islands, on San Clemente Island, and at a single apparently relict locality near Ensenada. Again, *Clarkia davyi* occurs on Santa Rosa Island and on the coastal bluffs from Monterey to Del Norte County, whereas the coast between Santa Barbara and southern Monterey County is occupied by *C. prostrata*, an allopolyploid of obvious recent derivation involving *C. davyi* and another species. *Clarkia davyi* is representative of a group that will not be catalogued in detail here: plants of the northern Channel Islands with a main area of distribution lying at some distance to the north. A few others with similar distributions are *Trifolium microdon*, *Armeria arctica* subsp. *californica*, *Polygala californica*, *Lomatium caruifolium*, and *Erigeron glaucus*. There are also a number of others that come south to Point Conception or a little farther, and then occur on the northern islands. This last pattern is in a way a disjunct one, since the most constant Pliocene and Pleistocene land connection with the northern islands has been through the Santa Monica Mountains and not with Santa Barbara County.

Considering these patterns of distribution, one is soon convinced that many northern plants were at one time displaced to the south; that this must have occurred in the fairly recent past; and that some of these have survived in the Channel Islands, most spectacularly so on San Clemente and Guadalupe islands, and locally in other areas of moderate maritime climate such as coastal northern Baja California and the northern group of islands.

ENDEMISM IN THE CHANNEL ISLANDS

One final bit of floristic evidence will be provided by bringing up-to-date the lists of island endemics given by Munz (Man. So. Calif. Botan., p. xxvi-xxvii. 1935). Although necessarily tentative, such lists provide a basis for discussion.

Endemics of the group found on at least one of the northern islands and on San Santa Barbara County.

*Quercus tomentella**
*Eschscholzia ramosa**¹⁴
Dudleya greenii
*Jepsonia malvifolia**
Lyonothamnus floribundus
Astragalus miguelensis
Ceanothus arboreus

Cenothus megacarpus subsp. *insularis*¹⁵
*Rhamnus pirifolia**
Lavatera assurgentiflora
*Convolvulus macrostegius**
Amsinckia spectabilis var. *nicolai*
Mimulus flemingii
Hemizonia clementina

In considering this list, it is important not to neglect a number of species with similar distributions but which reach the mainland, such as *Prunus ilicifolia* subsp. *lyonii* and *Coreopsis gigantea*, and also a small number of cognate taxa that may have diverged from common ancestors with a similar distribution, such as:

Eriogonum arborescens-*E. giganteum*
Galium catalinense var. *buxifolium*-
G. c. var. *catalinense*

Haplopappus detonsus-*H. canus*

¹⁴Also to Coronados, Todos Santos, San Benito, and Cedros islands.

¹⁵Perhaps the basis for the record of *C. cuneatus* from Guadalupe Island.

As we have seen, there are 18 species endemic to more than one island in the southern group and found on San Clemente, and one more (*Lomatium insulare*) not found there, for a total of 19, 12 of which occur also on Guadalupe Island. *Eriogonum giganteum* is restricted to San Clemente, Santa Catalina, and Santa Barbara islands, but is omitted here, since its subsp. *formosum* is listed as an endemic of San Clemente Island.

Fig. 4. Part of the coast of southern California and Baja California, showing the position of the California Channel Islands and Guadalupe Island.

There are 13 taxa endemic to more than one island in the northern group:

Eriogonum arborescens	Galium californicum var. miguelense
Berberis pinnata subsp. insularis	Galium catalinense var. buxifolium
Dendromecon rigida subsp. harfordii	Haplopappus detonsus
Dudleya candelabrum	Malacothrix indecora (also San Nicolas)
Heuchera maxima	Malacothrix insularis (also Santa Barbara)
Phacelia divaricata var. insularis	Malacothrix saxatilis var. implicata
Castilleja hololeuca	

The figures for single island endemics are particularly interesting when compared with the 31 endemics (including two genera) on Guadalupe Island and the 10 (including one genus) on San Clemente Island. No genus is endemic to any one of the other islands, although *Lyonothamnus* is restricted to the group as a whole. Three entities (*Lyonothamnus floribundus* subsp. *floribundus*, *Solanum wallacei*, *Mimulus traskiae*) are endemic to Santa Catalina Island, two (*Phacelia cinerea*, *Lycium verrucosum*) to San Nicolas Island, one (*Dudleya traskiae*) to Santa Barbara Island, and one (*Astragalus traskiae*) to Santa Barbara and San Nicolas islands. In the northern group, five species (*Arabis hoffmannii*, *Sibara filifolia*, *Dudleya nesiotica*, *Helianthemum Greenei*, *Mimulus brandegei*) are endemic to richly varied Santa Cruz Island and three (*Dudleya blochmanniae* subsp. *insularis*, *Gilia tenuiflora* subsp. *hoffmannii*, *Salvia brandegei*) to Santa Rosa Island. No endemics are known from Anacapa or San Miguel islands. Thus there are 21 taxa endemic to the northern group, 36 endemic to the southern group (12 also on Guadalupe Island), and 14 on at least one island in both northern and southern groups: a total of 71 taxa endemic to the California Channel Islands (some extending to Guadalupe Island and at least two to other islands) and 31 additional species endemic to Guadalupe Island, which surely must be grouped with the California islands floristically. Thus there are four genera and 102 species and sub-species restricted to the group as a whole.

PALEOBOTANICAL EVIDENCE

It has been suggested, first by Lyon (Botan. Gaz. 11: 332. 1886) that since a high percentage of the flora of the Channel Islands is peculiar, insular genesis is indicated for the plants. Dunkle (Allan Hancock Pac. Exped. 13: 247-386. 1950) carried this one step further, postulating that the insular endemics developed on a large offshore body of land "Catalinia" from which the present day islands were separated. According to Reed (*Geology of California*. Tulsa: Am. Assoc. Petrol. Geol. 157 p. 1933), this "Catalinia" existed from the upper Cretaceous to the Middle Miocene. Unfortunately, even if this body of land did exist, it now seems to be much too old to account for the evolution of the peculiar forms seen on the islands today, and older than the rocks of most of the existing islands, including San Clemente.

In examining the fossil record for evidences of the island endemics, we must look for the woody species most likely to be preserved. The most characteristic woody endemics and characteristic species would seem to be *Quercus tomentella*, *Lyonothamnus floribundus*, *Prunus ilicifolia* subsp. *lyonii*, *Ceanothus arboreus*, and *Rhamnus pirifolia*. An examination of the relevant literature (Carn. Inst. Wash. Publ. No. 553. 1944; Publ. No. 590. 1950; Axelrod, Botan. Rev. 24: 433-509. 1958) shows that the Tertiary equivalents of the first three species were widely distributed in California and Nevada from the middle Miocene onward. Both *Lyonothamnus* and the *Quercus* appear to show a trend toward increasing leaf size from their first appearance in the fossil record onward, suggesting that they may gradually have become modified in response to coastal conditions since the middle Miocene. *Rhamnus pirifolia* probably could not be distinguished from *R. ilicifolia* by leaf impressions,

but a fossil species similar to both is widespread in this same period. Mason (in Van Rensselaer & McMinn, *Ceanothus*, p. 300. Santa Barbara: Santa Barbara Botanic Garden, 1942) mentioned the occurrence of leaves similar to those of *Ceanothus arboreus* in the Mint Canyon flora of mainland southern California.

In short, the representation of these present-day insular endemics on the mainland in the late Tertiary is so good as to leave no doubt that Axelrod is correct in stating that most of the island endemics are relicts of formerly more widespread species, and not in any sense autochthonous. Certainly some of the distinctive characteristics of the island populations have come about in view of the isolation they have been afforded on their respective islands, particularly, as we shall see, in the cases of San Clemente and Guadalupe islands; but in particular the islands seem to have provided excellent situations for survival.

GEOLOGIC EVIDENCE

Most critical in evaluating more specifically the history of the flora of the group is the geologic evidence. This account is based on the review articles of Corey (Calif. Div. Mines Bull. 170: 73-83. 1955) and Clements (in *Essays in the Natural Sciences in Honor of Captain Allan Hancock*, pp. 311-323. Los Angeles: Univ. So. Calif. Press. 1955). The northern islands (San Miguel, Santa Rosa, Santa Cruz, Anacapa) were probably connected with the mainland during most of the Pliocene and even more broadly during the early Pleistocene, with a peninsular extension southward which included San Nicolas Island also. Santa Catalina Island was probably not connected with the mainland during the Pliocene, but was included in it during the early Pleistocene. It was in contact with Santa Barbara Island during most of this period, and in the early Pleistocene both Santa Catalina and Santa Barbara islands were broadly joined to the mainland and with the northern group. San Clemente Island has apparently never been connected with any other body of land but may have been closer to several at various times in the past. There has been some suggestion that Guadalupe Island was at one time connected by land with the northern group, but this is extremely doubtful (cf. Moran, *Madroño* 11: 153. 1951), although certainly there may have been bodies of land between it and the other islands during the Pliocene and early Pleistocene, and these could have served as stepping-stones for plant migration. There probably have not been any islands directly between Guadalupe Island and the mainland of Baja California during this period.

In the late Pleistocene, with the raising of the sea level, San Nicolas and Santa Barbara islands were completely submerged, and San Clemente Island, as suggested by the successive wave-cut terraces extending up to about 1500 feet, was drastically reduced in size. Santa Rosa and Santa Cruz islands were also reduced, and Santa Catalina may have been. San Miguel Island might have been completely submerged, but Anacapa, especially judging from the presence of *Quercus tomentella*, probably was not.

HISTORY OF THE CHANNEL ISLANDS FLORA

The numbers of endemics on the individual islands are in agreement with the historical isolation and permanence through late Tertiary time of the islands. Guadalupe has been the most isolated, has certainly not been submerged recently, and has the most endemics (31 species and two genera); San Clemente has not been joined with other bodies of land, has been only partly submerged, and has more endemics than any of the others (10 species and one genus); no one of the other islands has more than five endemics, and they have all been connected with other bodies of land during the Pleistocene. The endemic species of Santa Barbara and San Nicolas islands are deserving of very close scrutiny, since these islands are thought to have been submerged so recently. This fact tends to lend credence

to Hitchcock's (Ann. Mo. Botan. Gard. 19: 257. 1932) suggestion that all the collections of *Lycium verrucosum* might have come from a single plant which was a striking variant of *L. brevipes*; to Moran's (*A Revision of Dudleya* (Crassulaceae). Unpub. Thesis, Univ. Calif., Berkeley. 1951) implied suggestion of the recent derivation of the tetraploid *Dudleya traskiae*; to the possibility of a very recent derivation for *Phacelia cinerea* from the widespread, similar *P. ramosissima*; and to the thought that *Astragalus traskiae*, endemic common to the two islands, might be of recent origin. This last suggestion is especially interesting, since *A. traskiae* forms a distinctive group with *A. nevinii*, an endemic of San Clemente Island (the portion of the island that was submerged in late Pleistocene time); the two have no close relatives in the genus (R. Barneby, pers. comm.). Did they both diverge from a species of some adjacent area, now extinct? The geologically recent submergence of San Nicolas Island also suggests that *Lomatium insulare*, common to San Nicolas and Guadalupe islands, must have reached San Nicolas very recently, probably from some third locality where it may now be absent.

The floristic similarity of the Channel Islands, to summarize from many of the lines of evidence that have been given above, is mostly due to their similar maritime climates; to their relative proximity to shore and occasional attachment to it; which has allowed more or less continuous migration from the mainland and the subsequent survival of some of the same relict species on different islands; to their isolation, which has provided the opportunity for further evolutionary shifts; and, on the other hand, to their proximity to one another, which has allowed some of the distinctive elements to pass from one to the other. The disparity between the floras of different parts of the archipelago is underscored by the fact that of the 71 island endemics of the California group, only 14 are common to both northern and southern groups.

As to the general question of when and by what route the northern relicts reached San Clemente and Guadalupe islands, it should be noted that the maximum amount of land was exposed in this area as recently as the early Pleistocene; *i.e.*, within the last million years. The sea level was lowest at the very time when the climate was moist and cold, and northern floras were displaced southward some 400 miles. Some of these northern species have persisted on these islands, with their moderate maritime climates, while their congeners on the mainland moved back to the north during the warm and dry inter- and postpluvial periods. It is doubtless not without significance that the maximum number of stepping-stones was available toward isolated Guadalupe and San Clemente islands during the period when the climate was cold, in view of the fact that so many of their endemic species have northern affinities.

It should be obvious that not all island endemics or disjunct patterns of distribution have resulted from the same causes. Islands like San Clemente and Guadalupe, which have been in existence as isolated bodies of land for a relatively long time have gained a number of distinctive endemics as they were colonized from the floras prevalent on the adjacent mainland under different climatic regimes at different times, and as these populations have evolved in isolation on the islands. Their floras are drawn from many sources, in an uneven fashion, and they are grouped into unique, unbalanced floristic assemblages. On the other hand, islands like Catalina and the northern tier have been, historically, less isolated from the main continental current of floristic change, and the composition of their floras reflects more faithfully that of the present on the nearest mainland areas. Although they have a number of distinctive island endemics, their endemism can be related more closely with survival under appropriate climatic conditions and despite continuous waves of migration from neighboring coastal areas. Their relictual types are more rapidly replaced under the brunt of this continued invasion coupled with climatic change. This replacement has been tremendously accelerated during the last two centuries with the arrival of European man

with his weeds and grazing animals, and the Channel Islands of the present day provide in varying degrees models of the destruction of island floras which is proceeding apace all around the world under the influence of these agencies.

With their differing degrees of isolation which has resulted in uneven migration from the mainland through relatively long periods of time, the California Channel Islands have acquired floras that give evidence for the great floristic migrations that have taken place on the mainland during the Pleistocene. A study of these floras, correlated with an understanding of the geologic history of the region, provides an exceedingly useful key in understanding the development of island floras in general.

ACKNOWLEDGEMENTS

Sincere thanks are due the Commanding Officer, United States Naval Ordnance Test Station, Pasadena Annex, not only for permission to visit the island but for extensive support, including the use of a driver and vehicle, while there. Ed Carpenter took personal charge of my activities on the island and helped in dozens of ways that have immeasurably improved the results of this project. He also very kindly arranged for the photographs that are reproduced here. I am most grateful to Mrs. Murbarger and to Drs. Dunkle, Munz, Thomas, and Wiggins, who have provided me with notes and information concerning their activities on the island; to W. S. Davis, D. W. Kyhos, and D. M. Moore, who made chromosome number determinations reported here; to the curators of the herbaria whose material has been consulted in the course of this study; and to those several botanists, mentioned in the text, who have given comments on certain critical groups. Rupert Barneby, Wallace R. Ernst, and Otto T. Solbrig kindly provided information about specimens in eastern herbaria. Martin A. Piehl and E. R. Blakley of the Santa Barbara Botanic Garden generously allowed me to study their collections from the island and helped in many other ways. Clifton F. Smith provided information on the distribution of certain species in Santa Barbara County. Finally, Reid Moran made an important and much appreciated contribution to this work by making certain information from his manuscript flora of Guadalupe Island available to me, critically reviewing this manuscript, and, in several useful discussions on the flora of the offshore islands, has helped greatly to stimulate my thinking on the subject. My colleagues, R. W. Holm and J. H. Thomas, have made valuable suggestions concerning the introduction, and Dr. Thomas helped with the maps.

CATALOGUE OF THE PLANTS

GENERAL REMARKS

In the following annotated list are cited all of the collections of vascular plants I have seen from San Clemente Island. The families of ferns are arranged according to Copeland's system, and those of angiosperms according to that of Engler. Collection numbers not associated with a name are those of the writer; the first set of his collections is in the Herbarium of the Rancho Santa Ana Botanic Garden. The herbaria where the collections of others are deposited are indicated by the standard abbreviations of Lanjouw and Stafleu (Reg. Veg. 15: 1-249. 1959). Localities given without reference to a collector in this list are sight records of the writer, 1962, unless otherwise indicated.

Certain species that have been reported from the island have been excluded from this list for various reasons. They are discussed above, in the section on "Botanical Exploration." Since most works have copied the earlier records of others in reporting plants from the island, I have tried in every case to cite the first report of a given species from San Clemente Island. The works of Lyon (Botan. Gaz. 11: 197-205, 330-336. 1886), Brandegee (Zoeé 1: 129-148. 1890), Trask (Bull. So. Calif. Acad. Sci. 3: 76-78, 90-95. 1904), Munz

(Man. So. Calif. Botan. 1935), Eastwood (Leaflet West. Botan. 3: 54-78. 1941), and Dunkle (Allan Hancock Pac. Exped. 13: 247-386. 1950), which are the most important works dealing with the flora of the island, are cited in this connection only by the name of the respective author. All except Lyon and Trask were based to some extent upon the work of their predecessors and not entirely on original observations. I have also indicated synonymy and incorrect determinations from these works, and in the few cases where the name used here differs from that given by Munz (Calif. Fl., 1959). Introduced species are indicated by an asterisk.

PLACE NAMES ON SAN CLEMENTE ISLAND

Localities for the plants cited here have been correlated as well as possible with U. S. G. S. 7.5 minute topographic maps for San Clemente Island North, Central, and South (Edition of 1950). With the exception of the place names that will be discussed here, all are found on these maps. In the annotated list that follows, localities are arranged roughly from north to south, without reference to the two sides of the island (unless otherwise stated). Few names used for places on San Clemente Island have had long permanence, and very few even of the commonly accepted ones are reproduced on the maps in question. Many of the names that do appear on these maps, such as "Thirst" and "Wall 2" are triangulation points used by Stehman Forney in his original survey of the island, carried out in 1878-1879 (United States Coast and Geodetic Survey Register Number 1526).

At present, an airfield extends across the island diagonally just below the Isthmus and south of Northwest Harbor. Wilson Cove, one of the main landings at the north end, has been called "Gallagher's" or "Howland's" in earlier days; Munz gave this locality as "Casa Blanca," presumably in reference to the ranch house there. The old airfield, which I have occasionally used as a locality, extends east-west across the island just east of Black Point 2 (San Clemente Central). My "canyon north of Nanny" is the southernmost of the pair of canyons marked with blue lines immediately east of the bench marks 919 and 924, just east of the old airfield. Lemon Tank was in the depression shown about 4000 feet slightly north of east from Bluff. Twin Canyon is the canyon on the east side north of the first canyon north of Boulder (both shown with blue lines). What I have called the second canyon south of Seal Cove (west side) and Moran has called the canyon 1.8 miles southeast of Eel Point is known as Wall Rock Canyon. It is the first canyon north of Mail Point. What Forney called Half Way House and what was later known as Middle Ranch was located near the stream fork near a point approximately 3450 feet due east of The Tomb. Probably these were also the Eagle Ranch or Hay Ranch of Munz and Peirson; this was also used as a general term for the whole middle portion of the island. The stream down from these buildings drains Middle Ranch Canyon. The next main canyon south is called Box Canyon, and the next, Horse Canyon. On the east side, the canyon reaching the sea at White Rock is what Piehl has called "canyon east of Thirst" and apparently also what I have called "canyon south of Thirst." Eagle Canyon is the large double canyon just north of Gray. At the south end, Chenetti Canyon (see also Holder, *The Channel Islands of California*, p. 136. Chicago: A. C. McClurg & Co. 1910; the spelling is given as "Chinetti" there) is the main canyon which is the first one marked on the coast east of the Lighthouse shown in the middle of Pyramid Cove. Pyramid Cove was formerly known as Smugglers Cove. The two canyons flanking the road going nearly due south to China Point are Horse Beach Canyon to the east and China Canyon to the west. The first canyon west of China Canyon is apparently unnamed, the second is Red Canyon, and the third, a very large canyon draining nearly due south from Thirst and with its mouth just off the quadrangle, is Cave Canyon. These notes should provide a basis for locating the place names used in this text, and it is hoped

that more of the outstanding place names may be included in a new edition of the topographic maps.

ANNOTATED LIST LYCOPSIDA

SELAGINELLACEAE

SELAGINELLA BIGELOVII Underw. Common over the whole island on rocky slopes or in shallow soil: 25 March 1918, *Evermann* (CAS); March 1936, *Murbarger* 42 (UC); west shore opposite Wilson Cove, 200 ft, 8 May 1962, 17635; second canyon south of Seal Cove, 100 ft, 8 May 1962, 17605; east coast south of Lemon Tank, 10 April 1923, *Munz* 6726 (POM); near foot of Middle Ranch Canyon, 450 ft, 12 April 1962, 17322; Twin Canyon; east side below a point about 2 miles north of Thirst, 1550 ft, 10 April 1962, 17232; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62390 (SBBG); Cave Canyon; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 341 (DS); China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62330 (SBBG). Reported by Mearns (U.S. Nat. Mus. Bull 56: 140. 1907; as *S. rupestris*).

PTEROPSIDA

FILICINAE

PTERIDACEAE

ADIANTUM JORDANII C. Müll. Shaded canyons near central part of island, occasional along the east coast, rare in those leading to the west coast: 25 March 1918, *Evermann* (CAS); canyon on east coast south of Lemon Tank, 10 April 1923, *Munz* 6714 (POM); canyon just north of Boulder; Horse Canyon; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62405 (SBBG); Eagle Canyon, 1200 ft, 9 May 1962, 17694; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 368 (CAS, DS). Reported by Eastwood.

CHEILANTHES NEWBERRYI (D. C. Eat.) Domin (*Notholaena newberryi* D. C. Eat.). Common on rocky canyonsides, central and southern parts of island: 25 March 1918, *Evermann* (CAS); east side to mesa summit, also along parts of west coast, March 1936, *Murbarger* 40 (UC); east coast south of Lemon Tank, 10 April 1923, *Munz* 6729 (POM, UC), *Peirson* 3439 (RSA); head of canyon near the Tomb, 12 April 1962, 17310; east side below a point about 2 miles north of Thirst, 1550 ft, 10 April 1962, 17231; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 349 (DS); canyon east of Peak 1135, south of Mosquito Cove, 9 June 1962, *Piehl* 62316 (SBBG); China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62328 (SBBG); Chenetti Canyon, 3 April 1939, *Dunkle* 7230 (LAM). Reported by Lyon.

PELLAEA ANDROMEDIFOLIA (Kaulf.) Fée. Common throughout on brushy or rocky slopes: 25 March 1918, *Evermann* (CAS); March 1936, *Murbarger* 20 (UC); near northeast end, 100–125 ft, 22 Feb. 1949, *Wiggins* 11963 (DS); Wilson Cove, 25 ft, 10 June 1962, *Blakley* 5218 (SBBG); about 1 mile south of Wilson Cove, 400 ft, 11 April 1962, 17304; Wilson Cove to Lemon Tank, east coast, 9 April 1923, *Munz* 6634 (POM); canyon north of Nanny; canyon 2 miles southeast of Eel Point, 100 m, 9 March 1959, *Moran* 7169 (SD); Twin Canyon; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62389 (SBBG); Cave Canyon; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 350 (CAS, DS); Chenetti Canyon, 3 April 1939, *Dunkle* 7231 (LAM), 4 April 1939, *Dunkle* 7247 (LAM). Reported by Eastwood.

PITYROGRAMMA TRIANGULARIS (Kaulf.) Maxon var. *TRIANGULARIS*. Common on rocky slopes over the entire island: 25 March 1918, *Evermann* (CAS); Wilson Cove, 300 ft, 12 April 1962, 17344; canyon north of Nanny; canyon south of Wilson Cove to Lemon Tank, 9 April 1923, *Munz* 6658 (POM); Twin Canyon; east-facing slope about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17221; east slope in vicinity of Thirst, 10 April 1923, *Peirson* 3440 (RSA); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 348 (CAS, DS); canyon east of Peak 1135 south of Mosquito Cove, 1000 ft, 9 June 1962, *Piehl* 62322a (SBBG); China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62329 (SBBG). Reported by Lyon (as *Gymnogramme triangularis*), by Munz (as *P. triangularis* var. *viscosa*), and by Eastwood (as *P. viscosa*). According to Alt and Grant (Brittonia 12: 153–170. 1960) the material from San Clemente Island is this species, in some cases slightly introgressed with what they consider a distinct species, *P. viscosa* (D. C. Eat.) Maxon. The material I have seen from this island all appears to belong to a single entity, although some of the plants do have a trace of the silvery indumentum characteristic of *viscosa*. Alt and Grant appear (op. cit.) to suggest in fig. 2 that *P. viscosa* is found on San Clemente Island, as it is on the other larger Channel Islands, but they do not record it from San Clemente in their more detailed fig. 9. As these authors have so clearly demonstrated, the complex displays an intricate pattern of variation richly deserving of further study.

ASPIDIACEAE

DRYOPTERIS ARGUTA (Kaulf.) Watt. Rare in shaded canyons near the central part of the island: canyon on east coast south of Lemon Tank, 10 April 1923, *Munz 6706* (POM); canyon on west side near Middle Ranch (Murbarger, pers. comm.); one tiny plant under rocks, canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl 62400* (SBBG).

POLYPODIACEAE

POLYPODIUM CALIFORNICUM Kaulf. (*P. c.* var. *kaulfussii* D. C. Eat.) Common on rocky, often somewhat protected slopes throughout: 25 March 1918, *Evermann* (CAS); near northeast end, 100–125 ft, 22 Feb. 1949, *Wiggins 11965* (DS, SD); Wilson Cove, 250 ft, 12 April 1962, *17341*; 1 mile north of Eel Point, 20 m, 9 March 1959, *Moran 7159* (SD); second canyon south of Seal Cove; canyon just north of Nanny; east coast between Wilson Cove and Lemon Tank, 9 April 1923, *Munz 6653* (POM), *Peirson 3441* (RSA); canyon south of Lemon Tank; canyon north of Boulder; Middle Ranch Canyon, 18 Feb. 1941, *Moran 598* (DS), 750 ft, 12 April 1962, *17329*; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl s. n.* (SBBG); Cave Canyon; head of canyon above Mosquito Cove. Reported by Lyon.

ANGIOSPERMAE

MONOCOTYLEDONAE

TYPHACEAE

**TYPHA DOMINGENSIS* Pers.¹⁶ Locally common in seepage below barracks area, Wilson Cove, 11 July 1962, *18018*.

**TYPHA LATIFOLIA* L. Locally common in seepage below barracks area, with preceding, Wilson Cove, 11 July 1962, *18017*, 10 June 1962, *Blakley 5223* (SBBG).

ZOSTERACEAE

PHYLLOSPADIX TORREYI S. Wats. Occasionally cast up on shores, at least around northern end: beach due west of Wall 2, 11 April 1962, *17274*; Wilson Cove. Reported by Dunkle.

GRAMINEAE

AGROSTIS DIEGOENSIS Vasey. Vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins 370* (DS). Reported by Eastwood (as *A. exarata*).

ARISTIDA ADCENSIONIS L. Scattered on dry rocky slopes, central and southern parts: second canyon south of Seal Cove, 100 ft, 8 May 1962, *17609*; head of canyon above Mosquito Cove; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins 364* (CAS, DS, UC); just north of Guds, 820 ft, 9 May 1962, *17650*; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl 62341* (SBBG).

**AVENA BARBATA* Pott ex Link. Common in grassland over entire island: Northwest Harbor; large dune north of a point due west of Wall 2, 125 ft, 11 April 1962, *17290*; west slope opposite Wilson Cove, 8 April 1923, *Munz 6614* (POM); Wilson Cove, 200 ft, *17132*; Seal Cove; Thirst; canyon at south end of Mosquito Cove; Guds; Pyramid Cove, 4 April 1939, *Dunkle 7255* (LAM). For a discussion of the author of this species, see Bor (Grasses of India, Burma and Ceylon, p. 433. 1960).

**AVENA FATUA* L. Common in grassland over the entire island: March 1936, *Murbarger 89* (UC); Northwest Harbor; west coast opposite Wilson Cove, 8 April 1923, *Munz 6619* (POM); Wilson Cove, 200 ft, 9 April 1962, *17133*; Seal Cove; head of canyon at south end of Mosquito Cove; Thirst. Reported by Dunkle.

