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Introduction

There was nothing where now are earth, sun, moon, stars and all that we see. Ages long the darkness was gathering until it formed a great mass in which developed the spirit of Earth Doctor, who, like the fluffy wisp of cotton that floats upon the wind, drifted to and fro without support or place to fix himself. Conscious of his power he determined to try to build an abiding place, so he took from his breast a little dust and flattened it into a cake. Then he thought within himself, "come forth, some kind of plant," and there appeared the creosote bush.

From the Pima Creation Myth

To the Pima Indians of the Sonoran Desert it was revered as the first plant on earth. The Spanish called it *governadora*, "the governess." These perceptions of the creosote bush embody two essential truths about this remarkable plant. As Gwen Waring describes in this special issue of *Agave*, individual creosotes rank among the oldest plants of the North American desert. The creosote is also the dominant one — thriving as does no other plant in the Chihuahuan, Sonoran and Mojave deserts.

People of our world today rarely have neutral feelings about the creosote bush. Many regard it as common, ugly and worthless. To others, it personifies the desert itself, delicate and graceful in form yet tough and persistent — the ultimate desert survivor.

This issue came about as a result of a gift from Samuel Sutton, who seeks to promote greater understanding of "my favorite plant, the creosote bush." It is our hope that this article will stimulate your thinking about this plant.

Read this issue, then take another look at the creosote bush. If you still find it unimpressive, try something else — after the next summer thunderstorm, close your eyes ... breathe deeply ... and smell the creosote-covered desert. Then you may reconsider and come to know "the governess."

Robert G. Breunig, Ph.D.
Executive Director

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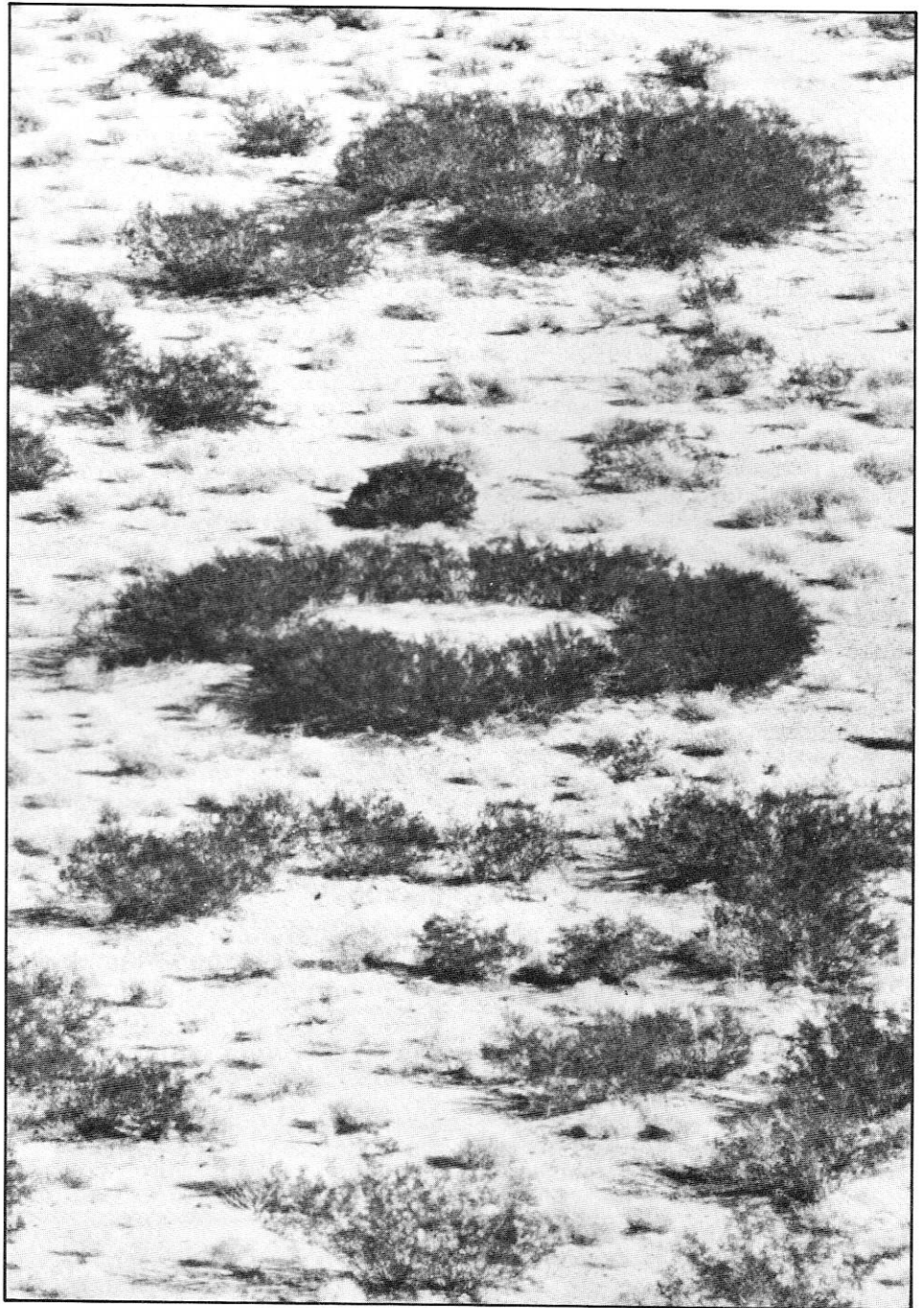
by Gwen Waring

