

MESEMBRYANTHEMUM IN CALIFORNIA

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Three species of *Mesembryanthemum* are well enough established in western North America to have been regarded by some authors as native. As segregated in recent studies, these are *Carpobrotus chilensis* (Molina) N. E. Br., *Cryophytum crystallinum* (L.) N. E. Br., and *Cryophytum nodiflorum* (L.) L. Bolus.

Of the thousand-odd species of *Mesembryanthemum*, a very great majority are African. Most species of *Cryophytum* are African, and the two occurring in California are found also in Africa. Likewise, most species of *Carpobrotus* are African, though the one occurring in California is found also in Chile but not in Africa. These facts seem to indicate that the California species of *Mesembryanthemum* are of African ancestry. The question is how and when they reached our shores. Was it before or after the arrival of the white man? And how long ago must they have arrived in order to be "indigenous"?

Brewer and Watson (1876, p. 251) and Wilson (1932, pp. 276-277) considered the California species of *Mesembryanthemum* as introduced. On the other hand, Parish (1890) argued that the three well-established species were indigenous; and Jepson (1914, p. 462) and Abrams (1944, p. 118) accepted this point of view. Von Poellnitz (1933, pp. 29, 36) and Munz (1935, p. 154) considered only *Carpobrotus chilensis* to be indigenous.

Parish argued that the more or less concentric distribution of these three species was "a natural arrangement for the species of an indigenous genus" but was difficult to understand on the basis of chance introduction. This argument assumes that the three species had a common ancestor in California, which is scarcely credible. The three California plants seem conspecific with plants of other lands. But even if they are not, their closest respective relationships surely are with three foreign species belonging to two very distinct groups here regarded as genera. Therefore, there must have been three—or, at the very least, two—separate introductions from other parts of the world. Any resemblance of the present distribution of *Mesembryanthemum* in western North America to the distribution of an indigenous genus must, therefore, be regarded as coincidental.

Parish noted the widespread occurrence of the *Mesembryanthemum* species in wild and isolated areas of California and Baja California, Mexico; he discussed the difficulties of explaining their early introduction, and he remarked on their apparent lack of rapid means of dissemination. He concluded that it would be difficult to account for their present wide distribution if they had been introduced since the Spanish settlement.

Although the means of dissemination may be difficult to understand, they seem none the less effective: there is some evidence that both *Cryophytum crystallinum* and *C. nodiflorum* have spread considerably since Parish's time.

Parish knew *Cryophytum nodiflorum* only from Santa Catalina and San Clemente islands and from the mainland in the immediate vicinity of San Diego, though it had also been collected on San Nicolas Island and at Santa Monica. From the early lists for the other islands of southern California and Baja California, *C. nodiflorum* was absent. It was first reported for Santa Rosa and San Miguel islands in 1932 and for Santa Barbara Island in 1941; and it has been found this year on Santa Cruz Island (*Moran 3331*). It was first collected on Guadalupe Island in 1932 and San Benito Island in 1937, and my collection in 1948 (*Moran 3030*) seems to be the first from Cedros Island. On the mainland it is now known from Santa Barbara County, California, to Socorro and San Bartolomé Bay, Baja California. It has also been collected at the mouth of the Pistol River, Oregon, and on ballast at Linnton, Oregon; but Professor M. E. Peck writes that he has no good evidence of its recent occurrence in Oregon.

Cryophytum crystallinum was widely distributed in California and Baja California at the time of Parish's writing. There is a suggestion, however, that it also has since spread both to the north and to the south. Then known only as far north as Santa Barbara County, it now occurs in the vicinity of Carmel. On his trip north from Magdalena Bay, Baja California, in 1889, T. S. Brandegee first encountered this species at San Benito, about 130 miles to the north. It has now been collected as far south as Rancho Salada, near Magdalena Bay; and reports not authenticated by specimens indicate that it may occur considerably farther south. More convincing evidence for the southward extension of *C. crystallinum* would be its discovery at some southern locality where Brandegee collected extensively but failed to find this conspicuous and weedy plant.

The apparent expansion of range of these two species of *Cryophytum* in the last sixty years might be explained partly as an increase in our knowledge of the range. On this basis, however, it is difficult to understand the apparent extension in both directions from an original center; for botanical exploration did not progress in a similar pattern. Thus it appears that *Cryophytum nodiflorum* has spread markedly in recent years, and it seems possible that this plant could have achieved its present distribution from one introduction since the Spanish settlement. With *C. crystallinum*, the evidence, though less convincing, points in the same direction.

Carpobrotus chilensis occurs along the coast from Oregon to Baja California and on the coast of Chile. This distribution pattern is similar to those of several plants whose nativity in

western North America is not questioned. There is no evidence at hand of recent extension of range. At present, therefore, there seems no reason to doubt that this species is native in western North America.

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THE GENUS BURRAGEA OF LOWER CALIFORNIA, MEXICO

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The first collection of a member of the genus *Burragea*, in the family Onagraceae, made in 1844 by R. B. Hinds, surgeon on H. M. S. "Sulphur," at Magdalena Bay, Lower California, Mexico, was described by George Bentham (1844, p. 15) as *Gaura? fruticulosa*. Bentham considered the development of the seeds within the branch to be due to fungi or to an unknown disease. The question mark between the genus and species name indicates that Bentham was doubtful as to the correct generic status. Mary Curran (1888, p. 231) described a new species, *Gongylocarpus frutescens*, from a collection made by W. E. Bryant, apparently without knowledge of *Gaura fruticulosa*. The following year, T. S. Brandegee (1889, p. 158) collected *Gaura fruticulosa*, which he transferred to *Gongylocarpus* Cham. & Schl., a related genus of the Mexican mainland, and gave *Gaura fruticulosa* and *Gongylocarpus frutescens* as synonyms. In the spring of 1911, while a member of the "Albatross Expedition," J. N. Rose collected specimens of what he and J. D. Smith determined as *Gongylocarpus frutescens* and *Gongylocarpus fruticosus*. However, they considered these two species to be sufficiently distinct from the mainland species of *Gongylocarpus* to merit segregation as a new genus, *Burragea* (1913), named in honor of Commander G. H. Burrage who was in command of the "U. S. S. Albatross" on the expedition to Lower California in 1911. The two species of *Burragea* that Rose and Smith recognized were *B. fruticulosa* and *B. frutescens*. However, as Brandegee (1889) had pointed out, *B. fruticulosa* and *B. frutescens* are synonyms. The specimens that Rose and Smith



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