**AVENA SATIVA* L. Scattered annual weed in clayey grassland near summit of ridge above Wilson Cove, 450 ft, 8 May 1962, *17622*.

BROMUS CARINATUS H. & A. Occasional in grassland, at least near north end: west side opposite Wilson Cove, 100 ft, 8 May 1962, *17623*; Wilson Cove, 200 ft, 9 April 1962, *17126*, *17169*. Reported by Lyon (as *Ceratochloa grandiflora*), by Brandegee (as *Bromus bookerianus*), and by Eastwood (as *B. carinatus* var. *bookerianus*).

**BROMUS DIANDRUS* Roth (*B. rigidus* sensu auct. Am., p. m. p.). Common in grassland throughout: April 1936, *Murbarger 88* (UC); Northwest Harbor; north end near airfield; beach west of Wall 2; Wilson Cove, 200 ft, 9 April 1962, *17151*; Seal Cove; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl 62397* (SBBG); Twin Canyon; China Canyon c. 2 miles above China Point, 700 ft, 9 June 1962, *Piehl 62332* (SBBG). This species is usually treated in American floras as *B. rigidus* Roth. The western American plants, however, have spreading and drooping panicle branches, at least when grown under

¹⁶Introduced species indicated by an asterisk.

favorable conditions, and have thus far been octoploid, $2n=56$.¹⁷ Therefore, it seems best to refer them to *B. diandrus* Roth [*B. gussonii* Parl., *B. rigidus* var. *gussonii* (Parl.) Coss. & Dur.]. This is in accord with most modern European usage, which is based on the studies of Camus and Cugnac (Bull. Soc. Bot. Fr. 78: 327-341. 1931). Meanwhile, botanists concerned with the flora of North America should search for *B. rigidus* Roth, which is hexaploid ($2n=42$) and has a contracted panicle with erect branches.

**BROMUS MOLLIS* L. Common in grassland everywhere: March 1936, *Murbarger* 237 (UC); 9 April 1923, *Munz* 6654 (POM, UC); north end near airfield; Wilson Cove, 9 April 1923, *Munz* 6654 (POM); 200 ft, 9 April 1962, 17159; mouth of canyon north of Nanny; mouth of canyon at south end of Seal Cove, 50 ft, 8 May 1962, 17599; Thirst; Cave Canyon; south end of mesa summit, April 1936, *Murbarger* 171 (UC); Guds; China Canyon 2 miles above China Point, 700 ft, *Piehl* 62325 (SBBG). The systematics of this and closely related species should be investigated in Europe, and it might well be that, following such investigation, we should have to take up the name *B. hordeaceus* L. for this species again.

**BROMUS RUBENS* L. Scattered in grassland over the whole island: 10 April 1923, *Munz* 6711 (POM, UC); April 1936, *Murbarger* 128 (UC); Northwest Harbor; west coast, 10 April 1923, *Munz* 6753 (POM); Wilson Cove, 200 ft, 9 April 1962, 17146; canyon north of Nanny; Seal Cove; Thirst, 1960 ft, 9 June 1962, *Piehl* 62363 (SBBG), 62368 (SBBG); canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62396 (SBBG); Cave Canyon; Eagle Canyon, 1000 ft, 9 May 1962, 17698; head of canyon south of Mosquito Cove, 1050 ft, 9 May 1962, 17668; Guds; Pyramid Cove, 4 April 1939, *Dunkle* 7256 (LAM).

BROMUS TRINII Desv. Common annual on side of small arroyo, Wilson Cove, 200 ft, 10 April 1962, 17185.

**CYNODON DACTYLON* (L.) Pers. Scattered colonies: one small clump at extreme north end and another in midisland, April 1936, *Murbarger* 138 (UC); road just above big dune, northwest end of island, 10 July 1962, 17962; common along dry stream, Wilson Cove, 150 ft, 12 April 1962, 17342.

DISSANTHELIUM CALIFORNICUM (Nutt.) Benth. San Clemente Island, *Trask* 324 (cited by Hitchcock, in Jepson, Fl. Calif. 1: 141. 1912). Otherwise known only from Santa Catalina and Guadalupe islands. This species is a northern outlier of a South American and Mexican genus. As far as I know, it has not been collected in the last 50 years and might even be extinct. Palmer, observing it on Guadalupe Island, said that it was "On warm rocky slopes . . . not very abundant; very succulent, and the goats are very fond of it," (Proc. Am. Acad. 1: 120. 1876).

DISTICHLIS SPICATA (L.) Greene var. *STOLONIFERA* Beetle. Scattered in low wet places around the shores: sandy beach due west of Wall 2, 20 ft, 11 April 1962, 17257; sand-dunes on northwest coast, 11 April 1923, *Munz* 6770 (POM); Pyramid Cove, 27 April 1939, *Dunkle* 7331 (LAM); salt-water slough at south end, April 1936, *Murbarger* 123 (UC). Reported by Munz (as var. *laxa*).

ELYMUS CONDENSATUS Presl. Plants up to 10.5 ft tall, forming an impenetrable mass over an area of 50 square feet at the mouth of a moist canyon on east side, March 1936, *Murbarger* 59 (UC).

**FESTUCA BROMOIDES* L. Rare annual on steep grassy hillside, near head of north branch of Eagle Canyon, 1600 ft, 10 May 1962, 17721. Reported by Eastwood (as *F. dertonensis*). This species is usually referred to in American works as *F. dertonensis* (All.) Asch. & Graebn., but since Chase (Man. Grasses U. S., ed. 2, p. 873. 1950) gives as the reason that "*F. bromoides* . . . seems to be a mixture; the name is referred to *F. myuros* by European authors." I follow Hubbard (Grasses, p. 135. 1954) for its specific name. See also Henrard, *Blumea* 2: 302-308. 1937.

FESTUCA MEGALURA Nutt. Common in grassland throughout: March 1936, *Murbarger* 107 (UC); north end; Wilson Cove, 200 ft, 9 April 1962, 17147; Lemon Tank, 10 April 1923, *Munz* 6701 (POM, UC); Seal Cove; summit of plateau, 10 April 1923, *Peirson* 3418 (RSA); north of Middle Ranch Canyon, 350 ft, 12 April 1962, 17315; east-facing slopes of summit ridge 2 miles north of Thirst, 1600 ft, 10 April 1962, 17228; Thirst, 1960 ft, 9 June 1962, *Piehl* 62367 (SBBG); Cave Canyon; Guds, 880 ft, 9 May 1962, 17640; China Canyon 2 miles above China Point, 9 June 1962, *Piehl* 62367 (SBBG); Pyramid Cove, 4 April 1939, *Dunkle* 7257 (LAM).

FESTUCA OCTOFLORA Walt. var. *HIRELLA* Piper. Rare: grassland near head of canyon south of Mosquito Cove, 1050 ft, 9 May 1962, 17667; China Point, 10-50 ft, 9 June 1962, *Piehl* 62352 (SBBG).

FESTUCA PACIFICA Piper. Scattered in sloping rocky grassland: mesa summit, May 1936, *Murbarger* 200 (UC); canyon at south end of Mosquito Cove, 1050 ft, 9 May 1962, 17672; Guds, 880 ft, 9 May 1962, 17644.

¹⁷Stebbins & Love, Am. J. Bot. 28: 372, 1941; plants from Berkeley, Alameda Co., Calif. Latigo Canyon, 300 ft, Los Angeles Co., Calif., June 1959, *Raven* 15417, $n=28$. A series of plants grown from seed from the Jardin de Plantes, Paris, 14 May 1962, *Raven* 17740, likewise had $2n=56$.

FESTUCA REFLEXA Buckl. Canyon southeast of Lemon Tank, 10 April 1923, *Munz* 6709 (POM); small area on west slope, April 1936, *Murbarger* 173 (UC). Spikelets 2-3-flowered, all reflexed. Doubtfully separable on a specific level from *F. microstachys* Nutt., which is the oldest name in this complex.

**GASTRIDIMUM VENTRICOSUM* (Gouan) Schinz & Thell. Common in grassland and about the heads of gullies in dry central part of island: Twin Canyon, especially abundant near head; near Thirst, 1900 ft, 10 June 1962, *Piehl* 62409 (SBBG); Cave Canyon; 10 July 1962, 17967, 17969; summit of plateau above Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 389 (DS, UC); east of peak 1135 south of Mosquito Cove, 1100 ft, 9 June 1962, *Blakley* 5209 (SBBG); Pyramid Cove, 24 Nov. 1939, *Dunkle* 7348 (LAM). Reported by Eastwood.

**HORDEUM GLAUCUM* Steud. (*H. stebbinsii* Covas). Occasional in rocky grassland, but not as common as *H. leporinum*: mesa summit, April 1936, *Murbarger* 114 (UC; det. Covas); common near head of canyon at south end of Mosquito Cove, 1050 ft, 9 May 1962, 17673.

**HORDEUM GENICULATUM* All. (*H. hystrix* Roth). Grassland in central part of island: canyon north of Nanny; canyon just south of Lemon Tank; canyon north of Boulder, 1600 ft, 10 May 1962, 17738; head of Horse Canyon, 1750 ft, 10 May 1962, 17725; upper reaches of Cave Canyon, 10 July 1962, 17970. See Bowden, *Canad. J. Botan.* 40: 1678-1679. 1962.

**HORDEUM LEPORINUM* Link. Abundant in grassland throughout, at least at lower elevations: north end near airfield; sandy beach due west of Wall 2, 20 ft, 11 April 1962, 17275; west coast opposite Wilson Cove, 8 April 1923, *Munz* 6620 (POM); Wilson Cove, 200 ft, 9 April 1962, 17138; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62331 (SBBG), 62350 (SBBG); China Point, 10-50 ft, 9 June 1962, *Piehl* 62351 (SBBG). Reported by Dunkle (as *H. murinum*). Unfortunately, records of *H. glaucum* and *H. leporinum* were not carefully distinguished in the field and so it is not possible to report their ranges with great accuracy. Plants of this complex were seen in all parts of the island visited.

HORDEUM PUSILLUM Nutt. Common in grassland, at least in central and northern parts of the island: West Point; beach due west of Wall 2; west coast opposite Wilson Cove, 8 April 1923, *Munz* 6613 (POM); Wilson Cove, 200 ft, 9 April 1962, 17141; Seal Cove; mesa summit, May 1936, *Murbarger* 193 (UC). Reported by Munz.

**HORDEUM VULGARE* L. Scattered by roadsides in areas that have been seeded, but doubtfully persistent: near airfield at north end, 100 ft, 11 April 1962, 17292; becoming quite widely established over mesa summit and south slopes, May 1936, *Murbarger* 174 (UC).

**LAMARCKIA AUREA* (L.) Moench. Abundant in rocky grassland and canyons throughout: April 1936, *Murbarger* 58 (UC); east coast, 9 April 1923, *Munz* 6671 (POM, UC); Wilson Cove, 200 ft, 9 April 1962, 17156; Seal Cove; second canyon south of Seal Cove; Thirst, 1960 ft, 9 June 1962, *Piehl* 62369 (SBBG); Guds; China Point; Pyramid Cove, 7 April 1939, *Dunkle* 7332 (LAM). Reported by Trask.

**LOLIUM MULTIFLORUM* Lam. Rare weed in grassland: north end near airfield; Wilson Cove, 10 June 1962, *Piehl* 62375 (SBBG), 50 ft, 12 April 1962, 17348. The species of *Lolium* are best regarded as an integral part of *Festuca*, differing from the main body of the genus no more than do the species of *Vulpia* (Stebbins, *Evolution* 10: 235-245. 1956). They are left under *Lolium* here only as a temporary expedient.

**LOLIUM PERENNE* L. Rare, but locally established in two patches: barracks area, Wilson Cove, 200 ft, 8 May 1962, 17617; waif in grassland near old airfield.

**LOLIUM TEMULENTUM* L. Rare weed in grassland: near airfield at north end of island, 100 ft, 11 April 1962, 17293; fewer than 20 plants in an area about 4 ft square, in a hot, dry location on south end of island, April 1936, *Murbarger* 136 (UC).

MELICA IMPERFECTA Trin. Occasional on rocky canyonsides throughout most of the island: east side meadows, first slope above the ocean, March 1936, *Murbarger* 71 (UC); Wilson Cove, 200 ft, 9 April 1962, 17170; small draw on west side of island opposite Wilson Cove, 8 April 1923, *Munz* 6621 (UC); Cave Canyon; canyon above Mosquito Cove. Reported by Lyon.

MUHLBERGIA MICROSPERMA (DC.) Kunth. Occasional annual on hot, rocky slopes in canyons, often with *Aristida adscensionis*: west side, May 1936, *Murbarger* 197 (UC); second canyon south of Seal Cove, 100 ft, 8 May 1962, 17603; Middle Ranch Canyon, 450 ft, 12 April 1962, 17324; Eagle Canyon, 1400 ft, 9 May 1962, 17708; just north of Guds, 820 ft, 9 May 1962, 17651. Reported by Dunkle.

**PARAPHOLIS INCURVA* (L.) C. E. Hubbard. Common at low elevations in grassland, often where moist: beach due west of Wall 2, 20 ft, 11 April 1962, 17276; Wilson Cove, 350 ft, 10 April 1962, 17187; foot of canyon north of Nanny; Pyramid Cove; China Point, 10 ft, 9 June 1962, *Piehl* 62353 (SBBG); salt-water slough and bare beaches at south end, April 1936, *Murbarger* 175 (UC).

PHALARIS CAROLINIANA Walt. Scarce, and probably confined to south end: May 1903, *Trask* (US; acc. D. E. Anderson); in one shallow ravine on south end, April 1936, *Murbarger* 137 (UC). Dr. Dennis E. Anderson, who determined these specimens, feels that this species may well be native in California (pers. comm.).

PHALARIS LEMMONII Vasey. Infrequent annual in formerly wet clayey grassland near head of canyon at south end of Mosquito Cove, 1500 ft, 9 May 1962, 17670.

**PHALARIS MINOR* Retz. Scattered in grassland throughout, and well established: northwest end between Driggs and West Rock, 50 ft, 11 April 1962, 17302; west side near ocean, April 1936, *Murbarger* 158 (UC); canyon north of Nanny, abundant, 11 July 1962, 17993; Thirst, along road; common locally, China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Blakley* 5205 (DS, SBBG). Reported by Eastwood, and perhaps the plant reported by Lyon as *P. canariensis*.

**PHALARIS PARALOA* L. Common weed in clayey grassland near summit of ridge above Wilson Cove, 450 ft, 8 May 1962, 17621. Perhaps will not persist.

**POA ANNUA* L. Moist pocket on grassy slope on east coast south of Lemon Tank, 10 April 1923, *Munz* 6727 (POM).

POA SCABRELLA (Thurb.) Benth. ex Vasey. Common in canyons and in shallow rocky soil throughout: mesa summit, April 1936, *Murbarger* 139 (UC); canyon wall on east slope, 10 April 1962, *Munz* 6708 (POM); Wilson Cove, 12 April 1923, *Munz* 6778 (POM, UC); Twin Canyon; Middle Ranch Canyon, 750 ft, 12 April 1962, 17332; Thirst, 1900 ft, 10 April 1962, 17209; Horse Canyon; Cave Canyon; canyon above Mosquito Cove; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62342 (SBBG). Reported by Munz.

POLYPOGON INTERRUPTUS Kunth. Near a seeping spring on east side of the island, March 1936, *Murbarger* 239 (UC).

**POLYPOGON MONSPELIENSIS* (L.) Desf. Common in moist or formerly moist places, often in canyon bottoms, at least in northern and central parts of island: north end near airfield; west coast opposite Wall 2; Wilson Cove, 150 ft, 12 July 1962, 18042, 200 ft, 9 April 1962, 17127, 10 June 1962, *Piehl* 62377a (SBBG); summit of island above Wilson Cove; canyon north of Nanny; canyon south of Lemon Tank; mouth of canyon at south end of Seal Cove, 30 ft, 8 May 1962, 17598; top of mesa, May 1936, *Murbarger* 229 (UC); upper reaches of Cave Canyon, 10 July 1962, 17968.

STIPA CERNUA Steb. & Love. Dry grassland in central and southern parts of island: Middle Ranch, 16 Feb. 1941, *Moran* 570 (DS); Thirst, 1960 ft, 9 June 1962, *Piehl* 62366 (SBBG); China Canyon 2 miles above China Point, 9 June 1962, *Piehl* 62349a (SBBG). Difficult to distinguish from *S. pulchra* on the island; one or the other occurred throughout.

STIPA LEPIDA Hitchc. Fairly common throughout in grassland: near big dune, northwest side of island; Wilson Cove, 200 ft, 9 April 1962, 17171; canyon north of Nanny; Twin Canyon; rocky slopes of east coast, 8 April 1923, *Munz* 6632 (POM); Cave Canyon; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62348 (SBBG). Reported by Munz.

STIPA PULCHRA Hitchc. Grassland on north end and perhaps at Mosquito Cove: March 1936, *Murbarger* 54 (UC); Northwest Harbor; Wilson Cove, 12 April 1923, *Peirson* 3419 (RSA), 200 ft, 9 April 1962, 17172; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 381 (DS, UC; determination doubtful). Reported by Lyon (as *S. setigera*).

**TRITICUM AESTIVUM* L. Waif by roadside, sandy slopes near point at east end of Northwest Harbor, 100 ft, 12 July 1962, 18027.

CYPERACEAE

CAREX TUMULICOLA Mackenzie. Local, forming colonies along streambeds: abundant, upper reaches of first canyon south of Lemon Tank, with *Juncus patens*, 11 July 1962, 18005; canyon bottom on west coast south of Lemon Tank, 10 April 1923, *Munz* 6737 (POM), *Peirson* 3417 (RSA); gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17239. Reported by Munz (as *C. praegracilis*). Mr. J. T. Howell has kindly determined these collections, apparently the only specimens of *Carex* from the island; reports of *C. praegracilis* are in error.

ELEOCHARIS PALUSTRIS (L.) Roem. & Schult. (*E. macrostachya* Britt.). Found in a single canyon at south end, at base of rubble from Indian campsite in a cave, May 1936, *Murbarger* 231 (UC).

JUNCACEAE

JUNCUS BUFONIUS L. Occasional along canyon bottoms and in formerly moist depressions: crevices in cliffs at North Head; canyon just north of Boulder; near mouth of canyon at south end of Seal Cove, 30 ft, 8 May 1962, 17594; gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17238, 17241; dry slope above canyon east of Thirst, 1900 ft, 10 June 1962, *Piehl* 62410 (SBBG); head of canyon above Mosquito Cove.

: *JUNCUS PATENS* E. Mey. Scattered colonies in seasonally wet places: upper reaches of first canyon south of Lemon Tank, 11 July 1962, 18004; gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17240; canyon to west side south of Lemon Tank, 10 April 1923, *Munz* 6735 (POM), *Peirson* 3416 (RSA); near head of canyon above Mosquito Cove, 850 ft, 9 May 1962, 17681.

LILIACEAE

ALLIUM PENINSULARE Lemmon. Rare, growing in heavy clay soil of canyonsides: heavy soil, mouth of canyon, east coast, between Wilson Cove and Lemon Tank, 9 April 1923, *Munz* 6657 (POM, UC; det. M. Ownbey); west side of island, in canyons, flowers pink, May 1936, *Murbarger* 227 (UC). Reported by Lyon (as *A. serratum*).

ALLIUM PRAECOX Brandege. Rare in heavy clay soil: Wilson Cove, 12 April 1923, *Peirson* 3486 (RSA, WS; det. M. Ownbey); Eel Point to Seal Cove, 10 June 1962, *Blakley* 5243 (DS, SBBG); clayey ledge in canyon just north of Thirst. Reported by Dunkle.

BRODIAEA FILIFOLIA S. Wats. Rare and local, in hard-baked clay soil of mesa summit: May 1936, *Murbarger* 219 (UC); near head of large canyon north of Boulder, 1550 ft, 10 May 1962, 17734. Reported by Hoover (Am. Midl. Nat. 22: 572. 1939).

DICHELOSTEMMA PULCHELLUM (Salisb.) Heller. Common in grassland throughout: March 1936, *Murbarger* 87 (UC); 25 March 1918, *Evermann* (CAS); Northwest Harbor; north end, 22 Feb. 1949, *Wiggins* 11959 (DS); beach west of Wall 2; Wilson Cove, 12 April 1923, *Peirson* 3485 (RSA), 200 ft, 9 April 1962, 17142; east coast 4 miles south of Wilson Cove, 9 April 1923, *Munz* 6662 (POM); Middle Ranch, 17 Feb. 1941, *Moran* 580 (DS); canyon above Mosquito Cove; Guds; Pyramid Cove; southeast point, 2 April 1939, *Dunkle* 7208 (LAM). Reported by Lyon (as *Brodiaea capitata*).

TRITELIA CLEMENTINA Hoover. Rare in clayey soil on canyonsides: 25 March 1918, *Evermann* (CAS); 6 April 1939, *Dunkle* 7324 (LAM); in shady cool canyons on east side, not plentiful, one flower head with 39 flowers, March 1936, *Murbarger* 79 (UC; type collection); canyon running from Lemon Tank, 9 April 1923, *Munz* 6695 (POM; may be same locality as *Murbarger* collection), *Peirson* 3472 (RSA); few on cliffs of canyon, 2 miles southeast of Eel Point, 100 m, 9 March 1959, *Moran* 7165 (RSA, SD); Mosquito Cove, grassy ridge, 6 April 1939, *Dunkle* 7283 (LAM). Endemic; reported by *Munz* (as *Brodiaea laxa*).

DICOTYLEDONAE

SAURURACEAE

ANEMOPSIS CALIFORNICA Hook. Found in three moist places on the island, April 1936, *Murbarger* 143 (UC).

FAGACEAE

QUERCUS TOMENTELLA Engelm. Scattered, mostly small groves on sides of ridges and canyons, mainly on the east side: April 1936, *Murbarger* 122 (UC); canyon below Lemon Tank, 9 April 1923, *Munz* 6693 (POM), 6694 (POM), *Peirson* 3456 (RSA), about 6 trees, 10 July 1962, 17980, 17981; about 6 trees, to 35 ft tall, head of Twin Canyon, 1400 ft, 11 July 1962, 18000; grove of about 8 trees at head of canyon just north of Boulder; 2 trees 20 ft tall, in shallow part at head of Horse Canyon, 1600 ft, 10 May 1962, 17726; canyon east of Thirst, 1000 ft, scattered clumps, 10 June 1962, *Piehl* 62407 (SBBG), 62407a (SBBG); grove of about 12 trees, 20 ft tall, near head of north branch of Eagle Canyon, 1600 ft, 10 May 1962, 17720; grove of about 50 trees on south rim of Eagle Canyon (*Murbarger*, pers. comm.); about 1000 trees on hillside near a point due east of Thirst and due south of Whiterock (*Murbarger*, pers. comm.). Reported by Trask. Dr. C. H. Muller, who has kindly reviewed my oak specimens and those of Dr. Martin Piehl, concludes that all are *Q. tomentella*. Thus despite considerable variation in leaf size and shape in this species, records of *Q. chrysolepis* Liebm. from the island are evidently erroneous.

URTICAEAE

HESPEROCNIDE TENELLA Torr. Scattered colonies in canyons on east side: May 1936, *Murbarger* 169 (UC); damp slope about 4 miles south of Wilson Cove, 9 April 1923, *Munz* 6664 (POM); grove of *Prunus ilicifolia* subsp. *lyonii* in Eagle Canyon, 1000 ft, 9 May 1962, 17701. Reported by Lyon.

PARIETARIA FLORIDANA Nutt. Frequent on protected slopes in the canyons throughout: *Evermann* (CAS); near Wilson Cove, 8 April 1923, *Munz* 6602 (POM), 12 April 1923, *Peirson* 3466 (RSA); 1 mile south of Wilson Cove, 75 ft, 7 May 1962, 17585; second canyon south of Seal Cove; canyon on east side, May 1936, *Murbarger* 201 (UC); head of canyon near the Tomb, 12 April 1962, 17309; gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17236; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62391 (SBBG); Eagle Canyon, 1000 ft, 9 May 1962, 17696; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 369 (DS); canyon just northeast of Peak 1135, south

of Mosquito Cove, 9 June 1962, *Piehl* 62316 (SBBG). Reported by Lyon (as *P. debilis*).

POLYGONACEAE

ERIOGONUM GIGANTEUM S. Wats. subsp. *formosum* (K. Brandegee) comb. nov. (based on *Eriogonum giganteum* var. *formosum* K. Brandegee, *Erythea* 5: 79. 1897). Widely scattered on rocky canyon walls: 25 Aug. 1894, *Brandegee* (DS, POM; type collection), 10 April 1923, *Peirson* 3450 (RSA); cultivated, Brandegee garden, San Diego, May-Oct. 1899, *Purpus* (POM, UC), July 1902, *Herre* (DS); east side near ocean, 1 plant, hanging from a cliff, to 8 ft tall, trunk 4 in in diameter, spread of 10 ft, May 1936, *Murbarger* 113 (UC); canyon below Lemon Tank, 750 ft, 10 July 1962, 17976; Twin Canyon; canyon 2 miles southeast of Eel Point, 100 m, 16 Sept. 1958, *Moran* 6843 (DS, RSA, SD, UC); 2 plants on cliff face above and north of Seal Cove, 200 ft, 10 June 1962, *Blakley* 5236 (SBBG); dry canyon walls on west side near Middle Ranch Canyon, 10 April 1923, *Munz* 6754 (POM); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 357 (CAS, DS). Reported by Lyon (as "n. sp. unfit for determination") and by Trask. A geographical race of this sort is what I prefer to call a subspecies. *Eriogonum giganteum* subsp. *giganteum* occurs on Santa Catalina Island, and var. *compactum* Dunkle, which may also deserve subspecific status, on Santa Barbara Island. One branch of one of the Brandegee collections (POM) is subsp. *giganteum*, and a specimen said to come from Santa Catalina Island (27 June 1902, *Jones*, DS) is subsp. *formosum*. Both may represent errors in labelling.

ERIOGONUM LATIFOLIUM Sm. subsp. *GRANDE* (Greene) Stokes. Scattered on steep slopes throughout: 25 Aug. 1894, *Brandegee* (UC); May 1936, *Murbarger* 176 (UC); 9 Sept. 1926, *Jones* (CAS); coast about 1 mile south of Wilson Cove; canyon north of Nanny, and steep bluffs above sea at its mouth; canyon below Lemon Tank, 800 ft, 10 July 1962, 17979; west slope of canyon 1.8 miles southwest of Eel Point, 100 m, 15 Sept. 1958, *Moran* 6827 (SD); canyon 2 miles southeast of Eel Point, 100 m, 16 Sept. 1958, *Moran* 6846 (DS, SD, UC); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 356 (DS, UC). Reported by Lyon (as *E. nudum* var. *pauciflorum* and by Eastwood (as *E. grande* and *E. rubescens*). One of the members of a very puzzling complex for which the conservative treatment of Stokes may be appropriate. Mr. D. W. Kyhos has determined a gametic chromosome number of 20 pairs in microsporocytes of my no. 17979, a number which agrees with most counts for the complex, including *E. l. grande* from Santa Cruz Island (Stokes & Stebbins, *Leaflet*. West. Botan. 7: 230-231. 1955).

**POLYGONUM ARENASTRUM* Bor. (*P. aequale* Lindm.). Rare and local weed in two spots: docks area, Wilson Cove, 30 ft, 12 April 1962, 17343, 11 July 1962, 18016; just south of old airfield, 11 July 1962, 17996. Usually grouped with *P. aviculare* L. in American literature, but Dr. B. T. Styles (in *Watsonia* 5: 177-214. 1962.) has clearly pointed out the characters by which they may be distinguished.

PTEROSTEGIA DRYMARIODES Fisch. & Mey. Common in grassland and brushy slopes throughout: north end; beach due west of Wall 2, 11 April 1962, 17277; Wilson Cove, 8 April 1923, *Munz* 6601 (POM), 9 April 1962, 17167; east side, April 1936, *Murbarger* 142 (UC); canyon north of Nanny; Twin Canyon; Seal Cove; east-facing slopes of summit ridge about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17225; Middle Ranch, 11 Feb. 1941, *Moran* 576 (DS); canyon east of Thirst, 1000 ft; Cave Canyon; canyon above Mosquito Cove; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62345 (SBBG). Reported by Lyon.

