EFFECTS OF FERAL PIGS AND DONKEYS ON THE DISTRIBUTION OF SELECTED FOOD PLANTS

by

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During an 18-month period of field work aimed at a description of the vegetation types of Santa Cruz and the Alcedo volcano on Isabela, (van der Werff, 1978), it became clear that there are significant differences in distribution and abundance of terrestrial orchids between the two localities.

Only one species, *Tropidia polystachya*, was found to be present in roughly the same habitat and the same abundance on both Santa Cruz and Alcedo.

Differences in distribution (a species present only on Santa Cruz or only on Alcedo, but not on both) can generally be attributed to differences in habitat: the required habitat is present in only one location and so is the species. Examples are *Cranichis lichenophila*, found once on a poorly weathered cinder cone on Alcedo; *Habenaria alata*, locally common on cinder or pumice slopes on Alcedo; and *Habenaria monorhiza*, common in the Pampa zone on Santa Cruz. Other terrestrial orchids restricted to one of the two localities include an unidentified *Cranichis* species on Alcedo, probably the recently described *C. werffii* (Garay, 1978), known from the volcanoes Wolf and Darwin, and *Erythrodes weberiana* and *Govenia utriculata* on Santa Cruz. There is only one report of *Erythrodes* (Weber, 1974) and the *Govenia* has not been found lately and has probably disappeared.

Finally, there are two terrestrial orchids present both on Santa Cruz and Alcedo, but with different abundances and growing under different climatic conditions. This observation was rather puzzling, as one would expect the habitats for the species to be the same in both localities. On Santa Cruz *Liparis nervosa* is not rare in the *Miconia* scrub, but is very rare outside it (only two plants found, both in *Scalesia* forest on the eastern slope). On Alcedo *Liparis* occurs in evergreen forest comparable to the *Scalesia* forest on Santa Cruz and in even drier evergreen scrub. Although the Alcedo habitats are much drier than the *Miconia* scrub, the Alcedo plants were at least as large and vigorous as the Santa Cruz ones. *Prescottia oligantha* is, on Santa Cruz, a rare species in the Pampa vegetation. On Alcedo *Prescottia* occurs in evergreen forest or scrub, a much drier habitat than the Pampa zone. The Alcedo plants were distinctly larger and more vigorous than the Santa Cruz plants.

In general, my field observations indicate that terrestrial orchids on Alcedo are more abundant and occur in drier habitats than on Santa Cruz, where terrestrial orchids are mostly confined to the Miconia and Pampa vegetation.

DISCUSSION

Climate or substrate factors do not offer an explanation for the different distributions of *Liparis* and *Prescottia* on Santa Cruz and Alcedo. These differences are probably a result of foraging by feral pigs, which dig up and eat orchids. Feral pigs are present on Santa Cruz and absent from Alcedo. Most terrestrial orchids in the Galapagos have either thick, fleshy roots (*Cranichis, Erythrodes, Prescottia*), pseudobulbs (*Govenia, Liparis*) or tubers (*Habenaria*) in which food is stored. The exception is *Tropidia polystachya*, which has thin, dry, fibrous roots and which is the only species present on both Santa Cruz and Alcedo in similar habitats and with similar abundances. Pigs do not forage with equal intensity in all climatic zones, but seem to prefer to the drier ones. Examples of their damage to animal life are from rather dry areas (destruction of sea turtle nests on Santiago (Green, 1981); destruction of tortoise nests, which are mostly in the arid zone (MacFarland et al., 1974)). Thus, the *Miconia* and Pampa zones on Santa Cruz serve as refuges for terrestrial orchids with fleshy roots, pseudobulbs and tubers. These vegetation zones are marginal habitats for some orchids (*Liparis, Prescottia*, possibly *Erythrodes*) and outside the tolerance limits for other species (*Govenia, Cranichis* sp.), which are presently not known to coexist with feral pigs on Santa Cruz.
The distribution of terrestrial orchids on other islands is in agreement with the feral pig effect. For instance, only two terrestrial orchids are known from San Cristobal, an island with feral pigs (but also otherwise severely disturbed); one of these, *Govenia*, was last collected by Captain Wood in 1846 (Weber, 1974). On the other hand, six species of terrestrial orchids occur on Pinta, a much smaller island than San Cristobal but without feral pigs. Pinta is the only island in the Galapagos where *Govenia* still occurs. It is not likely that feral goats, which were present on Santa Cruz but absent from Alcedo at the time of my field work, reduce the numbers of terrestrial orchids to the extent that pigs do. Ten years ago the vegetation of Pinta was severely damaged by goats (Weber, 1971), but since hunting programs were initiated, the vegetation has shown a strong recovery and terrestrial orchids are now rather common.

There are other indications that introduced animals can reduce the abundance of their preferred food plants. *Opuntia insularis* is rather scarce on Alcedo and is largely confined to the edges of steep arroyos, where donkeys cannot trample the plants, or to the center of dense thickets. The largest plant I saw in 1975 was in the center of a thicket of spiny shrubs; in 1977 the thicket was broken open, the *Opuntia* pushed over and eaten. Andersson (1857), who visited Alcedo in 1852 (he did not name the locality he visited on Isabela, but reported thick pumice deposits; according to Mc Birney & Williams (1969) such deposits are only known from Alcedo), mentioned that *Opuntia* cacti were very common. This is not the case any more. *Nicotiana glutinosa*, known in the Galapagos only from Alcedo, is restricted to vertical arroyo walls. Seedlings occur in flat terrain as well, but apparently do not survive the donkeys. *Galvezia leucantha*, a rare endemic, was found once on Alcedo inside a dense thicket; all peripheral branches were eaten. Again, some seedlings were present outside the thicket, but no older plants.

Although the damage to the vegetation by pigs and donkeys is far less serious than that by goats, or damage to the endemic reptiles by rats, cats, pigs and dogs, it is nevertheless useful to signal it. Future studies will probably reveal more instances of such damage and this knowledge may eventually influence the conservation programs of the National Park Service.

LITERATURE CITED