GETTING TO NORTH AMERICA

The Evolutionary History of Creosote Bush in North America

Creosote bush is the persistent shrub that seems to go on forever across the bajadas and valley floors of the southwestern deserts. The intent of this article is to reconstruct the ancient history of this fascinating plant — where it came from and how it has migrated and adapted to the habitats it has come to occupy, namely a large part of the North American Southwest. Creosote bush is known as *Larrea tridentata* in the family Zygophyllaceae. The family is a small one with world wide distribution and is comprised mainly of species which are well-adapted to life in the desert. One species, *Augea capensis*, a succulent, is one of the few plant species encountered in the deserts of South Africa where there may be no rain for years on end (Hutchinson 1967).

Creosote bush (*Larrea* spp.) itself occurs only in the New World, where there are five species. One of these alone, *L. tridentata*, has come to live in North America, in three of the four western deserts (Chihuahuan, Sonoran, Mojave) and the northern half of Mexico, representing a very large range of hundreds of thousands of square miles. The other four species of creosote bush occur only in South America, in Argentina, Chile and Peru, with several species extending as far north as Bolivia. All five species look alike superficially, indicating that they are closely related. But through the process of evolution they have diverged considerably genetically in leaf, flower and fruit morphology and in the chemicals they produce, including proteins and phenolic leaf resins, giving rise to a group of very different species. Several species are adapted to wetter and milder or more mesic environmental conditions, while the other two have adapted to live in deserts, as has *Larrea tridentata* (Mabry et al. 1977). Knowledge of these traits



Some clones of the creosote bush in the Mojave Desert may be up to 11,700 years old. This aerial photo shows the large rings called "fairy rings."
Photo by Dr. Frank Vasek

has provided us with information about the evolutionary history of our northern creosote bush.

The closest relative to and probable ancestor of *Larrea tridentata* is *L. divaricata*, one of the South American species whose current range extends up to southern Bolivia. Because these two species are compatible sexually and the most similar morphologically

and in their biochemistry of all the *Larrea* species, most scientists regard them to be either the same species or very closely related subspecies, which are in the process of diverging. *L. tridentata* and *L. divaricata* are more closely related to and more compatible with one another than *L. divaricata* is to other creosote species which co-occur with it in South America. Yang et al.