**RUMEX CRISPUS* L. Small colonies observed in two localities: rare on hillside above Wilson Cove, 300 ft, 10 April 1962, 17189; mouth of canyon north of Nanny, just above the ocean.

RUMEX SALICIFOLIUS Weinm. s. str. Scattered along canyon streams: east side, May 1936, *Murbarger* 183 (UC); west side, April 1936, *Murbarger* 45 (UC); gully just above coast 1 mile south of Wilson Cove, 75 ft, 7 May 1962, 17587; canyon 3 miles southeast of Wilson Cove, 9 April 1923, *Munz* 6679 (POM); canyon below Lemon Tank, 750 ft, 10 July 1962, 17986; second canyon south of Seal Cove; 6 miles southeast of Wilson Cove, 9 April 1923, *Peirson* 3473 (RSA); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 366 (DS; det. K. H. Rechinger). Reported by Lyon.

CHENOPODIACEAE

APHANISMA BLITOIDES Nutt. ex Moq. Common in grassland around the shores at relatively low elevations: April 1885, *Nevin* (DS); West Point; west coast opposite Wilson Cove, 11 April 1923, *Munz* 6774 (POM, UC; RSA, as *Peirson* 3479); Wilson Cove, 200 ft, 9 April 1962, 17178; west and south side, March 1936, *Murbarger* 238 (UC); beach due west of Wall 2, 30 ft, 11 April 1962, 17268; Seal Cove; second canyon south of Seal Cove, 100 ft, 8 May 1962, 17610; Guds; Pyramid Cove. Reported by Lyon.

ARTHROCNEUM SUBTERMINALE (Parish) Standl. Patches near ocean around the entire shore, often with *Suaeda californica*: just west of North Head, 20 ft, 12 July 1962, 18039; Northwest Harbor; north end, to 100 ft, May 1936, *Murbarger* 223 (UC); due west of Wall 2, 10 ft, 11 April 1962, 17269; Wilson Cove, 20 ft, 10 June 1962, *Blakley* 5221 (SBBG); Eagle Ranch, 11 April 1923, *Munz* 6768 (POM, UC); Pyramid Cove, 4 July 1919, *Knoche* A1007 (DS); south end, April 1936, *Murbarger* 148

(UC). Reported by Munz (as *Salicornia subterminalis*). For a discussion of the generic disposition of this species, see Mason, Fl. Marshes Calif., p. 451-2. 1957.

ATRIPLEX ARGENTEA Nutt. subsp. *EXPANSA* (S. Wats.) Hall & Clements. Common in open clayey grassland, often along natural drainageways: Northwest Harbor, 100 ft, 12 July 1962, 18021; dunes at extreme northern end, May 1936, *Murbarger* 222 (UC); above Wilson Cove, 400 ft, 8 May 1962, 17619, 450 ft, 10 July 1962, 17964; just south of old airfield, 11 July 1962, 17998; below Lemon Tank; Black 2, 4.5 miles southeast of Wilson Cove, 9 June 1962, *Blakley* 5173 (DS, SBBG); along road near Thirst. Reported by Trask (as *A. expansa*).

ATRIPLEX CALIFORNICA Moq. Common in clayey grassland at low elevations throughout: 25 Aug. 1894, *Mearns* 4059 (DS), 4074 (DS); *Brandegee* (UC); Sept. 1926, *Jones* (POM); cliffs at North Head; Northwest Harbor; beach due west of Wall 2, 30 ft, 11 April 1962, 17254, 10 July 1962, 17951; west side, April 1936, *Murbarger* 235 (UC); exposed slopes, 8 April 1923, *Munz* 6616 (POM); Wilson Cove, 50 m, 15 Sept. 1958, *Moran* 6840 (DS, SD), 20 ft, 10 June 1962, *Blakley* 5222 (SBBG), 200 ft, 9 April 1962, 17158, 11 July 1962, 19010; lowest terrace 1.7 miles southeast of Eel Point, 10 m, 18 Sept. 1958, *Moran* 6853 (DS, SD); Seal Cove; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 362 (CAS, DS, UC). Reported by Lyon.

ATRIPLEX COULTERI (Moq.) D. Dietr. Locally common on steep clay slopes near western shore: west side opposite Wilson Cove, 150 ft, 8 May 1962, 17633; slopes above Seal Cove, 125 ft, 8 May 1962, 17589; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62339 (SBBG). These plants are all annual, with entire leaves and the bracts of the pistillate flowers with many teeth. They are very close to *A. pacifica*, in which the pistillate bracts are subentire.

ATRIPLEX LENTIFORMIS (Torr.) S. Wats. subsp. *BREWERI* (S. Wats.) Hall & Clem. Two small clumps near the sea: 1 shrub near coast 1 mile south of Wilson Cove, 20 ft, 7 May 1962, 17580; sandy ravine above Pyramid Cove, 10 shrubs up to 7 ft tall, April 1936, *Murbarger* 153 (UC). Reported by Trask and by Munz (as *A. breweri*).

ATRIPLEX LEUCOPHYLLA (Moq.) D. Dietr. Fairly common on dunes, Northwest Harbor, 10 ft, 11 April 1962, 17295, 30 ft, 12 July 1962, 18032. Reported by Lyon.

ATRIPLEX PACIFICA A. Nels. Local on clayey slopes along west coast: seabluff, Eagle Ranch, 11 April 1923, *Munz* 6764 (POM), *Peirson* 3461 (RSA). Reported by Lyon (as *A. microcarpa*).

**ATRIPLEX SEMIBACCATA* R. Br. Abundant in clayey grassland over the entire island: 9 Sept. 1926, *Jones* (POM); May 1936, *Murbarger* 211 (UC); north end; Northwest Harbor, 100 ft, 12 July 1962, 18020; beach due west of Wall 2, 10 July 1962, 17948; old airfield, 11 July 1962, 17999; Wilson Cove, 12 April 1923, *Munz* 6783 (POM); Seal Cove; canyon north of Nanny; near Thirst; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 365 (DS); Guds; Pyramid Cove. Reported by Munz.

ATRIPLEX WATSONII A. Nels. Common and forming dense mats near the shore from the north end down the west coast to the south end: 25 Aug. 1894, *Mearns* 4078 (UC); 25 Aug. 1894, *Brandegee* (UC); March 1936, *Murbarger* 242 (UC); north end, May 1936, *Murbarger* 220 (UC); Northwest Harbor, 100 ft, 12 July 1962, 18019; beach due west of Wall 2, 30 ft, 11 April 1962, 17255, 10 July 1962, 17950; bluffs on west coast near Eagle Ranch, 11 April 1923, *Munz* 6765 (POM), *Peirson* 3462 (RSA); Eel Point, 20 ft, 10 June 1962, *Blakley* 5227 (SBBG); 1.7 miles southeast of Eel Point, 10 m, 18 Sept. 1958, *Moran* 6855 (DS, SD). Reported by Munz.

**BASSIA HYSSOPIFOLIA* (Pall.) Kuntze. Scattered by airfield and along roads at north end, not common: Northwest Harbor, 30 ft, 12 July 1962, 18033.

**BETA VULGARIS* L. subsp. *MARITIMA* (L.) Thell. Small patch just above coast 1 mile south of Wilson Cove, 20 ft, 7 May 1962, 17581.

CHENOPODIUM CALIFORNICUM (S. Wats.) S. Wats. Common in protected canyon bottoms and slopes throughout: 25 March 1918, *Evermann* (CAS); March 1936, *Murbarger* 109 (UC); Northwest Harbor; Wilson Cove, 200 ft, 9 April 1962, 17164; rocky places, east coast, 9 April 1923, *Munz* 6641 (POM); canyon north of Nanny; below Lemon Tank; Seal Cove; east side below a point about 2 miles north of Thirst, 1550 ft; Middle Ranch, 17 Feb. 1941, *Moran* 578 (DS); head of canyon above Mosquito Cove; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 355 (DS); China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62338 (SBBG). Reported by Lyon.

**CHENOPODIUM MURALE* L. Scattered over the whole island, in clumps, and often in disturbed soil: Northwest Harbor, 20 ft, 11 April 1962, 17299; alkaline flat on west coast opposite Wilson Cove, 400 ft, 8 April 1923, *Munz* 6623 (POM, UC); canyon north of Nanny; Lemon Tank, 9 April 1923, *Munz* 6689 (POM, UC), *Peirson* 3481 (RSA); mesa top near old sheep corrals, April 1936, *Murbarger* 152 (UC); Seal Cove; just north of Guds, 820 ft, 9 May 1962, 17645; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62336 (SBBG). Reported by Eastwood, and possibly the basis for the record of *C. album* (Lyon).

MONOLEPIS NUTTALLIANA (Schult.) Greene. Local on dry rocky slopes near south end: south end, April 1936, *Murbarger* 126 (UC); just north of Guds, 820 ft, 9 May 1962, 17653.

SUAEDA CALIFORNICA S. Wats. Locally common around the island at low elevations, often in rocky soil: April 1936, *Murbarger* 145 (UC); North Head, 20 ft, 12 July 1962, 18040; large dunes near Wall 2, 20 ft, 10 June 1962, *Blakley* 5249 (SBBG); beach due west of Wall 2, 15 ft, 11 April 1962, 17266; low shore, west coast, 11 April 1923, *Munz* 6773 (POM); Wilson Cove, 100 ft, 7 May 1962, 17574; old airfield; 1 mile south of Wilson Cove on beach. Reported by Trask, and by Eastwood (as *S. torreyana*). I have no definite record from the south end but the plant undoubtedly occurs there. All material from San Clemente Island is pubescent and would thus be referable to var. *pubescens* Jeps., if that variety were recognized.

NYCTAGINACEAE

ABRONIA MARITIMA Nutt. ex S. Wats. Locally common and forming colonies at scattered localities on the dunes: 25 Aug. 1894, *Mearns* 4073 (DS); south, west, and north sides, April 1936, *Murbarger* 163 (UC); Northwest Harbor, 10 ft, 11 April 1962, 17296; northwest end, 22 Feb. 1949, *Wiggins* 11967 (DS, UC; specimen at RSA introgressed by *A. umbellata*, acc. Tillett); beach due west of Wall 2, 10 June 1962, *Blakley* 5258 (SBBG); Pyramid Cove, 4 July 1919, *Knoche* A1010 (DS). Reported by Trask.

ABRONIA UMBELLATA Lam. (*A. alba* Eastw., *A. insularis* Standl.). Near coast on sand dunes, farther up from the tide line than *A. maritima* when the two grow together, north, west, and south sides of island: April 1936, *Murbarger* 114 (UC); 25 March 1918, *Evermann* (CAS); Northwest Harbor, 20 ft, 11 April 1962, 17297; northwest coast, 8 April 1923, *Munz* 6607 (POM, UC); beach due west of Wall 2, 30 ft, 11 April 1962, 17253, 10 July 1962, 17952; sand flat $\frac{1}{4}$ mile toward Pyramid Cove from China Point, 100 ft, 9 June 1962, *Blakley* 5193 (SBBG). Reported by Lyon. Dr. S. S. Tillett of Occidental College has kindly advised me about this complex, and I have had access to his unpublished thesis (*The Maritime Species of Abronia*, Claremont University College, 1959). He feels that the variation in *A. umbellata* on the Channel Islands, which has resulted in plants described as *A. alba* Eastw. and *A. insularis* Standl., and the recognition of *A. umbellata* subsp. *alba* (Eastw.) Munz, can be explained on the basis of introgression from *A. maritima*. He has examined the type of *A. insularis* (San Clemente Island, Oct. 1902, *Trask* 50, US) and found it to be just such an introgressant. Since there are no distinctive populations found on the Channel Islands, but only a variable complex, formal taxonomic recognition does not seem to be called for.

MIRABILIS LAEVIS (Benth.) Curran. Common over the entire island on brushy or grassy slopes: March 1936, *Murbarger* 234 (UC); North Head; Wilson Cove, 8 April 1923, *Peirson* 3470 (RSA), 200 ft, 9 April 1962, 17174; canyon north of Nanny; Lemon Tank; 2 miles southeast of Eel Point, 75 m, 18 Sept. 1958, *Moran* 6848 (RSA, SD), 120 m, 9 March 1959, *Moran* 7170 (SD); Eel Point to Seal Cove, 20 ft, 11 April 1962, 17307; above and north of Seal Cove, 200 ft, 10 June 1962, *Blakley* 5238 (SBBG); east coast between Wilson Cove and Lemon Tank, 9 April 1923, *Munz* 6645 (POM); canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62384 (SBBG); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 347 (DS, UC); just north of Guds, 820 ft, 9 May 1962, 17655; Chenetti Canyon, 3 April 1939, *Dunkle* 234 (LAM, type of var. *cordifolia* Dunkle); China Point, 30 ft, 9 June 1962, *Blakley* 5183 (SBBG). Reported by Lyon (as *M. californica*), by Eastwood (as *Hesperonia cedrosensis* and *H. californica* var. *microphylla*), and by Dunkle (as *Mirabilis laevis*, *M. laevis* var. *cedrosensis*, and *M. laevis* var. *cordifolia*). This species is extremely variable on San Clemente Island, as elsewhere in southern California. *Mirabilis laevis* var. *cordifolia* Dunkle, described as an endemic of San Clemente Island, has the longer pubescence of the common mainland form, and appears merely to be a late season collection with smaller flowers. Plants with more scabrid pubescence and shorter anthocarps have been called var. *cedrosensis*, but there is no clear geographical separation between them and other populations of the species, even on San Clemente Island. I believe that the application of formal subspecific categories to this complex may at present be more confusing than helpful. Needless to say, a thorough systematic study is badly needed.

BATIDACEAE

BATIS MARITIMA L. San Clemente Island, April 1885, *Nevin* (DS). It is strange that this species was not recorded by Lyon, but there seems to be no valid reason to doubt the authenticity of this specimen. The plant has apparently not been collected on the island subsequently.

AIZOACEAE

**CARPOBROTUS CHILENSIS* (Mol.) N. E. Br. (*Mesembryanthemum chilense* Mol.). Cultivated and persisting, but not spreading, barracks area, Wilson Cove, 200 ft, 12 July 1962, 18045. The poor representation of species of this group in North America does not seem to me to be a valid reason for ignoring the well-characterized generic segregates recognized in other parts of the world.

**MESEMBRYANTHEMUM CRYSTALLINUM* L. (*Cryophytum crystallinum* (L.) N.E. Br.) Common in grassland throughout, but not as abundant as *M. nodiflorum*: March–May 1936, *Murbarger* 97 (DS, UC), 99 (UC); 13 April 1923, *Munz* 6785 (POM); north end; North Head to West Point; beach at northwest corner, 4 July 1919, *Knoche* A990 (DS); beach due west of Wall 2; Wilson Cove, 10 June 1962, *Blakley* 5214 (SBBG); bluffs 1 mile south of Wilson Cove, 11 July 1962, 18008; Seal Cove; Thirst; Guds; Pyramid Cove, 4 July 1919, *Knoche* A1015 (DS). Reported by Lyon. This species may have been more common when the island was more severely overgrazed. Trask (p. 92) writes, "Johnny [Robearts] says it increases yearly, and can recall when it never left the dunes. It now runs almost to the center on the tableland heights, to the exclusion of nearly all other plant-life; it soaks boots and leggings and makes 'time' impossible in its region."

**MESEMBRYANTHEMUM NODIFLORUM* L. (*Cryophytum nodiflorum* (L.) N. E. Br.). Abundant in grassland over the entire island: April 1885, *Nevin* (DS); 4 July 1919, *Knoche* A991 (DS); 13 April 1923, *Munz* 6786 (POM, UC); abundant over entire north end; beach west of Wall 2; Wilson Cove, 30 ft, 10 June 1962, *Blakley* 5215 (SBBG); 1 mile south of Wilson Cove, 11 July 1962, 18009; old airfield, 11 July 1962, 17995; canyon north of Nanny, at mouth; Seal Cove; Thirst; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 367 (DS, UC); Guds; Pyramid Cove, 4 July 1919, *Knoche* A1013 (DS). Reported by Lyon.

PORTULACACEAE

CALANDRINIA CILIATA (Ruiz & Pav.) DC. var. *MENZIESII* (Hook.) Macbr. Frequent in grassland throughout: mesa top and upper slopes of east side, March 1936, *Murbarger* 106 (UC); mesa summit, March 1936, *Murbarger* 108 (UC); Wilson Cove, 200 ft, 10 April 1962, 17183; canyon just south of Lemon Tank; west coast south of Lemon Tank, 10 April 1923, *Munz* 6751 (POM); Thirst, 1900 ft, 10 April 1962, 17198; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62381 (SBBG); canyon above Mosquito Cove; Guds. This whole complex, and especially the degree of relationship between the North and South American plants, needs to be restudied.

CALANDRINIA MARITIMA Nutt. Only one plant noted on entire island, on flat near the sea, April 1936, *Murbarger* 217 (UC).

MONTIA PERFOLIATA (Donn ex Willd.) Howell. Common throughout, on shaded or open slopes: March 1936, *Murbarger* 85 (UC); north end; Wilson Cove, 200 ft, 9 April 1962, 17163; canyon north of Nanny; canyon below Lemon Tank, 10 April 1923, *Munz* 6696 (POM); canyon on east coast north of Lemon Tank, 9 April 1923, *Munz* 6667 (POM); second canyon south of Seal Cove; east slopes of summit ridge about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17218; Twin Canyon; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62380 (SBBG); Cave Canyon; head of canyon above Mosquito Cove; Guds. Reported by Lyon (as *Claytonia perfoliata*). Perhaps better treated as a species of *Claytonia*.

CARYOPHYLLACEAE

ARENARIA DOUGLASII Fenzl ex T. & G. Rare on grassy slopes near head of canyon north of Thirst, 1400 ft, 10 May 1962, 17718.

**CERASTIUM GLOMERATUM* Thuill. (*C. viscosum* auct.). Frequent on grassy slopes and in canyons, central part of island: March 1936, *Murbarger* 38 (UC); south of Lemon Tank, 10 April 1923, *Munz* 6715 (POM); canyon just north of Boulder; Thirst, 1900 ft, 10 April 1962, 17210; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62395 (SBBG); Cave Canyon; canyon south of Thirst; head of canyon above Mosquito Cove. Reported by Munz.

SILENE ANTIRRHINA L. Scattered in clayey grassland, found nearly throughout: west slope opposite Wilson Cove, 200 ft, 8 May 1962, 17634; west side, April 1936, *Murbarger* 157 (UC); west side 2.4 miles due south of Wilson Cove, 450 ft, 8 May 1962, 17637; above Mosquito Cove, 1100 ft, 9 May 1962, 17680; canyon south of Mosquito Cove; Guds. Possibly introduced.

**SILENE GALLICA* L. Common in grassland over the entire island: March 1936, *Murbarger* 64 (UC); north end; Wilson Cove, 8 April 1923, *Pierson* 3447 (RSA), 200 ft, 10 April 1962, 17184; Wilson Cove to Lemon Tank, 8 April 1923, *Munz* 6635 (POM); canyon north of Nanny; Seal Cove; Twin Canyon; Thirst; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62386 (SBBG); Cave Canyon; Guds; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62334 (SBBG). Reported by Munz.

**SPERGULARIA BOCCONEI* (Scheele) Aschers. & Graebn. Occasional along dry streams or near the coast, generally at low elevations: west coast, 8 April 1923, *Munz* 6628 (POM, UC; det. Rossbach); beach due west of Wall 2, 30 ft, 11 April 1962, 17267, 20 ft, 11 April 1962, 17256; Wilson Cove, 250 ft, 8 May 1962, 17615; canyon south of Lemon Tank; summit of plateau above Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 388 (DS; det. Rossbach). Reported by Eastwood (her record of *S. rubra* based on the collection by Abrams and Wiggins).

SPERGULARIA MACROTHECA (Hornem. ex Cham. & Schl.) Heynh. var. *MACROTHECA*. Around the coast at low elevations, often on grassy or bare bluffs, common: 9 Sept. 1926, *Jones* (DS, POM); 25 Aug. 1894, *Mearns* 4079 (DS); 25 Aug. 1894, *Brandege* (UC); northwest coast, 8 April 1923, *Munz* 6608 (POM, UC); Northwest Harbor; West Point; northern end, 22 Feb. 1949, *Wiggins* 11962 (DS, UC); west coast, 400 ft, 8 April 1923, *Munz* 6627 (POM); Wilson Cove, 21 Feb. 1949, *Wiggins* 11958 (DS, RSA, UC), 50 ft, 15 Sept. 1958, *Moran* 6836 (DS, RSA, SD, UC), 200 ft, 9 April 1962, 17145; east side, March 1936, *Murbarger* 65 (UC); mouth of canyon north of Nanny; 1.7 miles southeast of Eel Point, 10 m, 15 Sept. 1958, *Moran* 6856 (SD); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 360 (CAS, DS, UC); China Point, 10–50 ft, 9 June 1962, *Piehl* 62361 (SBBG). Reported by Lyon (as *Lepigonum macrothecum*). Rossbach (*Rhodora* 42: 75–76, 1940) discussed *S. macrotheca* var. *talinum* (Greene) Jeps. (type locality, Guadalupe Island), which in extreme form is characterized by its short internodes, crowded leaves, strict inflorescences standing above the foliage, and relatively small seeds (0.5–0.7 mm instead of 0.7–0.9 mm). Certain collections from San Clemente Island, especially those made late in the season, approach this form in habit. Rossbach concluded that var. *talinum* does not represent a consistent geographical entity. In my opinion the matter should not be regarded as closed and the complex needs more study, especially in the experimental garden, since the plants vary so widely in their ecology in nature and probably also show seasonal variation, as suggested above.

SPERGULARIA MARINA (L.) Griseb. var. *MARINA*. Rare, along watercourses in clay soil at high elevations: mesa top, March 1936, *Murbarger* 112 (UC: det. Rossbach); Thirst, 1900 ft, 10 April 1962, 17205, 9 June 1962, *Piehl* 62373 (SBBG). Reported by Munz (as *S. salina*). A similar species of *Spergularia* was seen at Guds, but it may have been *S. bocconei*. The two appear to be exactly similar on San Clemente Island, differing only in stamen number; and since these plants differ considerably from what is called *S. marina* in Europe, it would seem that a new investigation of the group might prove profitable.

**STELLARIA MEDIA* (L.) Vill. Infrequent, in grassland near central part of island: Twin Canyon; gully to west side of island about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17235; second canyon south of Seal Cove. Reported by Eastwood. In American literature, the binomial *Stellaria media* is usually attributed to Cyrillo (Char. Comm., p. 36, 1784); in fact he did not make the combination at all, but merely suggested it. The correct reference then is Villars, Hist. Dauph. III. II. 615, 1789.

RANUNCULACEAE

DELPHINIUM VARIEGATUM T. & G. Forming colonies locally in clayey grassland at relatively high elevations: dry mesa summit and on south end, April 1936, *Murbarger* 49 (UC); head of Eagle Canyon, 1600 ft, 9 May 1962, 17700; Mosquito Cove to Pyramid Cove trail, 6 April 1939, *Dunkle* 7322 (LAM). Reported by Lyon, and in error by all subsequent authors as *D. parryi*. Determinations of first two specimens by Prof. Harlan Lewis. Prof. J. Ewan has kindly informed me that the specimen mentioned by him (Univ. Colo. Stud., ser. D, 2: 181–182, 1945) as *D. parryi* (*W. P. Cockerell* in 1939) was probably fragmentary and may well have been discarded.

PAPAVERACEAE

DENDROMECON RIGIDA Benth. subsp. *RIGIDA*. Reported by Trask from an open canyon mouth somewhere near Northwest Harbor ("the 'nor'-west' coast") and at the head of some of the precipitous dips near the south end ("East End"). Apparently not since collected. There is a general tendency to treat Channel Islands material as a separate species, *D. barfordii* Kell., with a var. *rhamnoides* (Greene) Munz (*D. rhamnoides* Greene; type from San Clemente Island, June 1903, *Trask*, US; not seen), on Santa Catalina and San Clemente Islands. I can, however, see no consistent differences between *D. barfordii* var. *rhamnoides* and the broader-leaved individuals of the variable *D. rigida* from the mainland. Plants from Santa Rosa and Santa Cruz islands, on the other hand, with their very broad, obtuse leaves, are fairly distinct, and I propose that they be considered a distinct subspecies, *D. rigida* Nutt. subsp. *harfordii* (Kell.) comb. nov. (based on *D. barfordii* Kell., Proc. Calif. Acad. 5: 102, 1873; type locality, Santa Rosa Island). I am most grateful to Dr. W. R. Ernst for his comments on this problem.

ESCHSCHOLZIA RAMOSA (Greene) Greene. Common on grassy, often somewhat protected slopes, and found over the entire island: 25 March 1918, *Evermann* (CAS); April 1936, *Murbarger* 19 (UC); north end; beach due west of Wall 2, 30 ft, 11 April 1962, 17263; Wilson Cove, 200 ft, 9 April 1962, 17165; Seal Cove; bluffs northwest of Eagle Ranch (probably near mouth of Middle Ranch Canyon), 11 April 1923, *Munz* 6763 (POM), *Peirson* 3469 (RSA); gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17233; just north of Guds, 820 ft, 9 May 1962, 17646; China Point, 20 ft, 9 June 1962, *Piehl* 62356 (SBBG). Reported by Lyon (as *E. elegans* var. *ramosa*), this the basis for Brandege's report of *E. californica*; others have reported it as *E. elegans*. Dr. W. R. Ernst (Contr. Dudley Herb. 5: 111, 1958) determined the chromosome number of *E. ramosa* from Guadalupe Island,

the type locality, as $n=12$, which is the same number (Ernst, unpubl.) found in one plant of my no. 17263, cited above. Specimens of *E. ramosa* and *E. elegans* Greene sometimes are separated with difficulty; however, the chromosome number of *E. elegans* was determined from Guadalupe Island, the type locality, as $n=17$ (loc. cit.; and later from a cultivated plant as $n=18$). Ernst presently considers *E. elegans* possibly restricted to Guadalupe Island, while plants closely resembling *E. ramosa*, more widely distributed, have been collected on Santa Cruz, Santa Barbara, Santa Catalina, San Clemente, Guadalupe (type locality), Coronado, Todos Santos, San Benito, and Cedros islands, but not on the mainland. Further studies of the island complex will of course be necessary, but all of the dozens of colonies of this genus I examined from San Clemente Island appeared to belong to the same taxon, although they vary a great deal with age. Thanks are due Dr. Ernst for his valuable comments on this subject.

STYLOMECON HETEROPHYLLA (Benth.) G. Tayl. Scattered colonies on canyonsides along the northern part of the east coast: gully just above the coast 1 mile south of Wilson Cove, 75 ft, 7 May 1962, 17582; canyon about 5 miles south of Wilson Cove, 9 April 1923, Munz 6656 (POM), Peirson 3445 (RSA). Reported by Lyon (as *Papaver heterophyllum*). In his unpublished dissertation (*A Comparative Morphology of the Papaveraceae*, Stanford Univ., 1962), Ernst has pointed out the great need for a re-evaluation of the generic concepts *Papaver*, *Meconopsis*, and *Stylomecon*, together with their segregates, in the light of detailed comparative information that has accumulated recently.

CRUCIFERAE

***BRASSICA NIGRA** (L.) Koch. Reported by Trask (p. 93): "In one locality—an old harbor—*Brassica nigra* flourished six feet tall." These observations might pertain to *Hirschfeldia incana*, and the record needs to be confirmed.

***BRASSICA RAPA** L. (*B. campestris* L.). Scattered local weed in barracks area, Wilson Cove, 300 ft, 8 May 1962, 17618. The distinctions between this species and *B. campestris* do not appear valid; in the present collection the roots were somewhat tuberous.

