

DISCUSSION OF THE SIGNIFICANCE
OF DISTRIBUTION PATTERNS

Dr. Jay M. Savage: I do not really believe there were any land connections, but I cannot demonstrate it. All I can say is that the salamanders, frogs, snakes, and lizards could have gotten there without any land bridges. I certainly cannot agree with von Bloeker, who has suggested extensive land bridges running all over the place and connecting one point here with one point there. If we did that, we would have to connect points in western North America with Australia etc. using bridges that would let only one species across. Von Bloeker's comments are based primarily on the occurrence of 16 species of mammals on the Southern California Islands. My own interpretation of the mammal data suggests that they are in essential agreement with the conclusions drawn from the amphibians and reptiles.

Prof. J. C. von Bloeker, Jr.: I do not think that I have the last word, and I do not propose to tell you that you are wrong. You are probably more right than I am, but this is the picture as I see it.

Dr. Thomas R. Howell: I would like to say a very few words about the birds on Guadalupe Island, where I spent a week in 1953, and then give some very general remarks about the birds on other islands that can be checked by other people who are more familiar with them. First of all, the bird fauna of Guadalupe Island — the breeding land-birds — suggests that the population is derived by accident from the mainland. I am afraid I cannot agree with any statement claiming that Guadalupe was connected to the mainland by a great peninsula. It appears that the birds of Guadalupe are all over-water waifs. Perhaps the most interesting of these are two species which today are found on the mainland only much farther north than Guadalupe Island. These are the red-breasted nuthatch (*Sitta canadensis*) and the ruby-crowned kinglet (*Regulus calendula*). They do not breed anywhere south of the United States border and have been found much farther north on the mainland; yet they exist as breeding populations on Guadalupe Island. This is in concordance with other evidence which has been brought out in this symposium with regard to the fauna and flora of these islands being found today farther north on the mainland rather than at corresponding latitudes.

With regard to the birds on the other California Islands, as in the case of the reptiles, they appear to form a depauperate sample of the mainland fauna; and the main point is that in all cases these birds are insular representatives of forms that are common

and widely distributed on the mainland. Therefore, it appears much more likely that these forms such as the Santa Cruz jay, which have differentiated subspecifically, differentiated in isolation on these islands that they reached at a relatively late period (probably in the Pleistocene). They do not represent relict populations — otherwise we would have to assume that these very small populations on the islands had remained constant in their characters whereas widespread continental populations had differentiated from the ancestral types (as represented by those on the islands) during the Pleistocene. This latter alternative seems to be quite unlikely.

Dr. Peter H. Raven: It seems to me that the evidence from reptiles, amphibians, and mammals agrees very well with the evidence from plants: The islands closer to shore are relatively in balance with the mainland. On the other hand, evidence suggests that Santa Catalina has not been connected to the mainland and that San Nicolas is somehow not a part of the general pattern of relationship.

I think the picture is beginning to emerge that Guadalupe, San Clemente, and San Nicolas islands are outside of the general mainland influence, the other ones being inside and more closely related to the mainland.

GEOLOGIC HISTORY OF THE CALIFORNIAN INSULAR FLORA

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This study is dedicated to the memory of

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1823-1901*

who deduced that the insular flora has the aspect of the Pliocene vegetation of the mainland which had a source in Mexico, and that after migration to the island area over a Pliocene land bridge, it was supplemented by northern migrants during the glacial period and then, following subsidence, was preserved by isolation under mild marine climate (1887).

ABSTRACT

The Madro-Tertiary Geoflora commenced to invade the coastal strip and islands of southern California from the interior during Oligocene time. It was well established by the Miocene, being composed of woody plants similar to species that contribute to closed-cone pine forest, woodland, chaparral, and sage vegetation that now inhabit the insular area as well as the mainland. Their associates included species of oak-pine woodland, chaparral, short-tree forest, and thorn forest vegetation like those that now occur in Mexico and the southwestern United States, regions with summer rainfall.

Climate became drier and more intemperate over southwestern North America during the Miocene and Pliocene. As a result, species allied to insular endemics occupied a progressively shrinking belt of highly temperate climate that was gradually restricted to the California coastal strip and islands, and also to the mountains of Mexico where there are species closely allied to the Californian insular endemics. Many plants that had lived with fossil relatives of the insular endemics in California and Nevada were confined to areas far to the south and east as summer rainfall diminished during the later Tertiary.