***CAKILE MARITIMA** Scop. Common on sandy beach behind Northwest Harbor, 20 ft, 11 April 1962, 17294. Probably not present when Murbarger collected extensively in the area in 1936.

***CAPESELLA BURSA-PASTORIS** (L.) Medic. Occasional weed in grassland, central and southern parts of the island: canyon south of Lemon Tank; Twin Canyon; east side below a point about 2 miles north of Thirst, 1550 feet, 10 April 1962, 17229; grassy slope south of Lemon Tank, 850 ft, 10 April 1923, Munz 6728 (POM); mesa summit and higher eastern slopes, March 1936, Murbarger 5 (UC); canyon west of Thirst; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, Piehl 62323 (SBBG).

DESCURAINIA PINNATA (Walt.) Britt. subsp. **MENZIESII** (DC.) Detl. Rare, canyonsides on west side of central part: floor of Middle Ranch Canyon, 750 ft, 12 April 1962, 17333; canyon on west coast south of Lemon Tank, 10 April 1923, Munz 6740 (POM); Cave Canyon. Reported by Munz (as *D. pinnata*). The plants from San Clemente Island and some of those from Guadalupe Island have been considered subsp. *halictorum* (Cockerell) Detl. (Am. Midl. Nat. 22: 481-520, 1939) but their affinities with subsp. *menziesii* are more obvious.

***HIRSCHFELDIA INCANA** (L.) Lagr.-Foss. (*Brassica geniculata* (Desf.) J. Ball). Two colonies noted on grassy slopes: near the airfield, north end; slope overlooking Pyramid Cove, 550 ft, 9 May 1962, 17660.

LEPIDIUM LASIOCARPUM Nutt. var. **LASIOCARPUM**. Common on dunes all around north and west coasts, south to China Point at the south end: east end of Northwest Harbor, 100 ft, 12 July 1962, 18025; northwest coast, 8 April 1923, Munz 6609 (POM); beach due west of Wall 2, 20 ft, 11 April 1962, 17258; dunes opposite Wilson Cove, 8 April 1923, Peirson 3448 (RSA); Eel Point to Seal Cove, 20 ft, 10 June 1962, Blakley 5231 (DS, SBBG); China Point, 50 ft, 9 June 1962, Piehl 62359 (DS, SBBG). Reported by Hitchcock (Madroño 3: 290, 1936).

LEPIDIUM LATIPES Hook. Locally common around vernal pools in clayey grassland, central upland: with *L. nitidum*, just south of the Tomb, 1000 ft, 12 April 1962, 17337; mesa summit, April 1936 Murbarger 236 (UC). Reported by Eastwood (as *L. dictyotum* var. *acutidens*).

LEPIDIUM NITIDUM Nutt. var. **NITIDUM**. Fairly common on grassy slopes throughout: 25 March 1918, Evermann (CAS); Wilson Cove, 200 ft, 9 April 1962, 17134; south of Lemon Tank, 10 April 1923, Munz 6716 (POM); Thirst, 1900 ft, 10 April 1962, 17197, 9 June 1962, Blakley 5181 (SBBG), Piehl 62364 (SBBG); east of Peak 1135 south of Mosquito Cove, 1000 ft, 9 June 1962, Piehl 62322 (SBBG); Guds. Reported by Lyon.

***RAPHANUS RAPHANISTRUM** L. Locally abundant at north end of island and, at least formerly, elsewhere: two places on island, 4-6 ft tall around old sheep corrals, April 1936, Murbarger 192 (UC); Northwest Harbor, 20 ft, 11 April 1962, 17300, 30 ft, 12 July 1962, 18034. Of the two collections I made at Northwest Harbor, the earlier one had yellow petals and long, several-seeded siliques; the later one had purplish petals and shorter siliques. I am not certain if the latter one had short fruits only

because it was late in its flowering season. In any case, the line of demarcation between this species and *R. sativus* L. in California is very poorly drawn and does not correspond well with the situation in Europe.

**SISYMBRIUM* *IRIO* L. Locally common in weedy ground: March 1936, *Murbarger* 63 (UC); Wilson Cove, 200 ft, 9 April 1962, 17140, 10 June 1962, *Blakley* 5224 (SBBG).

THELYPODIUM LASIOPHYLLUM (H. & A.) Greene. Rather frequent, usually on canyonsides and often in patches of *Opuntia*: Wilson Cove, 12 April 1923, *Peirson* 3451 (RSA), 200 ft, 9 April 1962, 17177; Wilson Cove to Lemon Tank, east coast, 8 April 1923, *Munz* 6631 (POM); canyon south of Lemon Tank, east coast, 10 April 1923, *Munz* 6730 (POM); second canyon south of Seal Cove; near foot of Middle Ranch Canyon, 350 ft, 12 April 1962, 17320; Cave Canyon, 10 July 1962, 17974; clayey grassland near head of canyon above Mosquito Cove, 1100 ft, 9 May 1962, 17679. Reported by Lyon (as *Sisymbrium reflexum*) and by Eastwood (as *Caulanthus lasiophyllus*). Even granting the extraordinary variability of this species, the last-cited collection represents a truly remarkable form, very purplish in fruit, with thick, stiff, erect siliques. It grew in the beds of dry pools in very heavy adobe soil.

THYSANOCARPUS LACINIATUS Nutt. Widely scattered on sheltered canyon slopes: March 1936, *Murbarger* 12 (UC); Wilson Cove, 8 April 1923, *Munz* 6625 (POM), *Peirson* 3446 (RSA); canyon north of Nanny; gully to west side of island about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17234; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62379 (SBBG); head of canyon above Mosquito Cove. Reported by Eastwood (as *T. ramosus*). Variable in silicle form, but probably none of the forms warranting taxonomic recognition.

TROPICOCARPUM GRACILE Hook. Scarce and scattered in clayey grassland of central ridge: east side, March 1936, *Murbarger* 16 (UC); slopes south of Lemon Tank, 700 ft, 10 April 1923, *Munz* 6731 (POM), 1500 ft, 10 April 1923, *Peirson* 3422 (RSA); east-facing slopes of summit ridge about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17217. Reported by Munz (as *T. gracile* var. *dubium*).

CAPPARIDACEAE

ISOMERIS ARBOREA Nutt. Common on rocky sides of lower reaches of canyon north of Nanny, north-east of Lemon Tank, 11 July 1962, 17989, and fairly common with *Eriophyllum nevini* on bluffs just above the sea near the mouth of this canyon. None of the segregates of this species appears to me to be of much value.

RESEDACEAE

OLIGOMERIS LINIFOLIA (Vahl) Macbr. Common on low flats along the western shore: near south end of Seal Cove, 50 ft, 8 May 1962, 17601; near lighthouse, China Point, 9 June 1962, *Blakley* 5188 (SBBG); cliff in canyon west of road 2.5 miles north of China Point, 575 ft, 9 June 1962, *Blakley* 5199 (SBBG). Reported by Lyon (as *O. subulata*), and by Eastwood (as *O. glaucescens*).

CRASSULACEAE

CRASSULA ERECTA (H. & A.) Berger (*Tillaea erecta* H. & A.). Abundant in a variety of habitats over the entire island, and often coloring fairly extensive areas red: March 1936, *Murbarger* 160 (UC); beach due west of Wall 2, 30 ft, 11 April 1962, 17272; Wilson Cove, 8 April 1923, *Munz* 6600 (POM), 200 ft, 9 April 1962, 17175; Middle Ranch, 15 Feb. 1941, *Moran* 468 (DS, LAM); Thirst, 1900 ft, 10 April 1962, 17208; Guds; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62326 (SBBG). Reported by Dunkle. In my opinion, the burden of proof is on those who would recognize *Tillaea* as a distinct genus.

DUDLEYA VIRENS (Rose) Moran. Common on rocky cliffs and slopes in the central and southern parts of the island: June 1904, *Trask* (UC); *Miller*, grown at Berkeley by Jack Whitehead, *Moran* 1869 (UC; n=17); 25 Aug. 1894, *Brandegge* (UC; isotype of *Stylophyllum albidum* Rose); canyon north of Nanny; canyon below Lemon Tank, 750 ft, 10 July 1962, 17984; Seal Cove to Eel Point, 10 June 1962, *Blakley* 5244 (SBBG); walls of second canyon south of Seal Cove, 100 ft, 8 May 1962, 17607; Twin Canyon; near mouth of Middle Ranch Canyon, 500 ft, 18 Feb. 1941, grown at Berkeley, *Moran* 590 (UC; n=17); Middle Ranch Canyon, 350 ft, 17 Feb. 1941, *Moran* 584 (not seen); ocean cliffs on east side, April-June 1936, *Murbarger* 95 (UC); extreme south end, May 1936, *Murbarger* 96 (UC). Reported by Lyon (as *Cotyledon*?), and by others (as *Stylophyllum albidum* and *S. virens*). The type of this species was obtained at the south ("east") end of the island, June 1903, by Blanche Trask (US; not seen). The plants called *Stylophyllum hassei* Rose from Santa Catalina Island are tetraploid (n=34) and probably should be regarded as specifically distinct from the diploid (n=17) *D. virens*; but whether *S. albidum* or any of the plants on San Clemente Island are tetraploid remains to be seen (R. Moran, pers. comm.).

SAXIFRAGACEAE

JEPSONIA MALVIFOLIA (Greene) Small. Probably common on rocky slopes in clayey grassland over

the entire island, but rarely collected: May–Oct. 1898, *Purpus* (UC); 9 Sept. 1926, *Jones* (POM); canyon near Lemon Tank, 10 April 1923, *Munz 6725a* (POM); east slopes of summit ridge about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17222; Cave Canyon; Guds. Reported by Trask. According to Dr. R. Ornduff (pers. comm.), *J. malvifolia* differs from *J. parryi* (Torr.) Small of the mainland of southern California in a number of characters, and is best regarded as a distinct species, as is *J. heterandra* Eastw. of the Sierra foothills. *Jepsonia malvifolia* is also found on Santa Cruz, Santa Rosa, San Nicolas, Santa Catalina, and Guadalupe islands.

LITHOPHRAGMA MAXIMA Bacigalupi (see p. 349). Known only from the type collection, two plants in a shady canyon on the east side, in moist rocks, April 1936, *Murbarger 118* (UC). On the 9th of April, 1923, Dr. P. A. Munz made a collection in the canyon below Lemon Tank (his no. 6697), which he called *Heuchera* in his field notes. Unfortunately, the specimen has been misplaced; it might well belong to this species, and indeed could be from the same locality as Mrs. Murbarger's gathering. Endemic.

RIBES MALVACEUM Sm. var. **MALVACEUM**. Scattered plants occur in a few shaded localities in the canyons on the east side: one large shrub in head of canyon north of Boulder; canyon north of Thirst, 1000 ft, 10 May 1962, *s. n.*; two plants, the larger 2.5 ft tall, near mouth of canyon at Whiterock. April 1936, *Murbarger 150* (UC); rare, summit above Mosquito Cove, 24 Nov. 1939, *Dunkle 7338* (LAM, type of var. *clementinum* Dunkle). Reported by Trask. *Ribes malvaceum* var. *clementinum* Dunkle does not, in my opinion, differ from mainland material in any important characteristic. Trask (p. 92) said of this species, "In many a moist nook of the great north [-east] coast gulches, thrives a *Ribes* . . . becoming tree-like, even twelve feet high and eight inches in diameter . . ." Whether she was exaggerating the abundance of this species or whether it has subsequently become rarer, it is difficult to say.

CROSSOSOMATACEAE

CROSSOSOMA CALIFORNICUM Nutt. On the western slope of the island, perhaps confined to a single canyon: canyon west of Middle Ranch, 8 plants to 10 ft tall, April 1936, *Murbarger 119* (UC); in one locality, a few shrubs 10 ft tall crowded into a cleft (Trask); Eagle Ranch ("Hay Ranch") (=Middle Ranch?), 11 April 1923, *Munz & Smith 6717* (POM, UC), *Peirson 3444* (RSA); one nonflowering shrub 2 dm tall, 5 dm across, on steep rocky walls of gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17250. Reported by Trask. Perhaps the single small shrub I observed is the only one left on the island; all of the collections cited above may have come from the same colony.

ROSACEAE

ADENOSTOMA FASCICULATUM H. & A. var. **FASCICULATUM**. Rare, perhaps occurring in two localities: arid heights of east ("north") coast, 10–12 ft tall, 1–6 in in diameter (Trask); not more than a dozen shrubs, to 10 ft tall and 6 in in diameter, on a single ridge on east side, May 1936, *Murbarger 187* (UC); rare, head of Horse Canyon, 24 Nov. 1939, *Dunkle 7347* (LAM), the area burned over several years prior to 1962, and no shrubs seen then. Reported by Trask.

HETEROMELES ARBUTIFOLIA (Lindl.) M. Roem. (*Photinia arbutifolia* Lindl.). Scattered trees common in canyons throughout: 25 Aug. 1894, *Mearns 4076* (DS, UC), *Brandeggee* (UC); many 30 ft tall, April 1936, *Murbarger 120* (UC); coast 1 mile south of Wilson Cove, 75 ft, 7 May 1962, 17588; canyon north of Nanny; canyon below Lemon Tank, 800 ft, 10 July 1962, 17985; canyon on east coast south of Lemon Tank, 10 April 1923, *Munz 6759* (POM, UC); Twin Canyon; gully to west side of island about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17246; Horse Canyon; Cave Canyon, 10 July 1962, 17973; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins 385* (DS, UC); Mosquito Cove, deep canyon, 4 July 1919, *Knoche A1003* (DS); rocky canyon on east coast south of Mosquito Cove, 9 June 1962, *Blakley 5208* (SBBG); Guds; canyon west of road 2.5 miles north of China Point, 9 June 1962, *Blakley 5201* (SBBG). Reported by Mearns (U. S. Nat. Mus. Bull. 56: 57. 1907). The entity described as *Photinia arbutifolia* var. *macrocarpa* Munz (Bull. So. Calif. Acad. Sci. 31: 64. 1932), based on *Munz 6759*, is said to occur on Santa Catalina and San Clemente islands. I have not seen enough mature fruiting material from these islands to convince myself that all is referable to this variety (with fruits 8–10 mm long, instead of 5–6 mm), and further some collections I have examined from Santa Cruz and Santa Rosa islands have fruits as large as "typical" plants of var. *macrocarpa*. Therefore I propose not to recognize it formally, pending further studies.

LYONOTHAMNUS FLORIBUNDUS A. Gray subsp. **asplenifolius** (Greene) comb. nov. (based on *L. asplenifolius* Greene, Bull. Calif. Acad. Sci. 1: 187. 1886; *L. floribundus* var. *asplenifolius* (Greene) Brandeggee). To summarize the distribution of this species on the island, I can do no better than to quote Mrs. Trask (p. 90–1): "Small stunted groves . . . are occasionally met on the south [=west] coast heights, but it is on the north [=east] coast that it ever follows—who can say why—ledges of exposed rocks as trails and under these beclouded crests it marches in long defiles like a conquering army, one to two feet in diameter; ten to twenty-five feet high; strong, heavy trunks, and never an entire leaf . . .". The trees occur in all canyons from Thirst to the south end: 25 Aug. 1894, *Mearns 4049* (DS, UC), *Brandeggee* (DS, POM, UC); 25 March 1918, *Evermann* (CAS); May 1936, *Murbarger 194* (UC);

Twin Canyon, 2 trees; 11 trees, 5 alive, on east rim of Middle Ranch Canyon, 18 Feb. 1941, *Moran* 596 (IAM; none alive in 1962, but one still had leaves); canyon south of Lemon Tank, east coast, 10 April 1923, *Munz* 6758 (POM, UC), *Peirson* 3454 (RSA); canyon east of Thirst, 1000 ft, scattered clumps, 10 June 1962, *Piehl* 62404 (SBBG), 1200 ft, scattered, *Piehl* 62408 (SBBG); 2 trees, 1 dying, Horse Canyon; 2 living trees, with 6 dead ones nearby, upper reaches of Cave Canyon, 10 July 1962, 17971; canyon south of Thirst; Eagle Canyon, several hundred trees, 1000 ft, 9 May 1962, 17691A; Mosquito Cove, 900 ft, 4 July 1919, *Knoche* A1004 (DS); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 382 (CAS, DS, UC); few dozen scattered trees, steep canyon wall near head of canyon above Mosquito Cove, 900 ft, 9 May 1962, 17682; below Peak 1135, south of Mosquito Cove, scattered groves, 9 June 1962, *Piehl* 62321 (SBBG). Reported by Trask. I prefer to designate this sort of geographical race as a subspecies. This subspecies is found on Santa Cruz, Santa Rosa, and San Clemente islands, whereas subsp. *floribundus* is found only on Santa Catalina Island. The two appear different in habit in nature, but hybridize freely under cultivation. Seedling leaves of the Catalina plants are like those of subsp. *asplenifolius*. Although the latter has been reported from Santa Catalina Island, I have seen little evidence for this. A collection from Catalina, May 1889, *Brandegee* (UC) has a branch of *floribundus* and one of what appears to be *asplenifolius* in bud, but it would be very desirable to relocate trees of the dissected-leaved subspecies on that island before definitely concluding that it is there. As indicated in the discussion of localities, many of the groves on San Clemente Island, particularly those on the west side, are being decimated, principally by the activities of the goats in wearing away the soil around their bases and causing them to fall, and in eating the seedlings. No seedlings were seen on San Clemente Island. Dr. Martin Piehl observed a hummingbird feeding at the flowers of the grove from which he obtained his no. 62404.

PRUNUS ILICIFOLIA (Nutt. ex Hook. & Arn.) Walp. subsp. *lyonii* (Eastw.) comb. nov. (based on *Cercasus lyonii* Eastw., Occ. Papers Calif. Acad. Sci. 9: 54. 1905; *Prunus lyonii* (Eastw.) Sarg.; *P. ilicifolia* var. *occidentalis* Brandegee). Groves scattered in all the principal canyons of the central and southern portions of the island, more common on the east slope: 25 Aug. 1894, *Mearns* 4063 (DS), *Brandegee* (UC); to 50 ft tall, May 1936, *Murbarger* 203 (UC); 25 March 1918, *Evermann* (CAS); canyon below Lemon Tank; Twin Canyon; 4 trees on canyon side 2 miles southeast of Eel Point, 50 m, *Moran* 6844 (DS, SD); canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62392 (SBBG), 62402 (SBBG); 6 large trees, upper reaches of Cave Canyon, 10 July 1962, 17972, the roots of all severely eroded; canyon south of Thirst; Eagle Canyon, 1000–1200 ft, handsome groves of trees up to 40 ft tall and 2 ft 6 in in diameter, 9 May 1962, 17703; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 386 (DS, UC); 1 tree 10 ft tall, canyon just north of Guds, 650 ft, 9 May 1962, 17643; China Canyon 2 miles above China Point, 550 ft, 1 tree 10 ft tall, 9 June 1962, *Blakley* 5196 (SBBG). Reported by Trask. Island plants of this species are more arborescent than the mainland ones, have black instead of red drupes, and generally have entire leaves (except for seedlings). Plants with black fruits are occasionally found on the mainland, and the two subspecies readily produce vigorous, fertile hybrids when grown side by side. Further, many of the collections I have seen from Santa Cruz and Santa Rosa islands consist of plants with somewhat toothed leaves. In summary, I believe that subspecific status may reflect somewhat better the relationships of these two entities; in many ways, they appear analogous to the two subspecies of *Lyonothamnus*. *Prunus ilicifolia* subsp. *ilicifolia* may occur on Santa Catalina Island, but I am unable to substantiate its occurrence on San Clemente Island, as reported by Eastwood; nor have I seen material of subsp. *lyonii* from the mainland of Baja California, although it is reported from San Julio Canyon on the west side of the Sierra Giganta (*Brandegee*, Proc. Calif. Acad. Sci., ser. 2, 2: 117–216, 1889).

LEGUMINOSAE

ASTRAGALUS DIDYMOCARPUS H. & A. var. *DIDYMOCARPUS*. On one fertile flat, June 1903, *Trask* 206 (CAS; det. Barneby).

ASTRAGALUS MIGUELENSIS Greene. Common on dunes and sandy flats, occasional on sea bluffs; north, west, and south shores of the island: 25 Aug. 1894, *Brandegee* (UC); Wilson Cove, 200 ft, 11 July 1962, 18012; east end of Northwest Harbor, 100 ft, 12 July 1962, 18028; Northwest Harbor, 20 ft, 11 April 1962, 17298; northern end, 22 Feb. 1949, *Wiggins* 11960 (DS); northwest coast, 8 April 1923, *Munz* 6606 (DS, POM, UC), *Peirson* 3467 (RSA); beach due west of Wall 2, 20 ft, 11 April 1962, 17259, 10 July 1962, 17955; west and south end of island. April 1936, *Murbarger* 115 (UC); China Point, 10 ft, 9 June 1962, *Blakley* 5192 (SBBG). Reported by Barneby (in *Munz*, Calif. Fl., p. 877. 1959).

ASTRAGALUS NEVINII A. Gray. Throughout the same area as *A. miguelensis*, and often growing with it, but less common: April 1885, *Nevin & Lyon* (DS, UC; type collection); bluffs 1 mile south of Wilson Cove, 11 July 1962, 18007; east end of Northwest Harbor, 100 ft, 12 July 1962, 18029; north ("west") end on dunes, *Trask* 279 (RSA); near western shore opposite Wilson Cove, 150 ft, 8 May 1962, 17624; Eel Point to Seal Cove, 25 ft, 10 June 1962, *Blakley* 5233 (SBBG); west and south end

of island, April 1936, *Murbarger* 124 (UC). Endemic; records of *A. traskiae* from San Clemente Island refer to the present species.

LATHYRUS LAETIFLORUS Greene subsp. *BARBARAE* (White) C. L. Hitchc. Occasional, protected slopes in canyons, central part of island: canyon below Lemon Tank; east side, March 1936, *Murbarger* 32 (UC); canyon south of Lemon Tank, west coast, 10 April 1923, *Munz* 6736 (POM), *Peirson* 3455 (RSA); gully to west about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17247 (flowers white with pinkish wash); canyon just north of Thirst, 1100 ft, 10 April 1962, 17713. Reported by Munz (as *L. strictus*). The population on San Clemente Island is about as similar to *L. vestitus* Nutt. subsp. *puberulus* (White ex Greene) C. L. Hitchc. as it is to *L. laetiflorus*, and since the two appear to replace one another geographically (cf. Hitchcock, Univ. Wash. Publ. Biol. 15: 21–23. Map 2. 1952), it might be better to treat them as subspecies of a single species. The flower color of the San Clemente Island plants is similar to that of *L. laetiflorus* but their calyces resemble those of *L. vestitus*.

LOTUS ARGOPHYLLUS (A. Gray) Greene subsp. *adsurgens* (Dunkle) comb. nov. (based on *L. argophyllus* var. *adsurgens* Dunkle, Bull. So. Calif. Acad. Sci. 39: 197, 1941). "Very scarce. On second bluff above sea on South end of Island there were 38 plants in an area of $\frac{1}{4}$ acre. On West side of Island, about 900 feet elev. nine more plants occurred... Grew upright..." April 1936, *Murbarger* 146 (UC); without definite locality, 25 Aug. 1894, *Brandeggee* (UC); rocky bluff, Pyramid Cove, shrubby, 2 April 1939, *Dunkle* 7200 (LAM, type). Reported by Ottley (Univ. Calif. Publ. Botan. 10: 237, 1923; as var. *niveus*). A beautiful, silvery, suffrutescent plant with densely crowded, ascending leaves, perhaps related to *L. argophyllus* var. *niveus* (Greene) Ottley of San Cruz Island. Endemic, and very distinctive.

LOTUS ARGOPHYLLUS subsp. *ornithopus* (Greene) comb. nov. (based on *Hosackia ornithopus* Greene, Bull. Calif. Acad. Sci. 1: 185, 1885). Relatively low elevations, especially in sandy soil, over the entire island: March 1936, *Murbarger* 2 (UC); Northwest Harbor; beach west of Wall 2, 30 ft, 11 April 1962, 17281; opposite Wilson Cove, 8 April 1923, *Munz* 6611 (POM, UC); Wilson Cove, 10 m, 15 Sept. 1958, *Moran* 6482 (SD), 200 ft, 9 April 1962, 17149, 250 ft, 12 July 1962, 18043; 2 miles southeast of Wilson Cove, 9 April 1923, *Peirson* 3468 (DS, RSA); bluffs at mouth of canyon north of Nanny; Middle Ranch, 19 Feb. 1941, *Moran* 594 (DS); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 343 (CAS, DS, UC); Guds; China Point, 4 April 1939, *Dunkle* 7252 (LAM, type of var. *bancroftii*), 5 April 1939, *Dunkle* 7273 (LAM, type of var. *argenteus*), 30 ft, 9 June 1962, *Blakley* 5187 (SBBG). Reported by Lyon, by Brandeggee (as *Hosackia argophylla*) and by Eastwood (as *Syrmatium ornithopus*). This subspecies also occurs on Santa Catalina, San Nicolas, and Guadalupe islands. Collections from Santa Barbara Island approach var. *niveus* of Santa Cruz Island, and through it, certain populations from coastal Monterey County (e. g., Point Sur, April 1923, *Bacigalupi*, DS). On the other hand, *L. a. ornithopus* is very different from *L. a. argophyllus* of the mainland of southern California, and clearly has northern affinities. Dunkle described *L. argophyllus* var. *argenteus* (Bull. So. Calif. Acad. Sci. 39: 197, 1941) and var. *bancroftii* (op. cit., p. 197) from San Clemente Island; in my opinion, they are minor forms, differing slightly in pubescence. A more notable variation was collected by Mrs. Nell Murbarger (her no. 166), with the following data, "Found only four plants on West side, near the sea... These leaves smaller than [subsp. *ornithopus*], rounder. April" 1936 (UC). The specimen is part of a plant with small, nearly sessile bunches of flowers, which approaches populations from mainland southern California called *L. argophyllus* var. *decorus* (I. M. Johnst.) Ottley.

LOTUS HAMATUS Greene. Rare in clayey grassland on west side, near Seal Cove: above Seal Cove, 80 ft, 8 May 1962, 17591; second canyon south of Seal Cove. Reported by Eastwood (as *Syrmatium micranthum*).

LOTUS SCOPARIUS (Nutt.) Ottley subsp. *traskiae* (Eastw. ex Abrams) comb. nov. (based on *Syrmatium traskiae* Eastw. ex Abrams, Fl. Los Angeles, p. 201, 1917). Rare and scattered in rocky grassland at Wilson Cove and near Mosquito Cove, perhaps elsewhere: west and east sides, March 1936, *Murbarger* 44 (UC); Wilson Cove, 21 Feb. 1949, *Wiggins* 11956 (DS, SD), 15 Sept. 1958, *Moran* 6841 (SD), 10 April 1962, 17179, 7 May 1962, 17578, 12 July 1962, 18044; Mosquito Cove, *Trask* 287 (US, type, not seen). Reported by Trask (as *L. traskiae*), and also the basis for reports of *Lotus scoparius* var. *dendroideus*. Endemic. These plants have pods (2–)3–5 cm long with (3–)4–8 seeds. In other populations of *L. scoparius*, the pods very rarely reach 1.5 cm long and only exceptionally have as many as 3 seeds. Although *L. scoparius* var. *brevialatus* Ottley, which occurs along the desert margins, appears to be a distinct geographical race, the plants segregated as *L. scoparius* var. *dendroideus* (Greene) Ottley from the Channel Islands and adjacent mainland intergrade so broadly with more inland populations that I doubt if they can be delimited in a very meaningful way at present.

LOTUS STRIGOSUS (Nutt.) Greene. Infrequent in grassland and on canyon floors, more common on the west side: west side, March 1936, *Murbarger* 22 (UC), April 1936, *Murbarger* 167 (UC); canyon south of Lemon Tank, west coast, 10 April 1923, *Munz* 6750 (POM, UC); near mouth of canyon at

south end of Seal Cove, 75 ft, 8 May 1962, 17600; second canyon south of Seal Cove; 1.5 miles north of Thirst; common in floor of Eagle Canyon, 1400 ft, 9 May 1962, 17705.

LUPINUS BICOLOR Lindl. subsp. *UMBELLATUS* (Greene) D. Dunn. Common in grassland, central and southern parts of island: 6 April 1939, *Dunkle* 7321 (LAM); east side, March 1936, *Murbarger* 41 (UC); canyon on east coast south of Lemon Tank, 10 April 1923, *Munz* 6742 (POM); north of Middle Ranch, 19 Feb. 1941, *Moran* 592 (DS); canyon just north of Thirst, 800 ft, 10 May 1962, 17716; Thirst, 1965 ft, 9 June 1962, *Blakley* 5180 (SBBG), 1900 ft, 10 April 1962, 17195; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62406 (SBBG); head of canyon south of Mosquito Cove, 1000 ft, 9 June 1962, *Piehl* 62320 (SBBG); Mosquito Ridge, 6 April 1939, *Dunkle* 7319 (LAM); Guds; slope overlooking Pyramid Cove, 550 ft, 9 May 1962, 17661. Reported by Eastwood (as *L. bicolor*).

LUPINUS CONCINNUS J. G. Agardh var. *AGARDHIANUS* (Heller) C. P. Smith. Very rare in canyons near central part of island: canyon south of Lemon Tank, west coast, 10 April 1923, *Munz* 6747 (POM, UC), *Peirson* 3426 (RSA); Horse Canyon; Eagle Canyon, 1400 ft, 9 May 1962, 17706.

LUPINUS GUADALUPENSIS Greene, Bull. Calif. Acad. Sci. 1: 184, 1885 (*L. clementinus* Greene, Leaflet. Botan. Obs. 2: 85, 1910; *L. moranii* Dunkle, Bull. So. Calif. Acad. Sci. 42: 33, 1943; *L. aliclementinus* C. P. Smith, Sp. Lupin., p. 408, 1944). Uncommon; forming colonies locally near central part of island: frequent, 2 ft tall, June 1903, *Trask* 258 (US; type of *L. clementinus*); east side near sea, March 1936, *Murbarger* 15 (UC); gravelly bed of wash, Middle Ranch Canyon, 18 Feb. 1941, *Moran* 587 (LAM, type of *L. moranii*; DS, type of *L. aliclementinus*). Reported by Dunkle (as *L. nanus*). At the suggestion of Dr. David B. Dunn, I compared the type of *L. guadalupensis* (Guadalupe Island, 23 April 1885, *Greene*, CAS) and other material from Guadalupe Island (24 April 1885, *Greene*, UC; 20 March 1897, *Brandege*, CAS, UC) with collections from San Clemente Island, and found that all clearly belonged to the same species. The type of *L. clementinus*, kindly sent on loan by the United States National Herbarium, is a plant that had been somewhat injured and partly regenerated at the base, leading *Greene* to think that it was a perennial; this has caused some confusion in the past. According to Dr. Dunn, *L. guadalupensis*, restricted to Guadalupe and San Clemente islands, is most closely related to *L. affinis* Agardh of the Micranthi, a species that ranges from Monterey Bay to Oregon at present. Its keel is densely ciliate in the upper half and not at the base as would be suggested by its position in the treatment of *Munz* (Calif. Fl., p. 814, 1959).

LUPINUS HIRSUTISSIMUS Benth. Very rare, canyons on southern part of east coast: east side close to tide line, April 1936, *Murbarger* 60 (UC); 1 plant, Eagle Canyon, 1400 ft, 9 May 1962, 17702; rare on recent burn, Mosquito Cove, 6 April 1939, *Dunkle* 7299 (LAM).

LUPINUS SUCCULENTUS Dougl. ex K. Koch. Local but colonial and probably found over the entire island in grassland: beach due west of Wall 2, 30 ft, 11 April 1962, 17280; Wilson Cove, 300 ft, 10 April 1962, 17190; 1 mile south of Wilson Cove; canyon north of Nanny; head of canyon above Mosquito Cove, 1100 ft, 9 May 1962, 17677; Guds; Pyramid Cove, 5 April 1939, *Dunkle* 7279 (LAM). Reported by Lyon (as *L. affinis*).

LUPINUS TRUNCATUS Nutt. ex H. & A. Scattered colonies in grassy canyonsides, central and southern parts: east side, March 1936, *Murbarger* 35 (UC); west coast south of Lemon Tank, 10 April 1923, *Munz* 6744 (POM); Middle Ranch Creek, 18 Feb. 1941, *Moran* 588 (DS); Mosquito Cove, recent burn, rare, 6 April 1939, *Dunkle* 7303 (LAM); Guds, 820 ft, 9 May 1962, 17649; Pyramid Cove, 7 April 1939, *Dunkle* 7334 (LAM). Reported by Trask.

**MEDICAGO POLYMORPHA* L. (*M. hispida* Gaertn.). Common in grassland throughout: north end; Northwest Harbor; east side, March 1936, *Murbarger* 67 (UC); Wilson Cove, 200 ft, 9 April 1962, 17130; Lemon Tank, 9 April 1923, *Munz* 6691 (POM); Seal Cove; Thirst; canyon above Mosquito Cove; Guds. Reported by Lyon (as *M. denticulata*). *Medicago polymorpha* f. *tuberculata* (Gren. & Godr.) Shinnars (*M. hispida* var. *confinis* (Koch) Burnat) is also widespread: Northwest Harbor; Wilson Cove, 200 ft, 9 April 1962, 17131; Thirst; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 396 (DS). Reported by Eastwood (as *M. apiculata*). For a discussion of the same, see Shinnars (*Rhodora* 58: 1-13, 310, 1956) and Heyn (Bull. Res. Council Israel, sect. D, 7D: 157-174, 1959).

**MELILOTUS ALBA* Medic. Locally common along road just above big dune, near northwest end, 10 July 1962, 17959, and rare near Wilson Cove.

**MELILOTUS INDICA* (L.) All. Common in grassland over entire island, but especially at north end: north end; beach west of Wall 2; along road just above big dune, near northwest end, 10 July 1962, 17960; Wilson Cove, 200 ft, 9 April 1962, 17128, 10 June 1962, *Blakley* 5213 (SBBG), *Piehl* 62377 (SBBG); lower reaches of canyon north of Nanny; second canyon south of Seal Cove; Guds; plentiful on south end, April 1936, *Murbarger* 134 (UC).

TRIFOLIUM AMPECTENS T. & G. var. *AMPECTENS*. Occasional in grassland, central part: mesa top, March 1936, *Murbarger* 73 (UC); second canyon south of Seal Cove, 50 ft, 8 May 1962, 17613; Thirst,

1900 ft, 10 April 1962, 17194. Reported by Eastwood.

TRIFOLIUM FUCATUM Lindl. var. *GAMBELII* (Nutt.) Jeps. Abundant in clayey field, grassland near head of canyon above Mosquito Cove, 1100 ft, 9 May 1962, 17674.

TRIFOLIUM GRACILENTUM T. & G. Fairly common in grassland of central and southern parts of island: Lemon Tank, 9 April 1923, *Munz* 6692 in part (POM), *Peirson* 3437 (RSA); mesa top, 1500 ft, April 1936, *Murbarger* 46 (UC); Thirst, 1900 ft, 10 April 1962, 17200; Guds; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62324 (SBBG). Reported by Trask.

TRIFOLIUM MICROCEPHALUM Pursh. Rare in grassland: Wilson Cove, 8 April 1923, *Munz* 6603 (POM); 2 miles southeast of Wilson Cove, 9 April 1923, *Peirson* 3435 (DS, RSA); east slope, 1200 ft, April 1936, *Murbarger* 168 (UC). Reported by Lyon.

TRIFOLIUM PALMERI S. Wats. Common in grassland at relatively low elevations, often in sandy soli, or as Mrs. Trask (p. 91) put it, "*Trifolium Palmeri* is common, nearer the sea than *T. gracilentum* or *T. tridentatum*": April 1885, *Nevin & Lyon* (DS), *Nevin* (UC); north end; beach due west of Wall 2, 30 ft, 11 April 1962, 17270; Wilson Cove, 8 April 1923, *Munz* 6604 (POM), 12 April 1923, *Peirson* 3436 (DS, RSA), 200 ft, 9 April 1962, 17173; Wilson Cove to Lemon Tank, east coast, 9 April 1923, *Munz* 6666 (POM); 2.4 miles due south of Wilson Cove, west side, 450 ft, 8 May 1962, 17638; Lemon Tank, 9 April 1923, *Munz* 6692 in part (POM); near head of canyon above Mosquito Cove, 1100 ft, 9 May 1962, 17678; just north of Guds, 820 ft, 9 May 1962, 17648. Reported by Lyon, and by Dunkle (as *T. gracilentum* var. *palmeri*). *Trifolium gracilentum* and *T. palmeri* are completely distinct both ecologically and morphologically as they occur on San Clemente Island; they are, of course, closely related.

TRIFOLIUM TRIDENTATUM Lindl. Abundant in grassland and sometimes in canyons over the island: North Head; Wilson Cove, 8 April 1923, *Peirson* 3434 (RSA), 200 ft, 9 April 1962, 17154; canyon just north of Nanny, to its mouth; east slopes, March 1936, *Murbarger* 10 (UC); Seal Cove; second canyon south of Seal Cove, 50 ft, 8 May 1962, 17614; Thirst, 1900 ft, 10 April 1962, 17201; Cave Canyon; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 373 (DS); just north of Guds, 820 ft, 9 May 1962, 17647; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Blakley* 5202 (SBBG), *Piehl* 62337 (SBBG). Reported by Trask. All of these collections have extra nerves present between the main ribs on the calyx, and would thus be referable to var. *aciculare* (Nutt.) McDer., but that entity is probably not worthy of taxonomic recognition. Trask states (p. 91), "Clovers are four to six feet high, *Trifolium tridentatum* being the most common growth, is (sic) so dense under the feet that neither trail nor rocks can be discerned and you have to feel your way with hands and feet over jagged rocks, while the strong clovers trap you at every step like vines." Either she was exaggerating, or the years near the turn of the century must have been exceedingly moist on the island, for nothing of this sort has been seen in recent years.

VICIA EXIGUA Nutt. Scattered in grassland and on shaded canyonsides, northern and central parts of the island: canyons on east side, quite common, April 1936, *Murbarger* 43 (UC); near Wilson Cove, 9 April 1923, *Munz* 6644 (POM), *Peirson* 3442 (RSA); Wilson Cove to Lemon Tank, 9 April 1923, *Munz* 6669 (POM, UC); grassland just south of the Tomb, 1000 ft, 12 April 1962, 17338; near head of canyon above Mosquito Cove, 1100 ft, 9 May 1962, 17680. Reported by Lyon.

GERANIACEAE

**ERODIUM CICUTARIUM* (L.) L'Hérit. Abundant in grassland throughout: north end: beach west of Wall 2; Wilson Cove, 200 ft, 9 April 1962, 17136; Eel Point to Seal Cove, 175 ft, 10 June 1962, *Blakley* 5240 (DS, SBBG); Seal Cove; east side, March 1936, *Murbarger* 25 (UC); Twin Canyon; Thirst, 1960 ft, 9 June 1962, *Piehl* 62365 (SBBG); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 377 (DS); Guds; south end, April 1936, *Murbarger* 212 (UC). Reported by Lyon.

**ERODIUM MOSCHATUM* (L.) L'Hérit. Scattered in grassland throughout, but not as common as the preceding: beach due west of Wall 2; Wilson Cove, 200 ft, 9 April 1962, 17135; east side to mesa summit, March 1936, *Murbarger* 77 (UC); Wilson Cove to Lemon Tank, east coast, 9 April 1923, *Munz* 6665 (POM, UC); second canyon south of Seal Cove; Thirst; Guds. Reported by Lyon.

OXALIDACEAE

**OXALIS PES-CAPRAE* L. Pyramid Cove, 18–19 Feb. 1939, *Elmore* 423 (AHFH). Reported (as *O. cernua*) by Gentry (Allan Hancock Pac. Exped. 13: 29. 1949).

EUPHORBIACEAE

EREMOCARPUS SETIGERUS (Hook.) Benth. Fairly common in the grassland of central and southern parts: canyon just south of Lemon Tank; canyon 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran* 6829 (SD); just south of the Tomb, 1000 ft, 12 April 1962, 17339; Twin Canyon; mesa top and east side, May 1936, *Murbarger* 184 (UC); west slope south of Lemon Tank, 10 April 1923,

Munz 6760 (POM); Thirst; canyon east of Thirst, 1000 ft, 10 June 1962, Piehl 62388 (SBBG); vicinity of Mosquito Cove, 6 July 1931, Abrams & Wiggins 363 (DS); near head of canyon above Mosquito Cove, 1100 ft, 9 May 1962, 17676; Pyramid Cove. Reported by Munz.

EUPHORBIA MISERA Benth. "Two plants noted on West side. Fairly common on South side," April 1936, Murbarger 117 (UC); in an unpublished manuscript, Mrs. Murbarger speaks of this plant as being at a single locality, $\frac{3}{4}$ miles north of Seal Cove, near the sea; "a little colony . . . in the most picturesque of all the arrow-head points . . . in a broken edge" (Trask, p. 92). Reported by Trask. Apparently these are the only two collections.

EUPHORBIA SPATHULATA Lam. Robust plants up to 4 dm tall, scattered in bare, formerly moist clay soil, with *Silene antirrhina*, near head of canyon above Mosquito Cove, 1100 ft, 9 May 1962, 17675.

CALLITRICHACEAE

CALLITRICH LONGIPEDUNCULATA Morong. Scattered in mud of intermittent stream, local, Middle Ranch Canyon, 600 ft, 12 April 1962, 17328.

ANACARDIACEAE

MALOSMA LAURINA (Nutt.) Nutt. ex Abrams (*Rhus laurina* Nutt.). Vicinity of Mosquito Cove, 6 July 1931, Abrams & Wiggins 393 (DS). Reported by Eastwood. I find it impossible to deny Barkley's (Ann. Mo. Botan. Gard. 24: 265-300. 1937) reasoning about generic lines in this complex.

RHUS INTEGRIFOLIA (Nutt.) Benth. & Hook. f. ex Ro:hr. Common in canyons over the whole island: 9 Sept. 1926, Jones (DS); May 1936, Murbarger 180 (UC); 25 Aug. 1894, Brandegee (UC); cliffs above ocean at east end of Northwest Harbor; Wilson Cove, 300 ft, 7 May 1962, 17577; 1 mile south of Wilson Cove, east coast; canyon north of Nanny, masses on sea bluffs near its mouth; canyon below Lemon Tank; second canyon south of Seal Cove, 100 ft, 8 May 1962, 17611; steep gully to west side of island about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17245; canyon 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, Moran 6821 (SD); canyon 2 miles southeast of Eel Point, 100 m, 9 March 1959, Moran 7167 (SD); steep gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17245; Middle Ranch Canyon, 18 Feb. 1941, Moran 582 (DS); large canyon due north of Boulder, 700 ft, 10 May 1962, 17737; Horse Canyon, 1200 ft, 10 May 1962, 17729; Cave Canyon; vicinity of Mosquito Cove, 6 July 1931, Abrams & Wiggins 395 (DS); canyon south of Mosquito Cove, 1050 ft, 9 May 1962, 17666; Chenetti Canyon, 3 April 1939, Dunkle 7239 (LAM); China Canyon 2 miles above China Point, 550 ft, 9 June 1962, Blakley 5198 (SBBG). Reported by Lyon.

RHUS OVATA S. Wats. According to Trask (p. 93), a shrubby form of this species, about 4 ft tall, was found on the same heights as *Crossosoma californicum*; therefore, probably on the west coast near Middle Ranch Canyon. Barkley (op. cit.) cites no specimens of this species from San Clemente Island. and it would be very desirable to reconfirm its presence in the flora. Lyon's report of *R. ovata* very probably refers to the preceding. Possibly both are better referred to *Lobadium* (*Schmaltzia*).

TOXICODENDRON DIVERSILOBUM (T. & G.) Greene (*Rhus diversiloba* T. & G.). Scattered colonies on canyon sides in central and southern parts of island: isolated plants in perhaps 10 different places, March 1936, Murbarger 82 (UC); canyon below Lemon Tank; canyon on east coast south of Lemon Tank, 10 April 1923, Munz 6687 (POM); rocky slopes near head of canyon north of Boulder; Horse Canyon, 900 ft, 10 May 1962, 17732; fairly large patch, Cave Canyon; Pyramid Cove (Murbarger, pers. comm.). Reported by Dunkle.

RHAMNACEAE

CEANOTHUS MEGACARPUS Nutt. subsp. MEGACARPUS. Very rare, the shrubs scattered on canyon sides in the central and southern parts of the island: 3 shrubs about 2 m tall, scattered on walls of Eagle Canyon, 1200-1400 ft, 9 May 1962, 17704; single canyon on west side of island, 4 shrubs noted, the tallest 3 ft tall, April 1936, Murbarger 165 (UC). These two collections are from plants with alternate leaves and conspicuous horns on the fruits. A third—China Canyon 2 miles above China Point, rare, 8 ft tall, 9 June 1962, Blakley 5197 (SBBG)—is from a plant with thicker, opposite leaves and smaller horns on the fruit, and thus approaches subsp. *insularis* (Eastw.) comb. nov. (based on *C. insularis* Eastw., Proc. Calif. Acad. Sci., ser. 4, 16: 362. 1927). Reported by Trask. Most of the plants on Santa Catalina Island are likewise subsp. *megacarpus*. Although some plants have opposite leaves, I have not seen any from the southern islands that lack horns on the fruits completely, like most on Santa Cruz and Santa Rosa islands. Some collections even from Santa Cruz I. have alternate leaves and conspicuous horns on the fruit and thus are referable to subsp. *megacarpus*. Despite the often weak lines between species in *Ceanothus*, I think it is better to emphasize the close relationship and broad intergradation between these two entities by treating them as subspecies.

RHAMNUS PIRIFOLIA Greene (*R. crocea* Nutt. subsp. *pirifolia* (Greene) Wolf). Very rare trees in canyons on the southern part of the east coast, and reported by Trask (as *R. crocea*) from the west coast: ravine west of Thirst, 2 trees, April 1936, Murbarger 170 (UC), also 1 shrub noted there in 1962; 1

shrub 10 ft tall near head of canyon above Mosquito Cove, 900–1100 ft, 9 May 1962, 17683, 9 June 1962, *Blakley 5210* (SBBG). Reported by Eastwood (as *R. insulus*) and by Dunkle (as *R. crocea* var. *insularis*). Unpublished studies by Profs. H. J. Thompson and Harlan Lewis have shown that each of the 5 subspecies of *R. crocea* recognized by Wolf (Rancho Santa Ana Botan. Gard., Monogr. 1: 1–136, 1938) is best accorded specific status, because of their maintenance as distinct entities even where growing sympatrically. Being confined to the islands, *R. pirifolia* does not come into contact with its relatives, but morphologically, it appears to be coordinate with them.

MALVACEAE

EREMALCHE EXILIS (A. Gray) Greene (*Malvastrum exile* A. Gray). Reported by Trask (p. 93, as *Malva exile*) from "old Indian mounds."

LAVATERA ASSURGENTIFLORA Kell. Very rare, and confined to low slopes near the coast. Its occurrence is best treated historically. Lyon (p. 334) stated that in 1885 it occurred in only two localities, one or two plants each, but that a dozen years earlier it had extended for miles on the high plateaus. It must be remembered that Nevin and Lyon did not travel very widely on the island (*Nevin & Lyon*, April 1835, DS). Trask (p. 94–95) says it "was twice found—one tree eight inches in diameter—looking into the sea from a cliff near Mosquito Harbor; another in a region of Pot's Valley . . . a foot in diameter and twelve feet high . . . splitting at the base . . . Johnny [Robearts, a herdsman] tells me that there were many 'Malva Rosas' as he calls them; some even on the south coast; mostly eaten by cattle in years when feed was scarce. He recalls their forming groves" (June 1903, *Trask*, US; type of *Savonia clementina* Greene, Leaf. Bot. Obs. 2: 160, 1911). Murbarger found a single tree at West Cove, moved by a fisherman from Seal Cove (May 1936, 208, UC). When I visited the island in 1962, scattered trees were present about Wilson Cove, possibly as escapes from cultivation (7 May 1962, 17579), and a thriving colony, with seedlings, was found in sun on sandy flats, northwest end between Driggs and West Rock, 20 ft, 11 April 1962, 17303 (descended from the plant observed by Mrs. Murbarger?).

MALACOTHAMNUS CLEMENTINUS (Munz & Johnst.) Kearney (*Malvastrum clementinum* Munz & Johnst.). (Fig. 5.) Found in a single locality, open south-facing hillside with *Atriplex* and *Mirabilis*, head of canyon below Lemon Tank, 800 ft, 10 July 1962, 17977; occasional on walls of canyon running from Lemon Tank, 9 April 1923, *Munz 6684* (POM, type), *Peirson 3548* (RSA); also collected by Murbarger. It may be significant that the single locality for this species is near the edge of one of the few small areas of marine sedimentaries on the island. This locality was doubtless under water in the late Pleistocene but the plant may have survived elsewhere on the island. Endemic. According to Dr. D. M. Bates (*The Genus Malacothamnus*. Unpubl. thesis, Univ. Calif., Los Angeles, 1962), *M. clementinus* recombines the characters of two divergent mainland taxa in such a way as to suggest that it may be a remnant of a formerly more widespread race which once inhabited the mainland.

**MALVA PARVIFLORA* L. Common weed of grassland all over the island: March 1936, *Murbarger 101* (UC); Northwest Harbor; Wilson Cove, 13 April 1923, *Munz 6784* (POM), 200 ft, 9 April 1962, 17129, 10 June 1962, *Blakley 5225* (SBBG); canyon north of Nanny; second canyon south of Seal Cove; Guds; Pyramid Cove; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl 62333* (SBBG). Reported by Lyon (as *M. borealis*).

SIDA HEDERACEA (Dougl.) Torr. ex Gray. Locally abundant in a colony in low places in dunes, north of a point due west of Wall 2, northwest coast: 8 April 1923, *Munz 6622a* (POM), 10 July 1962, 17956; without definite locality, 9 Sept. 1926, *Jones* (POM).

FRANKENIACEAE

FRANKENIA GRANDIFOLIA Cham. & Schlecht. var. *GRANDIFOLIA*. Common on sandy flats and bluffs at low elevations, north, west, and south sides: north end, May 1936, *Murbarger 216* (UC); beach due west of Wall 2, 30 ft, 11 April 1962, 17273; west shore opposite Wilson Cove, 100 ft, 8 May 1962, 17631; Wilson Cove, 200 ft, 10 April 1962, 17183, 11 July 1962, 18014; China Point, 10 ft, 9 June 1962, *Blakley 5190* (SBBG); Pyramid Cove, 4 July 1919, *Knoche A1006* (DS); salt-water slough at south end, April 1936, *Murbarger 131* (UC).

VIOLACEAE

VIOLA PEDUNCULATA T. & G. Common in grassland, central part of island: east coast between Wilson Cove and Lemon Tank, 9 April 1923, *Munz 6660* (POM, UC), *Peirson 3443* (RSA); east side, forming dense patches of yellow which reached to one's knees, visited by many bees and other insects, March 1936, *Murbarger 9* (UC); east-facing slopes along summit ridge about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17214; Middle Ranch, 16 Feb. 1941, *Moran 572* (DS); head of canyon above Mosquito Cove. Reported by Trask; all collections from San Clemente Island lack the prominent purple markings on the back of the petals characteristic of other populations and might appropriately be treated as a distinct subspecies.

Fig. 5 *Malacothamnus clementinus* on steep canyonside near Lemon Tank (type and only known locality). Plant is about 4 dm tall. Official photograph, U. S. Navy.

LOASACEAE

MENTZELIA AFFINIS Greene. Sand flat $\frac{1}{4}$ mile toward Pyramid Cove from China Point, 9 June 1962, *Blakley 5194* (DS, SBBG). Reported by Lyon (as *M. gracilentia*).

MENTZELIA MICRANTHA (H. & A.) T. & G. Rare, central and southern parts of island: dry slope of canyon south of Lemon Tank, west coast, 10 April 1923, *Munz 6749* (POM); China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl 62335* (SBBG). Reported by Munz.

CACTACEAE

BERGEROCACTUS EMORYI (Engelm.) Britt. & Rose (*Cereus emoryi* Engelm.). Common on canyon walls and rocky slopes, erect or often pendent over the cliffs at relatively low elevations, throughout: March–May 1936, *Murbarger 91* (UC), 92 (UC); Northwest Harbor; North Head; near Wilson Cove, 13 April 1923, *Munz 6789* (POM, UC); lower reaches of canyon north of Nanny, and massed on sea bluffs near its mouth; above and north of Seal Cove, 200 ft, 10 June 1962, *Blakley 5237* (SBBG); Twin Canyon; Middle Ranch, 500 m, 18 Feb. 1941, *Moran 601* (LAM); Eel Point to Seal Cove, 10 June 1962, *Blakley 5248* (SBBG); near Thirst; Cave Canyon; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins 420* (DS, UC); Pyramid Cove. Reported by Lyon. I tentatively accept the reasoning of Moran (Cact. Succ. J. Am. 34: 88–94. 1962) on generic lines in this complex.

OPUNTIA LITTORALIS (Engelm.) Britt. & Rose Small clumps in grassland and in canyons over the whole island: March–May 1936, *Murbarger 90* (UC); Northwest Harbor; Wilson Cove, 13 April 1923, *Munz 6787* (POM), 300 ft, 11 May 1962, *17739* (POM); canyon south of Lemon Tank; Middle Ranch, 500 m, 18 Feb. 1941, *Moran 601* (LAM); Eel Point to Seal Cove, 10 June 1962, *Blakley 5248* (SBBG); near Thirst; Cave Canyon; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins 384* (DS); just north of Guds, dominant with *O. prolifera*, 820 ft, 9 May 1962, *17657* (POM). Reported by Trask (as *O. engelmannii* var. *littoralis*); said to be "not frequent"; reports of *O. occidentalis* from the island also refer to this entity. All plants of this complex on the island were similar, somewhat sprawling, and with dense clusters of relatively short, brownish spines. This is a form common in coastal southern California.

OPUNTIA PROLIFERA Engelm. Grassland over the whole island, but very rare on the east side, rare at the north end and often subdominant at the south end: West Point, a few plants; scattered near big dune, northwest side; vicinity of Wilson Cove, 13 April 1923, *Munz 6788* (POM, UC); Middle Ranch, 500 m, 18 Feb. 1941, *Moran 600* (LAM); above and north of Seal Cove, 10 June 1962, *Blakley 5239* (SBBG); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins 383* (DS); just north of Guds, dominant, with *O. littoralis*, 820 ft, 9 May 1962, *17656* (POM); Pyramid Cove. Reported by Lyon. A possible hybrid between the two species of *Opuntia*, a plant about 3 ft high, lacking thorns, with warty branches ascending as in *O. littoralis* but slender as in *O. prolifera*, corollas red, was collected on the mesa summit, March–May 1936, *Murbarger 93* (UC).

ONAGRACEAE

CLARKIA EPILOBIOIDES (Nutt. ex T. & G.) Nels. & Macbr. Rare in protected canyons, central part of east side: east slope, April 1936, *Murbarger 172* (UC); Twin Canyon; canyon just north of Thirst, 1100 ft, 10 May 1962, *17710*; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl 62401* (SBBG); Eagle Canyon, 1400 ft, 9 May 1962, *17699*.

OENOTHERA CHEIRANTHIFOLIA Hornem. ex Spreng. var. *CHEIRANTHIFOLIA*. Common locally on dunes, northwest end: large dune near northwest end, 10 July 1962, *17958*, 10 June 1962, *Blakley 5255* (SBBG); west side opposite Wilson Cove, 100 ft, 8 May 1962, *17627*. Most (all?) of the plants were annual, dying after flowering the first time.

OENOTHERA GUADALUPENSIS S. Wats. subsp. *clementina*, subsp. nov.

A subsp. *guadalupense* differt: pilis longis, rectis.

Type:—common on pebbly dune above ocean south of Eel Point, elevation 40 ft, 9 April 1962, *Raven 17125* (RSA).

Common on dunes around north end of island and down the west shore, perhaps to south end: east end of Northwest Harbor, 100 ft, 12 July 1962, *18023*; behind Northwest Harbor, 20 ft, 11 April 1962, *17301*; north of a point due west of Wall 2, on big dune, 100 ft, 11 April 1962, *17284*, 10 June 1962, *Blakley 5254* (SBBG); beach due west of Wall 2, 30 ft, 11 April 1962, *17260*, 10 July 1962, *17954*; west shore opposite Wilson Cove, 100 ft, 8 May 1962, *17628*; type locality, 10 June 1962, *Blakley 5229* (SBBG); south and west sides of island, April 1936, *Murbarger 154* (UC). Reported by Munz on the basis of a collection made by Trask (herb. Edinburgh). Although clearly forming a distinctive morphological unit with subsp. *guadalupensis*, the present subspecies is very different from it in pubescence. The plants from Guadalupe Island have appressed strigose pubescence, those from San Clemente Island long, spreading hairs.

OENOTHERA MICRANTHA Hornem. ex Spreng. Rare in grassland of a few canyons, central part of island: canyon just north of Thirst, 800 ft, 10 May 1962, 17715; west coast south of Lemon Tank, 10 April 1923, *Munz* 6743 (POM); west slope, March 1936, *Murbarger* 34 (UC); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 345 (DS), 6 April 1939, *Dunkle* 7298 (LAM). Reported by Eastwood. An aggregate species which I am studying cytotonomically.

ZAUSCHNERIA CALIFORNICA Presl subsp. *MEXICANA* (Presl) Raven. Common on brushy and cactus-covered slopes, central and southern parts of the island: 25 Aug. 1894, *Mearns* 4081 (DS); canyon north of Nanny; canyon below Lemon Tank; east coast south of Lemon Tank, 10 April 1923, *Munz* 6702 (POM); canyon 1.8 miles southwest of Eel Point, 100 m, *Moran* 6835 (SD); steep gully to west side below a point 2 miles north of Thirst, 1550 ft; Cave Canyon, 10 July 1962, 17975; canyon south of Thirst; Mosquito Cove, 24 Nov. 1939, *Dunkle* 7340 (LAM); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 380 (DS); Chenetti Canyon, 3 April 1939, *Dunkle* 7241 (LAM). Reported by Munz (as *Z. californica* var. *villosa*) and by Eastwood (as *Z. villosa*); the plants are white-hairy but fall into the subspecies known until recently as *Z. c. californica*.

UMBELLIFERAE

APIASTRUM ANGUSTIFOLIUM Nutt. Scattered on grassy slopes throughout: gully 1 mile south of Wilson Cove, 75 ft, 7 May 1962, 17584; 6 miles southeast of Wilson Cove, 9 April 1923, *Munz* 6675 (POM); canyon above Mosquito Cove; head of canyon at south end of Mosquito Cove, 1050 ft, 9 May 1962, 17665; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62344 (SBBG); south slope, local, April 1936, *Murbarger* 50 (UC).

**BOWLESIA INCANA* Ruiz & Pav. Common on relatively protected slopes or in patches of *Opuntia littoralis*, probably throughout: north end; east side, April 1936, *Murbarger* 190 (UC); Wilson Cove to Lemon Tank, east side, 9 April 1923, *Munz* 6643 (POM, UC); Twin Canyon; Middle Ranch, 500 m, 17 Feb. 1941, *Moran* 575 (LAM); Middle Ranch Canyon, 450 ft, 12 April 1962, 17326; canyon 1 mile north of Eel Point, 20 m, 9 March 1959, *Moran* 7161 (DS, SD); canyon at south end of Seal Cove, 30 ft, 8 May 1962, 17597; summit ridge about 2 miles north of Thirst, 450 ft, 12 April 1962, 17326. Reported by Lyon (as *B. lobata*) and by Eastwood (as *B. septentrionalis*). Introduced in North America according to Dr. Mildred E. Mathias (pers. comm.); this was suggested by Gray and Hooker as early as 1881 (Bull. U. S. Geol. Surv. 6: 58).

CAUCALIS MICROCARPA H. & A. North-facing canyon slope, Wilson Cove to Lemon Tank, 9 April 1923, *Munz* 6652 (POM), *Peirson* 3424 (RSA).

DAUCUS PUSILLUS Michx. Common in grassland, probably throughout: March 1936, *Murbarger* 37 (UC); Wilson Cove, 200 ft, 9 April 1962, 17168; 1 mile south of Wilson Cove, 75 ft, 7 May 1962, 17586; Wilson Cove to Lemon Tank, east coast, 9 April 1962, *Munz* 6672 (POM, UC); Eel Point to Seal Cove, 10 June 1962, *Blakley* 5242 (SBBG); Seal Cove; Twin Canyon; Thirst; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62383 (SBBG).

**FOENICULUM VULGARE* Mill. A few clumps scattered in grassland along roads; scarcely well established: Wilson Cove, 300 ft, 10 July 1962, 17965; above Wilson Cove, 600 ft, 10 April 1962, 17252; roadside near Thirst.

SANICULA ARGUTA Greene ex Coult. & Rose. Common in grassland of northern, central, and probably southern parts of island: April 1885, *Nevin & Lyon* (DS); north end; Wilson Cove, 9 April 1923, *Peirson* 3429 (RSA, UC), 200 ft, 9 April 1962, 17150; Wilson Cove to Lemon Tank, east coast, 9 April 1923, *Munz* 6659 (POM, UC), *Peirson* 3429 (RSA); east side, March 1936, *Murbarger* 68 (UC); canyon north of Nanny; canyon south of Lemon Tank; 1 mile north of Eel Point, 20 m, 9 March 1959, *Moran* 7160 (DS, SD); Middle Ranch, 17 Feb. 1941, *Moran* 579 (DS); Thirst, 1900 ft, 10 April 1962, 17211; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62399 (SBBG); canyon above Mosquito Cove. Reported by Lyon (as *S. bipinnatifida*).

PRIMULACEAE

DODECATHEON CLEVELANDII Greene subsp. *INSULARE* H. J. Thomps. Two small, widely separated colonies found in clayey grassland: base of slope above West Point, 12 July 1962, 18041; Middle Ranch, 16 Feb. 1941, *Moran* 571 (DS). Reported by Abrams (Ill. Fl. Pac. St. 3: 342. 1951, as subsp. *sanctarum*).

PLUMBAGINACEAE

**LIMONIUM PEREZII* (Stapf) Hubbard ex L. H. Bailey. Rare escape along drainage ditch, Wilson Cove, 100 ft, 10 June 1962, *Blakley* 5211 (DS, SBBG). Becoming common along the ocean bluffs of southern California.

CONVOLVULACEAE

CONVOLVULUS MACROSTEGIUS Greene. Common on rockslides, in cactus patches, and on brushy slopes throughout: April 1885, *Nevin* (DS); 25 Aug. 1894, *Brandegee* (UC); 25 March 1918, *Evermann*

(CAS); March 1936, *Murbarger* 52 (UC); northeast end, 100–125 ft, 22 Feb. 1949, *Wiggins* 11964 (DS, RSA, UC); Northwest Harbor, 50 ft, 12 July 1962, 18030; large dune, northwest side of island, 10 June 1962, *Blakley* 5253 (SBBG); Wilson Cove, 50 m, 15 Sept. 1958, *Moran* 6838 (DS, SD), 200 ft, 9 April 1962, 17143; west side opposite Wilson Cove, 8 April 1923, *Munz* 6621 (POM); 2 miles southeast of Wilson Cove, 9 April 1923, *Peirson* 3483 (RSA); Middle Ranch, 19 Feb. 1941, *Moran* 593 (DS, SD); canyon north of Thirst; Horse Canyon; Cave Canyon; western drainage opposite Mosquito Cove, 1050 ft, 9 May 1962, 17687; Mosquito Cove, 6 April 1939, *Dunkle* 7291 (LAM). Reported by Lyon, and by others (as *C. occidentalis* and *C. o.* var. *macrostegius*). Although insular material assigned to this species, has larger flowers, longer pedicels, and more elongate, longer bracts than most mainland material, assigned to *C. cyclostegius* House, the two appear to intergrade in the region of Santa Barbara, on Santa Catalina Island, and perhaps elsewhere. Hence it is my opinion that the relationship between the two could best be expressed by regarding them, together with *C. aridus* Greene, as subspecies of a single polytypic species. I am not making the new combinations, however, because I think that it will be desirable, following more detailed study, to refer these entities, plus *C. soldanella* among the species represented on San Clemente Island, to *Calystegia*.

CONVOLVULUS SIMULANS L. M. Perry. Rare in grassland of central and south parts of island: mesa top, a few plants, May 1931, *Murbarger* 221 (UC); south end, 8 plants noted, April 1936, *Murbarger* 125 (UC); China Canyon 2 miles above China Point, 1 plant, 700 ft, 9 June 1962, *Piehl* 62347 (SBBG).

CONVOLVULUS SOLDANELLA L. On extreme north end of island, only two plants noted, May 1936, *Murbarger* 209 (UC).

CRESSA TRUXILLENSIS Kunth var. *VALLICOLA* (Heller) Munz. Very poor rocky soil near tide line on south end, April 1936, *Murbarger* 213 (UC).

CUICUTA CALIFORNICA Choisy var. *CALIFORNICA*. San Clemente Island, *Trask* 187 (cited by Yuncker, Ill. Biol. Mongr. 6: 61. 1920; see Yuncker, Mem. Torrey Club 18: 160. 1932).

POLEMONIACEAE

ERIASTRUM FILIFOLIUM (Nutt.) Woot. & Standl. Infrequent in grassland above head of Eagle Canyon, 1700 ft, 10 May 1962, 17723.

GILIA NEVINII A. Gray. Abundant on grassy slopes over the entire island: April 1885, *Nevin* (DS, UC; isotypes), Lyon (DS); March 1936, *Murbarger* 39 (UC); North Head to West Point; Wilson Cove, 9 April 1923, *Peirson* 3433 (DS, RSA), 200 ft, 9 April 1962, 17166; near Wilson Cove, 8 April 1923, *Munz* 6633 (POM, UC); south of Wilson Cove, 300 ft, 10 April 1962, 17192; canyon north of Nanny; below Lemon Tank; canyon south of Lemon Tank; Twin Canyon; summit ridge about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17213; Thirst, 1965 ft, 9 June 1962, *Blakley* 5175 (SBBG); Cave Canyon; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 372 (DS, UC); canyon north of Peak 1135, south of Mosquito Cove, 1000 ft, 9 June 1962, *Piehl* 62318 (SBBG); Guds, 880 ft, 9 May 1962, 17641. Described from San Clemente Island, and restricted to it, Santa Catalina, and Guadalupe islands (Grant, *Aliso* 3: 24. 1954); other records are in error.

LINANTHUS BICOLOR (Nutt.) Greene subsp. *BICOLOR*. Scattered colonies in grassland throughout, except perhaps the extreme north end: March 1936, *Murbarger* 21 (UC); about 3 miles southeast of Wilson Cove, 9 April 1923, *Munz* 6677 (POM); Lemon Tank, 9 April 1923, *Peirson* 3428 (RSA); Twin Canyon; about 2 miles north of Thirst, summit ridge, 1600 ft, 10 April 1962, 17226; Cave Canyon; canyon south of Thirst; canyon above Mosquito Cove; canyon below Chenity, south of Mosquito Cove, 9 June 1962, *Piehl* 62317 (SBBG); Chenetti Canyon, 4 April 1939, *Dunkle* 7262 (LAM). Reported by Lyon (as *Gilia micrantha*) and by Munz (as *G. bicolor*).

LINANTHUS PYGMAEUS (Brand) J. T. Howell subsp. *PYGMAEUS*. Locally common in dry grassland, south-central part of island: Thirst, 1965 ft, 9 June 1962, *Piehl* 62371 (SBBG); Eagle Canyon, 1600 ft, 9 May 1962, 17692. Material of this species from San Clemente and Guadalupe (the type locality) islands differs from mainland California material in having distinctly lavender-blue corolla lobes and yellow throats, the flowers (4–)4.6–6 mm long, with the corolla exerted (1.2–)1.5–2.2 mm beyond the calyx. In mainland material, the corollas are white (rarely very pale lavender?), the flowers 3.8–6 mm long, and the corolla equal to the calyx in length or exerted up to 1.2(–1.4) mm. I therefore designate the mainland material as a separate subspecies, *L. pygmaeus* subsp. *continentalis*, subsp. nov. (Corollae albae; flores 3.8–6 mm longi; corolla quam calyce 0–1.2(–1.4) mm longior. Type:—Pacific Grove, Monterey Co., Calif., 28 May 1903, *A. A. Heller* 6796, DS 138947).

NAVARRETTIA HAMATA Greene. Uncommon, dry grassland on the summit ridge, sometimes along ephemeral streams, central and southern parts of island: mesa summit, May 1936, *Murbarger* 159 (UC); grassland above head of Eagle Canyon, 1700 ft, 10 May 1962, 17724; summit plateau above Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 387 (DS); head of canyon below Chenity, south of Mosquito

Cove, 1000 ft, 9 June 1962, *Piehl 62317b* (SBBG). Reported by Eastwood. At least the first two collections cited had the typical mephitic odor.

HYDROPHYLLACEAE

EMMENANTHE PENDULIFLORA Benth. Dry grassy slopes near the south end: Eagle Canyon, 1400 ft, 1 plant, 10 May 1962, 17722; Guds (2 plants); China Canyon 2 miles above China Point, 9 June 1962, *Blakley 5203*. Reported by Dunkle.

EUCRYPTA CHRYSANTHEMIFOLIA (Benth.) Greene var. *CHRYSANTHEMIFOLIA*. Rare in disturbed soil, protected canyon slopes in central part of island: 1 plant, canyon north of Thirst, on south side, 1400 ft, 10 May 1962, 17719; 1 plant, near head of Horse Canyon, 1600 ft, 10 May 1962, 17727; Eagle Canyon, with *Phacelia lyonii*, 1000 ft, 9 May 1962, 17695.

PHACELIA DISTANS Benth. Sandy slopes along central part of west coast: *Nevin & Lyon* (UC); west side near ocean, March 1936, *Murbarger 28* (UC); canyon on west coast south of Lemon Tank, 3–4 miles south of Seal Cove, 10 April 1923, *Munz 6738* (POM, UC), *Peirson 4121* (RSA); Eel Point to Seal Cove, 20 ft, 11 April 1962, 17306, 10 June 1962, *Blakley 5230* (SBBG). Reported by Lyon.

PHACELIA FLORIBUNDA Greene. Infrequent: grassy slopes over the entire island: extreme north end, May 1936, *Murbarger 198* (UC); west end of Northwest Harbor, 50 ft, c. 1.2 m tall, 12 July 1962, 18037; Wilson Cove, 8 April 1923, *Munz 6624* (POM, UC), 12 April 1923, *Munz 6779a* (POM, UC), *Peirson 3484* (RSA); gully to west side of island about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17243; Horse Canyon, 1500 ft, 10 May 1962, 17728; southeast point, 2 April 1939, *Dunkle 7212* (CAS). Reported by Lyon (as *P. phyllomanica*). Also occurs on Guadalupe and Santa Barbara (*Dunkle 7441, 8122, CAS*) islands. The colony at Northwest Harbor was abundantly visited, about noon, by a bee of the genus *Anthophora*, actively gathering pollen.

PHACELIA LYONII A. Gray. Scattered on canyonsides, often in patches of cactus or on earth slides: east side, May 1936, *Murbarger 226* (UC); 1.8 miles southeast of Eel Point (second canyon south of Seal Cove), 100 m, 15 Sept. 1958, *Moran 6826* (SD), 100 ft, 8 May 1962, 17602; 2 miles southeast of Eel Point, 18 Sept. 1958, *Moran 6849* (SD); Eagle Canyon, 1000 ft, 9 May 1962, 17690; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Blakley 5206* (SBBG). Reported by Munz (Calif. Fl., p. 529. 1959). Corollas uniformly very pale blue; much more variable in color on Santa Catalina Island.

PHOLISTOMA AURITUM (Lindl. ex Lindl.) Lilja var. *AURITUM*. Occasional on canyonsides in northern and central parts: east side and mesa summit, March 1936, *Murbarger 7* (UC); Wilson Cove, 300 ft, 12 April 1962, 17346; Wilson Cove to Lemon Tank, east coast, 9 April 1923, *Munz 6663* (POM, UC); gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17249. Reported by Constance (Bull. Torrey Botan. Club 66: 347. 1939).

PHOLISTOMA RACEMOSUM (Nutt. ex A. Gray) Const. Common on rocky, often somewhat protected, slopes or in patches of brush or cactus, over the whole island: April 1885, *Nevin & Lyon 14* (DS), *Nevin* (DS); 25 March 1918, *Evermann* (CAS); Northwest Harbor; near sea, due west of Wall 2, 10 ft, 11 April 1962, 17264; Wilson Cove, 8 April 1923, *Peirson 3452* (RSA), 200 ft, 9 April 1962, 17148; canyon north of Nanny; Wilson Cove to Lemon Tank, east coast, 9 April 1923, *Munz 6646* (POM, UC); 1 mile north of Eel Point, 20 m, 9 March 1959, *Moran 7157* (SD, UC); second canyon south of Seal Cove; Twin Canyon; Middle Ranch, 17 Feb. 1941, *Moran 574* (DS); east-facing slopes of summit ridge about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17264; east side to mesa summit, March 1936, *Murbarger 76b* (UC); head of canyon above Mosquito Cove. Reported by Lyon (as *Nemophila racemosa*).

BORAGINACEAE¹⁷

AMSINCKIA INTERMEDIA Fisch. & Mey. Fairly common in grassland throughout: 25 March 1918, *Evermann* (CAS, type of *A. evermannii* Suksd.); March 1936, *Murbarger 11* (UC); north end near airfield; North Head to West Point; beach due west of Wall 2, 30 ft, 17261; Wilson Cove, 8 April 1923, *Munz 6630* (POM, UC), 9 April 1962, 17181; east coast south of Lemon Tank, 10 April 1923, *Munz 6698* (POM, type collection of *A. insularis* Suksd.); canyon south of Lemon Tank; canyon 2 miles southeast of Eel Point, 100 m, 9 March 1959, *Moran 7163* (SD, UC); Middle Ranch, 16 Feb. 1941, *Moran 569* (DS); east-facing slopes 2 miles north of Thirst, 1600 ft, 10 April 1962, 17220 (form with short style and irregularly inserted stamens at throat, some included, others not); Guds. Reported by Lyon.

AMSINCKIA SPECTABILIS Fisch. & Mey. var. *NICOLAI* (Jeps.) I. M. Johnst. ex Munz (*A. st.-nicolai* Eastw.). Dunes near northwest end of island, rare: about a dozen plants, west side of island, on a sand dune near the ocean, March 1936, *Murbarger 116* (UC); beach due west of Wall 2, 30 ft, 17262; low shore of west coast opposite Wilson Cove, 11 April 1923, *Munz 6771* (POM). Reported by Munz, and

¹⁷Thanks are due Mrs. Francia Chisaki-Hommersand for reviewing my collections of this family.

by Eastwood (also as *A. maritima*). A homostylous form with bracteate inflorescences known also from San Nicolas and San Miguel islands. In these collections the axial calyx-lobes are united more than halfway to the summit.

CRYPTANTHA CLEVELANDII Greene (*C. brandegei* I. M. Johnst.). Near foot of Middle Ranch Canyon, 350 ft, 11 April 1962, 17317. Reported by Munz.

CRYPTANTHA INTERMEDIA (A. Gray) Greene. Dry grassland, mostly on summit ridge and south end: April 1885, *Nevin* (DS); east side and mesa summit, March 1936, *Murbarger* 13 (UC); hillside south of Wilson Cove, 300 ft, 10 April 1962, 17191; 3 miles southeast of Wilson Cove, 9 April 1923, *Munz* 6661 (POM), *Peirson* 3423 (RSA); Wilson Cove to Lemon Tank, 9 April 1923, *Munz* 6674, 6678 (POM); 2 miles north of Thirst, east-facing slopes, 1600 ft, 10 April 1962, 17219; near foot of Middle Ranch Canyon, 350 ft, 11 April 1962, 17316; Thirst, 1900 ft, 10 April 1962, 17196, 1960 ft, 9 June 1962, *Blakley* 5179 (DS, SBBG), *Piehl* 62372 (SBBG); canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62385 (SBBG); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 354, 391 (DS); same, summit of plateau, 6 July 1931, *Abrams & Wiggins* 390 (DS); head of canyon above Mosquito Cove, 1100 ft, 9 May 1962, 17681; China Point, 25 ft, 9 June 1962, *Piehl* 62360 (SBBG); Guds, 880 ft, 9 May 1962, 17639. Reported by Lyon (as *Krynitzkia ambigua*). All of the specimens from San Clemente Island have relatively small flowers and coarse, subinflated hairs on the calyx, thus approaching *C. foliosa* Greene, an endemic of Guadalupe Island.

CRYPTANTHA MARITIMA Greene var. *MARITIMA*. Occasional, west coast and south end: west coast south of Lemon Tank, 10 April 1923, *Munz* 6746 (POM, det. Johnston); near foot of Middle Ranch Canyon, 350 ft, 11 April 1962, 17318 (all three roughened nutlets regularly aborting); 6 plants, south end, May 1936, *Murbarger* 186 (UC); China Point, 30 ft, 9 June 1962, *Blakley* 5186 (DS, SBBG), *Piehl* 62354 (DS, SBBG). Reported by Munz.

CRYPTANTHA TRASKIAE I. M. Johnst. Sandy flats along west coast: beach due west of Wall 2, 30 ft, 11 April 1962, 17271, 17282; on sea bluff, Eagle Ranch, 11 April 1923, *Peirson* 3421 (DS, RSA). Reported by Eastwood. Known otherwise only from San Nicolas Island.

HELIOTROPIMUM SPATHULATUM Rydb. subsp. *OCULATUM* (Heller) Ewan (*H. curassavicum* L. var. *oculatum* (Heller) I. M. Johnst. ex Tidestr.). South slope near the sea, scarce, May 1936, *Murbarger* 205 (UC). See Ewan, *Bull. So. Calif. Acad. Sci.* 41: 51-57. 1942.

PECTOCARYA LINEARIS DC. var. *FEROCULA* I. M. Johnst. Occasional on dry grassy slopes in central part of island: Lemon Tank, 9 April 1923, *Munz* 6690 (POM, UC); mesa summit, March 1936, *Murbarger* 100 (UC); east-facing slopes 2 miles north of Thirst, 10 April 1962, 17224; Thirst, 1900 ft, 10 April 1962, 17204; Eagle Canyon, 1400 ft, 9 May 1962, 17707.

PLAGIOBOTHRYS CALIFORNICUS (A. Gray) Greene var. *GRACILIS* I. M. Johnst. Dry grassland of summit ridge, central and south parts of island: mesa summit, March 1936, *Murbarger* 36 (UC); center of island south of Lemon Tank, 10 April 1923, *Munz* 6705 in part (POM); Thirst, 1900 ft, 10 April 1962, 17203; Guds. Reported by Munz.

PLAGIOBOTHRYS CANESCENS Benth. (*P. arizonicus* (A. Gray) Greene var. *catalinensis* A. Gray, acc. I. M. Johnst., in *Munz, Man. So. Calif. Botan.*, p. 433-434. 1935). Dry grassland of summit ridge in central part: center of island south of Lemon Tank, 10 April 1923, *Munz* 6705 in part (POM); Thirst, 1900 ft, 10 April 1962, 17202. Reported by Munz (*Bull. So. Calif. Acad. Sci.* 24: 50. 1925).

VERBENACEAE

VERBENA LASIOSTACHYS Link var. *LASIOSTACHYS*. East side of island in washed gravel, slide rock, and sand near tide line, May 1936, *Murbarger* 218 (UC); bottom of canyon south of Lemon Tank, west coast, 10 April 1923, *Munz* 6734 (UC). Reported by Munz (as *V. prostrata*), and by Eastwood (as *V. robusta*). Dr. Harold N. Moldenke has identified these collections and also *Trask* 7 from the island, but has kindly informed me that he has not seen any San Clemente Island material of *V. robusta*.

LABIATAE

**MARRUBIUM VULGARE* L. Common in seasonally moist places in canyons all over the island: March 1936, *Murbarger* 75 (UC); Northwest Harbor (acc. Trask); Wilson Cove, 250 ft, 12 April 1962, 17340; coast 1 mile south of Wilson Cove; canyon north of Nanny; west coast, canyon south of Lemon Tank, 10 April 1923, *Munz* 6745 (POM); Eel Point to Seal Cove, 175 ft, 10 June 1962, *Blakley* 5241 (SBBG); Middle Ranch Canyon, 900 ft, 12 April 1962, 17335; Cave Canyon; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 374 (DS). Reported by Trask.

SALVIA COLUMBARIÆ Benth. Local colonies on dry canyonsides on west side and south end of island: canyon south of Lemon Tank, west coast, 10 April 1923, *Munz* 6748 (UC); Middle Ranch Canyon, 350 ft, 12 April 1962, 17319; Cave Canyon; head of canyon on west side, opposite Mosquito Cove, 1050 ft, 9 May 1962, 17688; 18 plants in area 5 ft across near extreme south end, 2 more in a deep lava canyon

on west side, April 1936, *Murbarger 130* (UC). Reported by Eastwood.

SOLANACEAE

LYCIUM BREVIPES Benth. Thickets covering about an acre on sand dunes of slope above Northwest Harbor, Oct. 1902, *Trask 28* (US; not seen); May 1936, *Murbarger 196* (UC). Not seen in 1962 and perhaps destroyed. Reported by Hitchcock (Ann. Mo. Botan. Gard. 19: 253. 1932; as *L. richii*).

LYCIUM CALIFORNICUM Nutt. ex A. Gray. Common at relatively low elevations over the whole north end, in grassland, and scattered down the west side; rare on the east side, and again fully common on coastal flats at the south end: 25 March 1918, *Evermann* (CAS); April 1936, *Murbarger 103* (UC); North Head; North Head to West Point; beach due west of Wall 2; Wilson Cove, 9 April 1923, *Munz 6648* (POM); 300 ft, 9 April 1962, *17155*; canyon north of Nanny; Seal Cove; floor of canyon north of Thirst; Pyramid Cove, 7 April 1939, *Dunkle 7328* (LAM). Reported by Lyon. The shrubs lose all their leaves in the summer and become spiny skeletons; they are apparently in full bloom in about February.

LYCIUM HASSEI Greene. One small tree, with swollen trunk, grew apparently with *L. brevipes* near Northwest Harbor, *Trask 331* (NY, US; not seen), June 1903, *Trask 332* (NY, US; not seen). Reported by Mrs. Murbarger (pers. comm.) as dead in 1936, although the skeleton was there. Apparently the single tree at Avalon, Santa Catalina Island, said to be 4 ft in circumference with limbs covering over 200 square feet, was removed by 1908 to make way for new buildings (Field Mus. Nat. Hist. Publ. 212: 218. 1923). Reports from the mainland probably represent introductions or escapes from cultivation, or, as suggested by Hitchcock (Ann. Mo. Botan. Gard. 19: 257. 1932), it may be extinct as a native plant—apparently only two native individuals were ever known, one on each island. With such a great difference in habit, as well as in the calyx, this can well be treated as a species distinct from *L. brevipes*, particularly since the two apparently grew sympatrically at Northwest Harbor. When first proposing this entity as a variety of *L. brevipes* (which he called *L. richii*), I. M. Johnston (Proc. Calif. Acad. Sci., ser. 4, 12: 1154. 1924) was not aware of the occurrence of *L. brevipes* on San Clemente Island, nor of the great differences in habit between the two. As far as I can judge, *L. brevipes* on San Clemente Island, as elsewhere, was a branching shrub, according to Murbarger about 4–5 ft tall. The name *L. richii* has been misapplied to *L. hassei*, but is really a synonym of *L. brevipes*.

SOLANUM DOUGLASII Dunal. Common in canyons and on brushy or cactus-covered slopes throughout: March 1936, *Murbarger 6* (UC); near north end, 8 April 1923, *Munz 6605* (POM, UC); large dune north of a point due west of Wall 2, 100 ft, 11 April 1962, *17286*; Wilson Cove; canyon north of Nanny; canyon 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran 6830* (SD); gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, *17248*; vicinity of Mosquito Harbor, 6 July 1931, *Abrams & Wiggins 346* (DS, UC); Mosquito Summit, 24 Nov. 1939, *Dunkle 7339* (LAM); Chenetti Canyon, 3 April 1939, *Dunkle 7225* (LAM); Pyramid Cove, 18–19 Feb. 1939, *Elmore 420* (AHFH). Reported by Munz; Gentry's (Allan Hancock Pac. Exped. 13: 34. 1949) report of *S. villosum* (L.) Mill. from the island rests on the Elmore specimen cited above.

**SOLANUM NODIFLORUM* Jacq. Few on canyonside, 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran 6834* (SD).

SCROPHULARIACEAE

ANTIRRHINUM NUTTALLIANUM Benth. Colonies scattered on dry slopes in central part of island, mostly on west side: west slope, May 1936, *Murbarger 181* (UC); Eel Point to Seal Cove, 100 ft, 10 June 1962, *Blakley 5247* (SBBG); 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran 6831* (SD); Twin Canyon; west coast below Eagle Ranch, 11 April 1923, *Munz 6766* (POM); head of canyon near the Tomb, 12 April 1962, *17313*; gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, *17242*. Reported by Lyon. The very distinct cleistogamous f. *pusillum* (Brandegee) Munz was collected in shade at the base of cliffs, Middle Ranch Canyon, 450 ft, 12 April 1962, *17325*. Its status should be further investigated.

CASTILLEJA GRISEA Dunkle (*C. hololeuca* Greene subsp. *grisea* (Dunkle) Munz). Occasional on southeast coast, and very rare on canyonsides elsewhere: 24 Aug. 1894, *Brandegee* (UC); steep walls at head of canyon north of Boulder, 900 ft, 8 plants noted, 10 May 1962, *17735* (somewhat lax and greener shade form); south and east sides, April 1936, *Murbarger 132* (UC); common on lower slope bluffs, southeast coast, 2 April 1939, *Dunkle 7201* (LAM; type) Pyramid Cove, 18–19 Feb. 1939, *Elmore 384* (AHFH). This remarkable endemic species of *Castilleja* was first noted by Trask. It is only distantly related to *C. hololeuca*, an endemic of the northern Channel Islands, being covered with branched hairs (that species, contrary to the key in Munz, Calif. Fl., p. 667, 1959, has dense simple hairs); in fact, its affinities are quite obscure, although it might be distantly related to *C. mollis* Penn. or *C. foliolosa* H. & A. Dr. Rimo C. Bacigalupi, who has very kindly commented on these specimens, has pointed out several discrepancies in the key to group *Lanatae* given by Pennell (in Abrams, Ill. Fl. Pac. St. 3: 824. 1951): in *C. grisea* the corollas are 15–20 mm long, as given in the original description,

and just as in *C. foliolosa* and *C. hololeuca*; and lower lip of the corolla is barely a third as long as the galea in all three species.

COLLINSIA HETEROPHYLLA Buist ex R. Grah. Occasional colonies on seasonally moist slopes in central and southern parts of island: lower reaches of canyon north of Nanny, extending down to the sea; Lemon Tank, 9 April 1923, *Munz* 6686 (POM, UC), *Peirson* 3457 (RSA); head of canyon north of Boulder; Middle Ranch Canyon, 450 ft, 12 April 1962, 17330; east slope in moist canyons, small colonies at infrequent intervals, March 1936, *Murbarger* 18 (UC); Pyramid Cove, acc. Trask. Reported by Lyon (as *C. bicolor*). The populations of this species on San Clemente Island have corollas that appear uniform pale lavender, quite unlike the contrasting purplish-and-white pattern of most mainland populations. Thus they might be deserving of subspecific recognition, but the species has such an intricate pattern of variation that in my opinion it is more useful to withhold such recognition for the present.

GALVEZIA SPECIOSA (Nutt.) A. Gray. Common, hanging from rocky walls in canyons and on sea bluffs nearly the whole length of the island: April 1885, *Nevin* (SD), *Nevin & Lyon* (DS); 25 Aug. 1894, *Brandegee* (UC); 1897, *Purpus* (UC); 25 March 1918, *Evermann* (CAS); April 1936, *Murbarger* 141 (UC); Wilson Cove, 21 Feb. 1949, *Wiggins* 11954 (DS, RSA, SD, UC), 250 ft, 9 April 1962, 17162 (subglabrous), 10 April 1962, 17180 (pubescent); canyon north of Nanny, 11 July 1962, 17991; canyon below Lemon Tank, 9 April 1923, *Munz* 6685 (POM, UC), *Peirson* 3476 (DS, RSA), 750 ft, 10 July 1962, 17982; Eel Point to Seal Cove, 100 ft, 10 June 1962, *Blakley* 5246 (SBBG); canyon 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran* 6825 (DS, RSA, SD, UC); canyon south of Lemon Tank; canyon north of Boulder; Middle Ranch, 18 Feb. 1941, *Moran* 584 (DS); Horse Canyon; Cave Canyon; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62403 (SBBG); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 352 (CAS, DS, UC; pubescent), 353 (CAS, DS, UC; subglabrous); Guds; $\frac{3}{4}$ miles toward Pyramid Cove from China Point, 9 June 1962, *Blakley* 5207 (SBBG). Reported by Lyon (as *Antirrhinum speciosum*). Far more common than it is on Santa Catalina Island. Pubescent and subglabrous individuals regularly occur intermixed, with no other obvious differences. I observed no hummingbirds visiting the flowers of this fine shrub in April and May, 1962, but on July 11, 1962, in the canyon north of Nanny, several were active. The four stamens lie in pairs on the roof of the narrow corolla, with the anthers about 2 mm apart and the stigma, which has an oval stigmatic surface only about 0.5 mm wide, directed downward, about 2 mm closer to the mouth. Pollen must be carried on the beak of the hummingbird, not on its head as is often the case.

LINARIA CANADENSIS (L.) Dum.-Cours. sens. lat. Scattered in dry grassland of central part of the island, and occasionally washed into the canyons: March 1936, *Murbarger* 27 (UC); east-facing slopes along summit ridge about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17212; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62408a (SBBG; probably cleistogamous); canyon south of Thirst. Reported by Dunkle. Further studies are indicated of the two species recognized in this complex by Pennell (in *Abrams*, III. Fl. Pac. St. 3: 784-785. 1951).

MIMULUS FLEMINGII Munz (*Diplacus parviflorus* Greene). Scattered small colonies on rocky walls in canyons, central part of island: east side, March 1936, *Murbarger* 33 (UC); canyon wall south of Lemon Tank, east side, 10 April 1923, *Munz* 6707 (POM); near head of Twin Canyon, 1400 ft, 11 July 1962, 18001; large canyon north of Thirst, 900 ft, 10 May 1962, 17712; Horse Canyon, 900 ft, 10 May 1962, 17731; Cave Canyon. Reported by McMinn (Madroño 11: 80. 1951). After having studied *M. clevelandii* Brandegee, I feel that it is more useful not to recognize *Diplacus* as a distinct genus until the relationships of the other subgenera of *Mimulus* have been more thoroughly explored.

MIMULUS FLORIBUNDUS Dougl. ex Lindl. Vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 394 (DS). Reported by Grant (Ann. Mo. Botan. Gard. 11: 219. 1934).

MIMULUS GUTTATUS Fisch. ex DC. Occasionally in seasonally moist canyon bottoms, central part of island: east side, May 1936, *Murbarger* 86 (UC); canyon south of Lemon Tank, east side, 500 ft, 10 April 1923, *Munz* 6699 (POM), *Peirson* 3471 (RSA); Twin Canyon, 1050 ft, 11 July 1962, 18002; canyon just north of Boulder; Middle Ranch Canyon, 600 ft, 12 April 1962, 17327; Cave Canyon; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62394 (SBBG); head of canyon above Mosquito Cove. The San Clemente Island form of this extremely polytypic species was described as *M. clementinus* Greene, Leaflet. Botan. Obs. 2: 5. 1909, on the basis of a collection made in June 1903 by Mrs. Trask (US; not seen). All of the populations seen from the island consisted of small-flowered annual plants with subterreous leaves, lacking glandular pubescence on the pedicels. The complex is so poorly understood and so evidently variable that giving formal taxonomic names to particular elements within it seems to have very little value.

PENSTEMON CORDIFOLIUS Benth. Rare and scattered in canyons, central part of island: east side, 8-10 ft tall, April 1936, *Murbarger* (UC); Twin Canyon, 1050 ft, 11 July 1962, 18003; 1 shrub 2 m tall, Horse Canyon, 900 ft, 10 May 1962, 17733; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins*

379 (DS, UC). Reported by Trask.

SCROPHULARIA VILLOSA Penn. Very rare on rocky slopes in moist canyons (perhaps in a single canyon) near central part of island: steep volcanic rocks in partial shade, floor of canyon north of Thirst, 1000 ft, 10 May 1962, 17711; canyon wall south of Lemon Tank on the east coast, 10 April 1923, *Munz* 6703 (POM), *Peirson* 3438 (RSA). Reported by Munz (as *S. californica* var. *catalinae*).

PLANTAGINACEAE

PLANTAGO ERECTA Morris. Locally common in short grassland on clay slopes, at relatively high elevations, near central part of island: mesa summit, March 1936, *Murbarger* 233 (UC); dry canyon slope south of Lemon Tank, west coast, 10 April 1923, *Munz* 6752 (POM, UC); east-facing slopes of summit ridge about 2 miles north of Thirst, 1600 ft, 10 April 1962, 17227. Reported by Munz (as *P. hookeriana* var. *californica*). The first and third collections correspond with *P. erecta* subsp. *rigidor* Pilger, having slightly smaller flowers and seeds, often rather stiff and wide-spreading scapes, and shorter, sparser pubescence on the bracts and sepals (according to annotations by G. Thomas Robbins).

P. ANTAGO INSULARIS Eastw. Common on low sandy flats the length of the west coast: March 1936, *Murbarger* 23 (UC); sandy beach due west of Wall 2, 30 ft, 11 April 1962, 17278; near west shore opposite Wilson Cove, 150 ft, 8 May 1962, 17626; slopes above Seal Cove, 80 ft, 8 May 1962, 17593; sea bluff, Eagle Ranch, 11 April 1923, *Peirson* 3427 (RSA); Guds; China Point, 30 ft, 9 June 1962, *Blakley* 5184 (SBBG); Pyramid Cove. Reported by Lyon (as *P. patagonica*). None of the characteristics used to distinguish var. *fastigiata* (Morris) Jeps., a name applied to interior populations, appear at all consistent to me; therefore I see no value in recognizing infraspecific taxa within this species. Dr. D. M. Moore of the University of Leicester has determined the somatic chromosome number of my no. 17593 as $2n=8$, the same as reported for desert plants of *P. insularis* (Moore, *Madroño* 16: 267. 1962; Snow, *Madroño* 15: 83. 1959).

**PLANTAGO LANCEOLATA* L. One plant, on sandy flats, Northwest Harbor, 30 ft, 12 July 1962, 18035.

RUBIACEAE

**GALIUM APARINE* L. Common on canyon sides and in patches of cactus throughout: east side and moist canyons of west side, March 1936, *Murbarger* 14 (UC); north end: Wilson Cove, 8 April 1923, *Peirson* 3431 (RSA), 200 ft, 9 April 1962, 17176; east coast south of Lemon Tank, 9 April 1923, *Munz* 6642 (POM); west coast south of Lemon Tank, low shore, 11 April 1923, *Munz* 6772 (POM); canyon at south end of Seal Cove, 30 ft, 8 May 1962, 17595; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62346 (SBBG). Reported by Lyon. With one exception, these collections have fruits which in size correspond with *G. spurium* L. var. *echinospermum* (Wallr.) Hayek; *Munz* 6772 has fruits up to 4 mm across. While these two species are probably reasonably distinct in the Old World, and are even said to have different chromosome numbers, in the present state of knowledge it does not seem possible to separate them in western North America, although this would appear to be a desirable goal.

GALIUM CATALINENSE A. Gray var. *CATALINENSE*. Occasional on canyon walls, often growing out of cracks in the rocks; probably found all over the island: 25 March 1918, *Evermann* (CAS); east coast, March 1936, *Murbarger* 70 (UC); gully just above coast 1 mile south of Wilson Cove, 75 ft, 7 May 1962, 17583; canyon north of Nanny; canyon below Lemon Tank, 9 April 1923, *Munz* 6682 (POM, UC), *Peirson* 3432 (RSA); canyon south of Lemon Tank; canyon 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran* 6822 (DS, SD); 2 miles southeast of Eel Point, 100 m, 9 March 1959, *Moran* 7168 (SD); Middle Ranch Canyon, 900 ft, 12 April 1962, 17334; canyon south of Thirst; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 371 (CAS, DS, UC). Reported by Trask. *Galium catalinense* var. *buxifolium* (Greene) Dempster is found on San Miguel and Santa Cruz islands.

CAPRIFOLIACEAE

LONICERA HISPIDULA (Lindl.) Dougl. ex T. & G. Very rare in the most protected spots in canyons near the center of the island: canyon on west side near top of mesa, 1 plant about 10 ft tall, May 1936, *Murbarger* 179 (UC); canyon south of Lemon Tank, 1 plant with 2 branches about 2 dm long; rocky walls of canyon just north of Thirst, 1000 ft, 10 May 1962, 17714; canyon south of Thirst, 1200 ft, 1 dead shrub. Reported by Trask (as *Lonicera* sp.).

SAMBUCUS MEXICANA Presl ex DC., vel aff. Rare trees scattered in protected places, deep canyons near center of island: canyon below Lemon Tank, 9 April 1923, *Munz* 6683 (POM), 1 small shrub seen, 1962; canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl* 62393 (SBBG), tree with trunk 1 ft in diameter; canyon south of Thirst, 1 tree, trunk 2 ft in diameter, about 15 ft tall; Eagle Canyon, 1 large tree near grove of *Prunus ilicifolia* subsp. *lyonii*, 1000 ft, 9 May 1962, 17697. Reported by Trask (as *S. glauca*). I am not sure whether the two entities in this complex recognized by Ferris (in *Abrams &*

Ferris, Ill. Fl. Pac. St. 4: 43–46. 1960) and by Munz (Calif. Fl., pp. 1047–1048. 1959)—*S. mexicana*, said to be a tree with short-acuminate leaflets usually nearly symmetrical at base, cymes 7–15 cm across, and leaflets mostly 3–5; and *S. caerulea* Raf., said to be a shrub or small tree with acuminate leaflets markedly asymmetrical at base, cymes 12–30 cm across, and leaflets mostly 5–9—are so distinct that they need to be accorded specific status, though the tendencies certainly exist. Collections I have seen from the Channel Islands are particularly troublesome, my collection from San Clemente Island being from a tree about 6 m tall and 7 m across, the trunk nearly 1 m in diameter, with acuminate leaflets, the bases very asymmetrical, and cymes about 20 cm across. A comprehensive review of the genus, which probably contains fewer than 20 species, would be most welcome.

CUCURBITACEAE

MARAH MACROCARPUS (Greene) Greene. Common over the entire island, often on rocky slopes: 25 Aug. 1894, *Mearns* 4066 (DS); 25 March 1918, *Evermann* (CAS); 3 Sept. 1926, *Jones* (DS); May 1936, *Murbarger* 240 (UC); Northwest Harbor; near airfield, 250 m, 9 March 1959, *Moran* 7161a (DS); Wilson Cove, 21 Feb. 1949, *Wiggins* 11955 (DS, RSA), 100 ft, 9 April 1962, 17160; 5 miles southeast of Wilson Cove, 9 April 1923, *Peirson* 3480 (DS, RSA); east coast south of Lemon Tank, 11 April 1923, *Munz* 6779 (POM); Cave Canyon; Guds; Pyramid Cove. Reported by Lyon (as *Megarrhiza californica*), by Brandegee (as *Echinocystis fabacea*), by Munz (as *E. macrocarpa*), and by Eastwood (as *Marah major*). Stocking (Madroño 13: 113–137. 1955) recognizes the plants from the islands off the coast of southern California as var. *major* (Dunn) Stocking, characterizing them by their larger seeds, flower parts, and leaves. In addition, he recognizes from Guadalupe Island *M. guadalupensis* (S. Wats.) Greene, which he separates by its more campanulate flowers and relatively non-spiny fruits. On the other hand, Mrs. Ferris (in Abrams & Ferris, Ill. Fl. Pac. St. 4: 67–71. 1960) records both *M. macrocarpus* and *M. guadalupensis* from the islands, including in her concept of *M. guadalupensis* much of Stocking's *M. macrocarpus* var. *major*. Since many of the island plants are more or less intermediate between var. *macrocarpus* and var. *major*, I tend to agree with Stocking, but, although the extremes are quite different, the variation pattern does not at present appear to me to be such that it is useful to recognize formally a geographical race or subspecies. In my opinion, the plants from Guadalupe Island are also very probably conspecific with *M. macrocarpus*. Much more fruiting material from the islands is needed before definite conclusions can be reached; and the possibility that plants with large flowers and fruits may independently have been derived on several of the islands cannot for the present be discarded. *Marah major* Dunn was described from specimens collected by Trask on Santa Catalina, San Clemente, and San Nicolas islands.

COMPOSITAE

ACHILLEA LANULOSA Nutt. Scattered in dry grassland, on eastern slope: Wilson Cove, 30 ft, 10 June 1962, *Blakley* 5219 (SBBG); about 1 mile south of Wilson Cove, 400 ft, 11 April 1962, 17304; Wilson Cove to Lemon Tank, east coast, 9 April 1923, *Munz* 6647 (POM, UC); principally on mesa summit, March 1936, *Murbarger* 47 (UC; mean pollen diameter 26.48 μ , acc. Ehrendorfer); just north of Guds, 750 ft, 9 May 1962, 17642. Reported by Lyon (as *A. millefolium*). Lawrence (Am. J. Bot. 34: 538–545. 1947) reported a hexaploid ($n=27$) count for a plant of this complex from Nojoqui Pass, near Santa Barbara, and a tetraploid ($n=18$) count from the Palomar Mountains, in San Diego County. The assumption has been that the hexaploid, *A. borealis* Bong., extended down into coastal southern California, but no chromosome counts have been reported from populations in that area. I can now report that my no. 17304, cited above, was tetraploid, with 18 pairs of chromosomes at meiotic metaphase I (kindly determined for me by Mr. D. W. Kyhos). Therefore the entire status of this complex in coastal southern California needs to be investigated cytotaxonomically. It is possible that the tetraploid San Clemente Island population may be a relictual one, and the hexaploid may now actually be dominant in coastal southern California, but this cannot be determined without more chromosome counts. Contrary to an opinion I once expressed (Univ. Calif. Publ. Bot. 34: 6. 1962), I now believe that it is highly desirable to consider the tetraploid and hexaploid achilleas in North America as distinct species. They are major systems of populations, strongly isolated from one another, and with some modal differences in morphology. Therefore, I feel that their differences should be strongly emphasized even though it is necessary to determine the chromosome numbers of some doubtful populations to decide which entity they are to be associated with.

ACHYRACHAENA MOLLIS Schauer. Rare on dry grassy slopes in central part of island: mesa top, not plentiful, April 1936, *Murbarger* 147 (UC); Thirst; head of canyon at south end of Mosquito Cove, 1050 ft, 9 May 1962, 17663.

AMBLYOPAPPUS PUSILLUS H. & A. Abundant in grassland all over the north end and down the west shore to the south end, at relatively low elevations; north end near airfield; North Head to West Point; beach due west of Wall 2; Wilson Cove, 200 ft, 9 April 1962, 17137; east coast south of Wilson Cove, 9 April 1923, *Munz* 6670 (POM); mouth of canyon north of Nanny; Eel Point to Seal Cove, 20 ft, 10

June 1962, *Blakley* 5232 (SBBG); Seal Cove, 125 ft, 8 May 1962, 17590; west side, March 1936, *Murbarger* 61 (UC); Guds; China Point, 10–50 ft, 9 June 1962, *Piehl* 62357 (SBBG). Reported by Eastwood.

ARTEMISIA CALIFORNICA Less. Scattered in small patches on canyonsides all over the island, except for the extreme north end: 25 March 1918, *Evermann* (CAS); canyon walls and slopes on east side, to 6 ft tall, April–May 1936, *Murbarger* 149 (UC); wall of canyon south of Lemon Tank, east coast, 10 April 1923, *Munz* 6713 (POM); canyon, east side below a point about 2 miles north of Thirst, 1550 ft; Twin Canyon; upper reaches of Cave Canyon, 1.5 m tall, 1 m across, 10 July 1962, 17966; canyon south of Thirst; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 392 (CAS, DS); Guds; Pyramid Cove; China Point, 10–50 ft, 9 June 1962, *Piehl* 62355 (SBBG).

ARTEMISIA nesiotica, nom. nov. (based on *Crossostephium insulare* Rydb., N. Am. Fl. 24: 244, 1916; non *Artemisia insularis* Kitamura 1936. *Artemisia californica* Less. var. *insularis* (Rydb.) Munz). Scattered in open grassland at north end and along the west shore to the south end; west side opposite Wilson Cove, 8 April 1923, *Munz* 6615 (POM, UC); Wilson Cove, 150 ft, 9 May 1962, 17709; upper end of canyon south of Lemon Tank, 11 July 1962, 18006; canyon 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran* 6833 (DS, SD, UC); extreme south end, in cactus clumps, April 1936, *Murbarger* 127 (UC). The type is from "along Pot's Trail," San Clemente Island, *Trask* 286 (US; not seen). Having had the opportunity of studying this and *A. californica* on San Clemente Island, I have been forced to the conclusion that they are entirely distinct and should be treated as separate species. There is no intergradation between them, and they are ecologically very different, *A. californica* occurring on the drier, hotter slopes, *A. nesiotica* on the lower, foggy hillsides. The leaves of *A. nesiotica* are not or slightly revolute, less lobed than those of *A. californica*, and 1–3 mm wide; in addition, as pointed out by Ward (in *Abrams & Ferris*, Ill. Fl. Pac. St. 4: 409, 1960), *A. nesiotica* also has fuller heads, with up to 15 ray florets and to 40 disc florets, as opposed to 6–10 and 15–30 in *A. californica*. *Artemisia nesiotica* is known only from San Clemente, Santa Barbara, and San Nicolas islands; on the latter two, it is the only species of *Artemisia* present.

BACCHARIS PILULARIS DC. subsp. *CONSANGUINEA* (DC.) C. B. Wolf. About 150 shrubs in large dune near northwest end of island, and two shrubs near the south end: large dune near northwest end, 22 Feb. 1949, *Wiggins* 11961 (DS), 11 April 1962, 17288; south slope, 900 ft, 2 shrubs, the largest 10 ft tall and 10 in in diameter, April 1936, *Murbarger* 156 (UC). Reported by Munz, and by Eastwood (as *B. consanguinea*).

BACCHARIS VIMINEA DC. One huge pistillate shrub 12 ft tall, 30 ft across, with many stems from the base; severely trimmed by salt spray on side facing the ocean, dunes on west side 0.3 mile from the ocean, opposite Wilson Cove, 40 ft, 8 May 1962, 17629, 10 June 1962, *Blakley* 5257 (SBBG); presumably what was meant by Trask (p. 94), "One shrub of *Baccharis* holds forth alone in the treeless region of the west [=north] end . . ." Since there are apparently no staminate bushes on the island, this one is not setting any seed. Whether it is a remnant of a once more extensive population or a primary colonist cannot probably be decided but is nonetheless extremely interesting in view of the dioecious nature of this species.

**CENTAUREA MELITENSIS* L. Locally common and well established: scattered down canyon north of Nanny, 11 July 1962, 17988; east side, June 1936, *Murbarger* 241 (UC). Reported by Eastwood.

CIRSIO OCCIDENTALE (Nutt.) Jeps. Grassy slopes near north end: Wilson Cove, 100 ft, 12 April 1923, *Munz* 6781 (POM), *Peirson* 3480 (RSA), 200 ft, 10 April 1962, 17186; 1 mile south of Wilson Cove; canyon north of Nanny; mesa summit and ravines on west side, March 1936, *Murbarger* 102 (UC). Reported by Trask (as *Cnicus occidentalis*).

ENCELIA CALIFORNICA Nutt. var. *CALIFORNICA*. Scattered on dry slopes near south end: up to 10 ft tall, March 1936, *Murbarger* 48 (UC); just north of Guds, 820 ft, 9 May 1962, 17659. Reported by Trask from "Chalk Cliff Canyon," up to 12 ft tall and 4 in in diameter.

**ERIGERON BONARIENSIS* L. (*Conyza bonariensis* (L.) Cronq.). Common weed in barracks area, Wilson Cove, 8 May 1962, 17616, 10 June 1962, *Piehl* 62376 (SBBG).

**ERIGERON CANADENSIS* L. (*Conyza canadensis* (L.) Cronq.). Scattered in a few disturbed places near the north end: Northwest Harbor; beach west of Wall 2; Wilson Cove; just south of old airfield, 11 July 1962, 17997. The occasional production of hybrids between this species and *E. acer* L. in Britain underscores their close morphological similarity and leads me to believe that since there is no distinct break between them, *Conyza* and *Erigeron* can best be treated as a single genus, as argued at one time by Cabrera (Rev. Chil. Hist. Nat. 40: 228, 1937).

ERIGERON DISCOIDEUS Kell. (*Conyza coulteri* A. Gray). Small colony in arroyo 1 mile north of Eel Point, 20 m, 9 March 1959, *Moran* 7156 (SD).

ERIOPHYLLUM CONFERTIFLORUM (DC.) A. Gray var. *CONFERTIFLORUM*. Occasional on brushy

slopes, dry canyons throughout, except for the north end: east side, March 1936, *Murbarger* 69 (UC); canyon north of Nanny; canyon below Lemon Tank; canyon south of Lemon Tank; Twin Canyon; canyon on east side below a point about 2 miles north of Thirst, 1550 ft; east coast south of Lemon Tank, 10 April 1923, *Munz* 6710 (POM); Horse Canyon; Cave Canyon; canyon south of Thirst, 800 ft; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 341 (DS); head of canyon at south end of Mosquito Cove, 950 ft, 9 May 1962, 17669. Reported by Constance (Univ. Calif. Publ. Botan. 18: 110. 1937), and by Dunkle (as var. *trifidum*).

ERIOPHYLLUM NEVINII A. Gray. Common on sea bluffs and on cliffs in the lower reaches of canyons all around the island: April 1885, *Nevin & Lyon* (DS), *Nevin* (DS, UC; type collection); 25 Aug. 1894, *Brandegee* (UC); 9 Sept. 1926, *Jones* (DS, POM); northeast end of island, 100–125 ft, 22 Feb. 1949, *Wiggins* 11966 (DS); east end of Northwest Harbor, 100 ft, 12 July 1962, 18024; east slopes or on sea bluffs, 10 April 1962, *Peirson* 3477 (RSA); east side, especially near coast, April 1936, *Murbarger* 182 (UC); canyon north of Nanny and bluffs at its mouth; below Lemon Tank; Eel Point, 20 ft, 10 June 1962, *Blakley* 5228 (SBBG); 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran* 6820 (DS, RSA, SD, UC); Seal Cove; west coast south of Lemon Tank, *Munz* 6756 (POM); canyon below the Tomb, 400 ft, 12 April 1962, 17312; east rim Middle Ranch Canyon, 18 Feb. 1941, *Moran* 597 (LAM); Cave Canyon; Mosquito Cove, 4 July 1919, *Knoche* A995 (DS); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 378 (CAS, DS, UC); Guds; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Blakley* 5200 (SBBG); Pyramid Cove.

FILAGO ARIZONICA A. Gray. Abundant in steep dry grassland all along the west side, and on the southern end of the summit ridge: west side, April 1936, *Murbarger* 161 (UC); west side opposite Wilson Cove, 150 ft, 8 May 1962, 17632; Seal Cove, 80 ft, 8 May 1962, 17592; north of Middle Ranch Canyon, 350 ft, 12 April 1962, 17314; near foot of Middle Ranch Canyon, 450 ft, 12 April 1962, 17321; near head of canyon at south end of Mosquito Cove, 1050 ft, 9 May 1962, 17671; just north of Guds, 820 ft, 9 May 1962, 17652; China Canyon about 2 miles above China Point, 700 ft, 9 June 1962, *Piehl* 62343 (SBBG). Reported by Munz; records of this species from Santa Cruz, Santa Rosa, and Santa Catalina islands and from the coast as far north as Ventura County need confirmation.

FILAGO CALIFORNICA Nutt. Occasional in dry grassland and in canyons, throughout except for north end: Wilson Cove to Lemon Tank, 9 April 1923, *Munz* 6668 (POM); mesa summit and west side, May 1936, *Murbarger* 202 (UC); Twin Canyon; Middle Ranch Canyon, 100 ft, 8 May 1962, 17604; Thirst, 1960 ft, 9 June 1962, *Piehl* 62370 (SBBG); Cave Canyon; just north of Guds, 820 ft, 9 May 1962, 17654.

FRANSERIA CHAMISSONIS Less. subsp. *BIPINNATISECTA* (Less.) Wiggins & Stockwell (*F. bipinnatifida* Nutt.). Abundant on dunes around north end of island and at Mosquito Cove: March 1936, *Murbarger* 155 (UC), April 1936, *Murbarger* 162 (UC); east end of Northwest Harbor, 100 ft, 12 July 1962, 18022; Northwest Harbor, May 1936, *Murbarger* 188 (UC); beach west of Wall 2, 11 April 1962, 17265, 10 July 1962, 17953; large dune north of a point due west of Wall 2, 100 ft, 11 April 1962, 17288 (plants more erect than usual, leaves more finely divided), 10 June 1962, *Blakley* 5250, 5251 (SBBG), 10 July 1962, 17957 in part; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 358 (DS, UC), 359 (DS, UC). Reported by Eastwood. Extremely variable in leaf shape, habit, and pubescence.

FRANSERIA CHAMISSONIS Less. subsp. *CHAMISSONIS*. Rare on dunes at the north end, always growing with the preceding, and apparently freely hybridizing with it: May 1936, *Murbarger* 207 (UC); Northwest Harbor, May 1936, *Murbarger* 214 (UC), 50 ft, 12 July 1962, 18031; dune north of a point west of Wall 2, 10 July 1962, 17957. Reported by Hall (Univ. Calif. Publ. Botan. 3: 122. 1907). Viewing the situation on San Clemente Island, one is lead to wonder if subsp. *chamissonis* might not once have been the only form present, and if it is now being "hybridized out of existence" by subsp. *bipinnatisecta*, which may have arrived on the island later. An exactly similar situation seems to obtain on San Nicolas Island (*Blakley* 4128, 4129, 4130, SBBG).

GNAPHALIUM BICOLOR Bioletti. Widespread on grassy slopes over the entire island: March 1936, *Murbarger* 8 (UC); large dune north of a point west of Wall 2, 100 ft, 11 April 1962, 17287; Wilson Cove, 12 April 1923, *Peirson* 3465 (DS, RSA), 21 Feb. 1949, *Wiggins* 11957 (DS); canyonside 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran* 6828 (SD); about 2 miles north of Thirst, 1700 ft, 10 April 1962, 17251; Middle Ranch, 19 Feb. 1941, *Moran* 595 (DS); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 375 (DS). Reported by Hall (Univ. Calif. Publ. Botan. 3: 113. 1907). Several collections from Wilson Cove—12 April 1923, *Peirson* 3464 (RSA); 200 ft, 9 April 1962, 17153; 350 ft, 12 April 1962, 17347 (annual); 100 ft, 10 June 1962, *Blakley* 5226 (SBBG)—are like *G. bicolor* in technical characters but have the leaves covered on both sides with loose lanate pubescence and the upper leaves perhaps not so strongly clasping. Two similar collections have been seen—Tia Juana River, San Diego County, 16 May 1903, *Abrams* 3516 (DS); Santa Barbara, May 1902, *Elmer* 3954 (DS). One might theorize that these plants were hybrids between *G. bicolor* and some other

species of *Gnaphalium*, such as *G. californicum* DC. or *G. microcephalum* Nutt., but no eligible species has yet been found on San Clemente Island. The record of *G. chilense* Spreng. from the island (Eastwood) undoubtedly rests on the Abrams & Wiggins collection, which is typical *G. bicolor*; that of *G. decurrens* (Lyon), which probably led to Eastwood's recording of *G. californicum*, might be based on the white-pubescent form; *G. bicolor*, however, was not described until after Lyon's report.

GNAPHALIUM PALUSTRE Nutt. Rare on strand of reservoir at Lemon Tank, 850 ft, 10 July 1962; lost in the press. Reported by Munz.

HAPLOPAPPUS CANUS (A. Gray) Blake. Rare and scattered on rocky canyon walls in the central and southern parts: 25 Aug. 1894, *Mearns 4071* (DS), *Brandegee* (UC); frequent in the vast gorges, 2–8 ft tall, June 1903, *Trask 292* (CAS; type of *Aplopappus traskiae* Eastw., Proc. Calif. Acad. Sci., ser. 4, 20: 156. 1931); canyon just north of Boulder, east side; Horse Canyon, 1000 ft, 10 May 1962, *17730*; Cave Canyon. Reported by Hall (Univ. Calif. Publ. Botan. 3: 65. 1907). The type locality of this species is Guadalupe Island, and plants from there and San Clemente Island differ from other populations assigned to the species, from Anacapa, Santa Cruz, and Santa Rosa islands, in a number of characters. The southern plants are rounded shrubs from which compound thyriform inflorescences arise; the northern ones irregularly branched with subcorymbose compound inflorescences. The leaves of the southern plants are membranous, consistently oblanceolate, closely and finely serrulate or subentire, glabrate above at maturity, and densely short-tomentulose beneath. When young, the leaves are thinly tomentulose above and densely so below. The leaves of the northern plants are thick, nearly leathery, narrowly ovate or obovate, coarsely serrate with a few teeth or subentire, densely short-tomentulose above (rarely glabrate) at maturity, and covered with dense loose woolly pubescence below. The phyllaries of the southern plants have a tuft of loose woolly pubescence at the apex, the inner ones being glabrous, whereas those of the northern plants are densely white-woolly all over at maturity. The disk corollas of the southern plants are 5.5–7.8 mm long, those of the northern plants 8.3–9.5 mm long. In view of this nonoverlapping pattern of variation in several morphological traits, specific status for these entities seems most appropriate. The correct name for the northern plants is therefore *Haplopappus detonsus* (Greene) comb. nov. (based on *Corethrogyne detonsa* Greene, Bull. Torrey Club 10:41. 1883). Both of these species have the same gametic chromosome number, $n=5$ (*H. detonsus*, Raven et al., Am. J. Botan. 47: 126. 1960 [as *H. canus*]; *H. canus*, aceto-orcein squashes from root tips of *Raven 17730*, growing at Claremont), as does the only other species of sect. *Hazardia* that has been examined, *H. squarrosus* (Raven et al., op. cit.). I believe that the confusion between the two species in the past has been caused by a lack of adequate material from the southern islands, and by the extreme variability of the populations on the northern islands, promoted on Santa Cruz Island by hybridization with *H. squarrosus* H. & A. subsp. *grindelioides* (DC.) Keck, and resulting in plants like that named *Hazardia serrata* Greene. Nevertheless, Hall (Carn. Inst. Wash. Publ. 389: 244. 1928) anticipated that the two species might be distinct. A final note may be added concerning the floral morphology of these species. Hall (loc. cit.) speaks of them as having "ray flowers said to be 4 to 6 and with very short ligules turning from yellow to purple." The actual situation in both is similar, and as follows: a ring of about 8–13 pistillate flowers is found around the margin of the head. Their corollas are about 0.3–0.4 mm wide near the base, as compared with c. 1 mm for those of the larger, more central, hermaphroditic florets. The pistillate corollas may be actinomorphic, or a few of them may be slightly bilabiate, in which case they could be spoken of as very short rays. They are slightly shorter than the hermaphroditic florets. In both kinds of floret, the corollas are at first orange-yellow, then purplish-brown, and finally brown. As the head matures, first the stigmas of the pistillate flowers are exerted; they are pollinated first and change color first. At much the same time, the large anthers of the hermaphroditic florets are shedding pollen inwardly, and finally their stigmas emerge through the pollen mass, being then covered with pollen.

HAPLOPAPPUS VENETUS (Kunth) Blake subsp. **FURFACEUS** (Greene) Hall. Reported by Hall (op. cit., p. 226) on the basis of a collection made by Brandegee, 25 Aug. 1894 (UC).

HAPLOPAPPUS VENETUS subsp. **VERNONIOIDES** (Nutt.) Hall. Scattered on open grassy slopes, Wilson Cove, 200 ft, 11 July 1962, *18011* (not in bloom). Reported by Eastwood (as *Isocoma vernonioides*), but her report probably relates to Hall's earlier (Univ. Calif. Publ. Botan. 3: 63. 1907) references to the Brandegee specimen, cited under the preceding entity. My collection appears typical of the mainland plants, having coarsely toothed, hairy leaves.

HEMIZONIA CLEMENTINA Brandegee. Common and forming extensive colonies in open grassland of north end, scattered down the west coast, and rare on rocks in canyons along the east coast: April 1885, *Nevin* (DS); 25 Aug. 1894, *Brandegee* (UC, type); Northwest Harbor, west end; West Point; above North Head, 12 July 1962, *18038*; north end, 9 April 1923, *Munz 6610* (POM, UC); beach due west of Wall 2; Wilson Cove, 50 m, 5 Sept. 1958, *Moran 6837* (DS, SD, UC), 200 ft, 9 April 1962, *17152*, 150 ft, 7 May 1962, *17575*, 200 ft, 11 July 1962, *18013*, 10 June 1962, *Blakley 5212*; 1 mile south of Wilson Cove; 2 miles southeast of Wilson Cove, 9 April 1923, *Peirson 3459* (RSA); canyon north of Nanny, 11 July 1962, *17990* (prostrate on rocks); canyon 1.8 miles southeast of Eel Point, 100 m,

15 Sept. 1958, *Moran* 6832 (SD); Mosquito Cove, 4 July 1919, *Knoche* A983 (DS); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 381a (CAS, DS, UC); China Point, 30 ft, 9 June 1962, *Blakley* 5189 (SBBG). Reported by Lyon (as *H. streetsii*).

HEMIZONIA RAMOSISSIMA Benth. Scattered and forming large colonies in open grassland throughout: $\frac{3}{4}$ mile southeast of Wall 2, 9 June 1962, *Blakley* 5174 (DS, UC); above Wilson Cove, 450 ft, 10 July 1962, 17963; Wilson Cove, 150 ft, 7 May 1962, 17576; upper reaches of canyon north of Nanny, 11 July 1962, 17994; north end of mesa summit, May 1936, *Murbarger* 215 (UC); Thirst; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 361 (CAS, DS); road above Pyramid Cove, 400 ft, 9 May 1962, 17689. Reported by Trask (as *H. fasciculata*) and by Eastwood (as *H. f.* var. *ramosissima*). The relationship between this species and *H. fasciculata* (DC.) T. & G. is so close, and specimens are so often difficult to determine as one or the other, that I think their taxonomic status should be reconsidered, using a number of different strains. As it is, their occurrence is largely allopatric, and they are the most highly interfertile entities considered species in their section (cf. Clausen, *Stages Evol. Pl. Sp.*, fig. 62. Ithaca: Cornell Univ. Press, 1951).

HETEROTHECA GRANDIFLORA Nutt. Scattered on dunes, northwest side: large dune north of a point west of Wall 2, 100 ft, 11 April 1962, 17285, 10 June 1962, *Blakley* 5256 (SBBG); west side opposite Wilson Cove, 0.3 mile from ocean, 40 ft, 8 May 1962, 17630.

**HYPOCHOERIS GLABRA* L. Rare in canyons on east side, central part of island: canyon east of Thirst, 1900 ft, 10 June 1962, *Piehl* 62378 (SBBG); Eagle Canyon, 1 plant, 1400 ft, 9 May 1962, 17693.

LASTHENIA CHRYSOSTOMA (Fisch. & Mey.) Greene (*Baeria chrysostoma* F. & M.). Frequent large colonies in shallow grassland all over the island, more common and colorful southward: near West Point; beach west of Wall 2, 30 ft, 11 April 1962, 17283; Wilson Cove, 9 April 1923, *Peirson* 3425 (RSA), 300 ft, 10 April 1962, 17193; vicinity of Wilson Cove, 8 April 1923, *Munz* 6626 (POM, UC); canyon near Lemon Tank, 9 April 1923, *Munz* 6688 (POM, UC); canyon south of Lemon Tank; Thirst, 1900 ft, 10 April 1962, 17207, 1965 ft, 10 June 1962, *Blakley* 5178 (SBBG); head of canyon east of Peak 1135 south of Mosquito Cove, 1000 ft, 9 June 1962, *Piehl* 62317a (SBBG); Guds; Pyramid Cove. Asa Gray described *Baeria palmeri* A. Gray var. *clementina* A. Gray, regarded as a synonym, from collections made on the island by Nevin and Lyon.

LAYIA PLATYGLOSSA (Fisch. & Mey.) A. Gray subsp. *CAMPESTRIS* Keck. Common in grassland of canyons over the whole island: Wilson Cove, 9 April 1923, *Peirson* 3430 (DS, RSA); Wilson Cove to Lemon Tank, east coast, 9 April 1923, *Munz* 6673 (POM, UC); canyon north of Nanny; canyon south of Lemon Tank; west side, March 1936, *Murbarger* 84 (UC); near mouth of canyon at south end of Seal Cove, 30 ft, 8 May 1962, 17596; head of canyon near the Tomb, 1200 ft, 12 April 1962, 17308; east side and rare on mesa top, March 1936, *Murbarger* 17 (UC); Twin Canyon; Middle Ranch Canyon, 750 ft, 12 April 1962, 17331; gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17237; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 376 (DS); near head of canyon at south end of Mosquito Cove, 1050 ft, 9 May 1962, 17662; Guds; China Canyon 2 miles above China Point, 700 ft, 9 June 1962, *Blakley* 5204 (DS, SBBG). Reported by Lyon and subsequent authors as *L. glandulosa*.

MADIA SATIVA Mol. Scattered in canyon below Lemon Tank, 10 July 1962, 17983. Possibly introduced.

MALACOTHRIX FOLIOSA A. Gray. Abundant and colorful in grassland over the entire north end and down the west coast, rare in canyons on the east side: April 1885, *Nevin & Lyon* (DS); north end, 9 April 1923, *Munz* 6612 (POM, UC); east and north sides, May 1936, *Murbarger* 164 (UC); North Head to West Point; West Point; east end of Northwest Harbor, 100 ft, 12 July 1962, 18026; beach due west of Wall 2, 30 ft, 11 April 1962, 17279; west shore opposite Wilson Cove, 150 ft, 8 May 1962, 17625; Wilson Cove, 12 April 1923, *Peirson* 3463 (DS, RSA), 300 ft, 11 April 1962, 17291, 30 ft, 10 June 1962, *Blakley* 5220 (SBBG); above and north of Seal Cove, 10 June 1962, *Blakley* 5234 (SBBG); second canyon south of Seal Cove, 100 ft, 8 May 1962, 17606; east side, March 1936, *Murbarger* 3 (UC); Mosquito Cove, 4 July 1919, *Knoche* A982 (DS); vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 339 (CAS, DS); head of canyon above south end of Mosquito Cove; Guds; Pyramid Cove; China Point, 15 ft, 9 June 1962, *Blakley* 5191 (SBBG). Described from the island from material collected by Nevin and Lyon. Mr. W. S. Davis obtained a gametic chromosome number of $n=7$ from my no. 17279, cited above. As suggested previously (Madroño 16: 263-264, 1962), it would be highly desirable to investigate this complex using cytotoxic methods. This species is known with certainty only from Santa Barbara Island and the Coronados, in addition to San Clemente Island.

MALACOTHRIX INCANA (Nutt.) T. & G. West side near the sea, April 1936, *Murbarger* 189 (UC). Reported by Williams (*Am. Midl. Nat.* 58: 494-512, 1957); plants probably annual, their herbage glabrous.

MICROSERIS DOUGLASII (DC.) Sch.-Bip. subsp. *PLATYCARPHA* (A. Gray) K. Chamb. Dry grassy

slopes in central part of island: mesa summit, March 1936, *Murbarger 51* (UC); west side south of Lemon Tank, 10 April 1923, *Munz 6739a* (POM); Thirst, 1900 ft, 10 April 1962, 17199; canyon above Mosquito Cove. Reported by Munz (as *M. platycarpa*); Chambers (Contr. Dudley Herb. 4: 297, 1955) considers the San Clemente Island material he examined to be intermediate to subsp. *douglasii*.

MICROSERIS ELEGANS Greene ex A. Gray. Rare in vernal moist spots, grassland in central part of island: mesa summit, April 1936, *Murbarger 111* (UC); east side south of Lemon Tank, 800 ft, 11 April 1923, *Munz 6732* (POM, UC; mixed with *M. douglasii platycarpa*). Reported by Munz. Eastwood's report of *M. aphantocarpa* may well apply to this species also.

MICROSERIS HETETOCARPA (Nutt.) K. Chamb. (*M. lindleyi* auth.). Rare but widely scattered in dry grassland: Wilson Cove, 200 ft, 9 April 1962, 17144; Thirst, 1900 ft, 10 April 1962, 17206; below "Chenity" south of Mosquito Cove, 1000 ft, 10 June 1962, *Piehl 62319* (SBBG). Reported by Lyon.

MICROSERIS LINEARIFOLIA (Nutt.) Sch.-Bip. Fairly common in grassland throughout: Wilson Cove, 12 April 1923, *Peirson 3453* (RSA), 200 ft, 9 April 1962, 17157; second canyon south of Seal Cove, 100 ft, 8 May 1962, 17612; east side, May 1936, *Murbarger 206* (UC); east side to mesa top, March 1936, *Murbarger 26* (UC); Wilson Cove to Lemon Tank, 800 ft, 10 April 1923, *Munz 6732a* (POM); canyon east of Thirst, 1000 ft, 10 June 1962, *Piehl 62382* (SBBG); Cave Canyon; Guds. For the name of this species, I accept the reasoning of Chambers (Contr. Dudley Herb. 5: 63-64, 1957); this reasoning has, however, apparently been rejected by Munz (Calif. Fl., p. 1290, 1959) with the unfortunate consequence that he uses *M. lindleyi* (DC.) A. Gray as the name for this species, although it has previously always been applied to the preceding one.

Munzothamnus, gen. nov. (Fig. 6).

Compositae; Cichorieae: Stephanomerinae. Frutex; involucris paucifloris, angustis; floribus purpureis; setis crassis, paucis, eplumulosis; chromosomata, $n=8$. Species unica, *M. blairii* (Munz & Johnston.) comb. nov. (*Stephanomeria blairii* Munz & Johnston, Bull. Torrey Club 51: 301, 1924. *Malacothrix blairii* (Munz & Johnston.) Munz, Man. So. Calif. Botan. p. 591, 601, 1935). Grows from steep rocky canyon walls, the individuals mostly scattered, but probably in every canyon in central part of island, on both sides: May 1936, *Murbarger 195* (UC); 5-13 Aug. 1930, *House & Grumbles* (POM). East side: about 13 on steep north-facing slopes in canyon north of Nanny, 11 July 1962, 17992; 1 in same canyon at about 200 ft; canyon below Lemon Tank, 9 April 1923, *Munz 6681* (POM), *Peirson 3475* (RSA), about 100 counted in 1962; probably same canyon, autumn 1923, *E. G. Blair* (POM, type); 28 counted in canyon just south of Lemon Tank, one worked by a hummingbird, 11 July 1962; Twin Canyon, about 45; about 100 in canyon north of Boulder; canyon north of Thirst, rare, 10 May 1962, 17717; canyon east of Thirst, 1000 ft, 4-5 seen, 10 June 1962, *Piehl 62398* (SBBG); canyon south of Thirst, 600 ft, 1 shrub. West side: 1.8 miles southeast of Eel Point, 100 m, 15 Sept. 1958, *Moran 6824* (SD, UC); 2 miles southeast of Eel Point, 100 m, rather frequent, 9 March 1959, *Moran 7162* (SD); 1 shrub in canyon below the Tomb, 800 ft, 12 April 1962, 17310; Middle Ranch Canyon, about 6. Endemic. This handsome plant has a pattern of branching, with a tuft of large shiny, sinuate-margined leaves at the end of each branch, totally unlike any species of *Stephanomeria* or *Malacothrix*, with which it has heretofore been associated. Furthermore, in technical characters, as pointed out by Stebbins *et al.* (Univ. Calif. Publ. Botan. 26: 405, 1953; these authors also report the chromosome number, $2n=16$) it does not agree well with either of them. It is as distinct from the other 9 genera of the subtribe (as constituted by Stebbins, Madroño 12: 65-81, 1953) as they are from one another, and cannot be associated readily with either one of the two major lines within the subtribe, as outlined by Stebbins. In my opinion, it is clearly a relictual and highly isolated genus. It was first discovered by the indefatigable Mrs. Trask, who stated (p. 94): "A new *Malacothrix* overhung many an inaccessible gorge in October and November, with its great masses of lavender flowers in atonement for its rank leaves..." It is a great pleasure to name this fine genus in honor of Dr. Philip A. Munz, lifelong student of the flora of California and of the Onagraceae, who was (with Ivan M. Johnston) the first to call it to scientific notice, following his early exploration of San Clemente Island.

PERITYLE EMORYI Torr. Frequent colonies on slopes all over the island: March 1936, *Murbarger 83* (UC); west end of Northwest Harbor, 50 ft, 12 July 1962, 18036; northwest coast, 8 April 1923, *Munz 6617* (POM, UC); Wilson Cove, 300 ft, 12 April 1962, 17345; canyon north of Nanny; Seal Cove; Middle Ranch Canyon, 450 ft, 12 April 1962, 17323; Cave Canyon; just north of Guds, 820 ft, 9 May 1962, 17658; China Point, 30 ft, 9 June 1962, *Blakley 5185* (SBBG). Reported by Lyon, and by Eastwood (as *P. greenii*). Mr. D. W. Kyhos found 54 pairs of chromosomes in meiotic metaphase I of my no. 17345; this is in agreement with other determinations of coastal and desert plants (Raven & Kyhos, Am. J. Botan. 48: 845, 847, 1961) and suggests that the basic number for the species may be $x=17$.

PSILOCARPHUS TENELLUS Nutt. var. *TENELLUS*. Common annual in caked adobe, grassland near head

Fig. 6. *Munzothamnus blairii* in upper reaches of canyon below Lemon Tank; medium-sized plant about 0.7 m tall, the trunks about 2 cm in diameter. In mature bud. Official photograph, U .S. Navy.

of canyon at south end of Mosquito Cove, 1050 ft, 9 May 1962, 17664.

RAFINESQUIA CALIFORNICA Nutt. Occasional colonies on canyon slopes in central and south parts of island: mesa summit, May 1936, *Murbarger* 178 (UC); canyon north of Nanny; second canyon south of Seal Cove, 100 ft, 8 May 1962, 17608; west coast south of Lemon Tank, 10 April 1923, *Munz* 6755 (POM); canyon below farm buildings at Eagle Ranch, 11 April 1923, *Peirson* 3474 (RSA); gully to west side about 1.5 miles north of Thirst, 1500 ft, 10 April 1962, 17244; canyon above Mosquito Cove. Reported by Munz.

SENECIO LYONII A. Gray. Scattered on grassy slopes and in canyons over the whole island: April 1885, *Nevin & Lyon* (DS, type collection); 25 March 1918, *Evermann* (CAS); March 1936, *Murbarger* 29 (UC); North Head; Wilson Cove, 8 April 1923, *Munz* 6629 (POM, UC), 12 April 1923, *Peirson* 3478 (RSA), 22 Feb. 1949, *Thomas* 1 (DS), 250 ft, 9 April 1962, 17161, 350 ft, 10 April 1962, 17188, 100 ft, 10 June 1962, *Blakley* 5217 (SBBG); canyon south of Lemon Tank; second canyon south of Seal Cove; mouth of Middle Ranch Canyon, 150 m, 18 Feb. 1941, *Moran* 589 (DS); canyon west of Thirst; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 340 (DS); Pyramid Cove. Reported by Lyon. Known also from Santa Catalina Island and the vicinity of Bahía de San Quintín (including Isla San Martín) in Baja California. Full bloom occurs in March, and by midsummer the plants are completely dry; this is in contrast to the related mainland species *S. douglasii* DC., which blooms in midsummer.

**SENECIO VULGARIS* L. Rare in a few canyons on east side, central part of island: Twin Canyon; canyon on east side below a point about 2 miles north of Thirst, 1550 ft, 10 April 1962, 17230; Thirst; canyon south of Thirst.

**SONCHUS ASPER* (L.) Hill. Scattered in canyons, central and southern parts: canyon north of Nanny; east side, March 1936, *Murbarger* 78 (UC), May 1936, *Murbarger* 228 (UC); east coast south of Lemon Tank, 10 April 1923, *Munz* 6700 (POM); second canyon south of Seal Cove; Middle Ranch Canyon, 900 ft, 12 April 1962, 17336; Thirst; Guds.

**SONCHUS OLERACEUS* L. In canyons throughout: 9 Sept. 1926, *Jones* (POM); March 1936, *Murbarger* 103, 105 (UC); Northwest Harbor; beach west of Wall 2; Wilson Cove, 200 ft, 9 April 1962, 17139; 2 miles south of Wilson Cove, 9 April 1923, *Munz* 6680 (POM); canyon north of Nanny; canyon below Lemon Tank; dune south of Eel Point, 50 ft, 10 June 1962, *Blakley* 5259 (SBBG); Seal Cove; second canyon south of Seal Cove; Twin Canyon; China Point, 10–50 ft, 9 June 1962, *Piehl* 62358 (SBBG). Reported by Lyon.

**SONCHUS TENERRIMUS* L. Common on a sea cliff, May 1903, *Trask* 356 (NY, acc. R. Barneby); common, May 1903, *Trask* 355 (NY, acc. Barneby). Recorded by Hall (Univ. Calif. Publ. Botan. 3: 273. 1907). Apparently much rarer in insular California now than formerly, although adventive.

STEPHANOMERIA VIRGATA Benth. Scattered on grassy slopes, probably throughout: March 1936, *Murbarger* 66 (UC); north end; big dune, northwest side of island, 10 June 1962, 17961; Wilson Cove, 50 m, 15 Sept. 1958, *Moran* 6839 (SD), 200 ft, 11 July 1962, 18015; canyon north of Nanny; canyon below Lemon Tank, 800 ft, 10 July 1962, 17987; above and north of Seal Cove, 200 ft, 10 June 1962, *Blakley* 5235 (SBBG); Thirst; vicinity of Mosquito Cove, 6 July 1931, *Abrams & Wiggins* 344 (DS, UC); Guds. Mr. D. W. Kyhos has obtained a gametic chromosome number of 8 pairs in microsporocytes of my no. 18015. These plants are like the "second diploid form" of the species discussed by Stebbins *et al.* (Univ. Calif. Publ. Botan. 26: 407. 1953), from Torrey Pines, San Diego County, in flower number (8–12 per involucre), but unlike it in lacking glandular pubescence. The complex is badly in need of cytotaxonomic investigation.