Ghost Stories From the Ice Age

Some plants are haunted by large mammals from another era.

Story by Connie Barlow ~ Illustrations by Michael Rothman

"In the shadows along the trail," wrote paleoecologist Paul Martin in 1992, "I keep an eye out for ghosts, the beasts of the Ice Age. What is the purpose of the thorns on the mesquites in my backyard in Tucson? Why do they and honey locusts have sugary pods so attractive to livestock? Whose foot is devil's claw intended to intercept? Such musings add magic to a walk and may help to liberate us from tunnel vision, the hubris of the present, the misleading notion that nature is self-evident."

A mere 13,000 years ago, near the end of the Pleistocene Epoch (which began 1.6 million years ago), fruiting plants of the Western Hemisphere that had long relied on big animals to distribute their seeds suddenly lost these allies. Although some scientists believe diseases or climatic change may have been factors, a growing body of evidence supports Paul Martin's hypothesis, first advanced in the 1960s, that newly arriving humans equipped with formidable stone-tipped spears were responsible for wiping out the large Pleistocene mammals that had roamed forests, deserts, and plains. Within a thousand years of the first evidence of this hunting culture in the Americas, the mastodons and mammoths, tall camels, giant armadillos, and ground sloths—and the giant bears, cats, and wolves that stalked them—had all disappeared.

These extinct American herbivores once dispersed the seeds of such big-fruited plants as honey locust, Kentucky coffee tree, and Osage orange, all of which produce fruits that no native animal today regards as food. Now the seeds either rot with the pulp or sprout too close to the parent tree. Avocado trees yield fruit with an outlandishly large pit that no native gullet can accommodate. In addition to bearing these "anachronistic" fruits, some trees display defenses that are equally out of step with current conditions. Mesquite, hawthorn, and honey locust protect their trunks or lower branches with long, sturdy thorns that now seem unnecessary.

How have these fruiting plants managed to survive for 13,000 years without their dispersal partners? An individual plant can keep sending up root suckers that allow it to persist for hundreds, even thousands of years. Another way is by entering into new partnerships: humans now plant seeds and saplings in widely scattered locations. Yet these plants still proclaim, by the very structure of their fruits, seed coats, and armaments, that they are adapted for life in a vanished world.

ALVIN E. STAFFAN, NATIONAL AUDUBON SOCIETY/ PHOTO RESEARCHERS, INC.

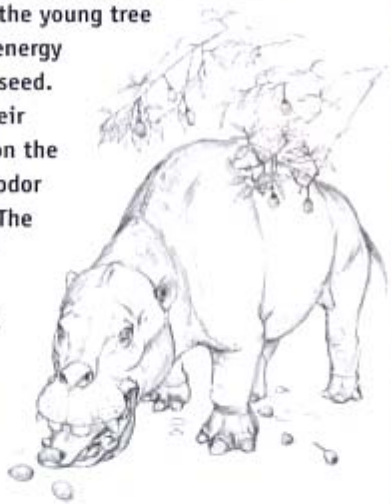
BILL BEATTY

OSAGE ORANGE *(Maclura pomifera)* could have been more accurately named American breadfruit; the color and fibrous texture of this New World fruit closely resembles its tropical Asian counterpart. The fruit is, however, shunned by humans and all mammals native to North America, where the tree was once common in woodland meadows and at prairie edges. After losing its dispersal partners, which presumably were large herbivores, Osage orange became increasingly rare. The hard, fibrous spheres, above, frustrate deer and cattle, which lack upper incisors. By the time Europeans arrived, the tree's range was confined to just a few river valleys in what is now eastern Texas. Ranch horses there do consume the fruit after it has fallen, which suggests that early native horses of the Pleistocene, opposite page, may also have eaten it.

ROBB AND ANN SIMPSON

A MASTODON plucks pods from a honey locust tree, below. For more than 20 million years, the honey locust *(Gleditsia triacanthos)* lured big beasts to disperse its tough, tooth-resistant seeds by embedding them in sweet, protein-rich pods. Native to the central United States, this tree of the forest edge also sported ferocious thorns on its trunk and lower branches, left, preventing the elephants from stripping bark—and thus killing the tree—while they browsed for seed pods. No contemporary seed dispersers can reach the pods, and today the thorns are probably superfluous. We now plant this sturdy, drought-resistant tree along urban sidewalks and in suburban parking lots. The fallen pods can be a nuisance to pedestrians, though, and the sharp thorns are dangerous, so domesticated varieties tend to be male (podless) and thornless. Among older plantings in city parks, however, one can find female trees with pods, their trunks heavily armed with mastodon-proof thorns.

WILD AVOCADOS produce nutritious, energy-rich fruit, right, with one very large and dense seed that contains bitter poisons. This small tree *(Persea americana)* lives in shady tropical forests. During its first few months of growth, while seeking out shafts of sunlight, the young tree depends upon the energy stored in the huge seed. Adult trees drop their drab-colored fruit on the ground, where the odor attracts mammals. The largest living fruit-eaters of tropical America are several species of tapir, which eat around the seed or spit it out. Thirteen thousand years ago, however, the hippopotamus-like *Toxodon,* above, would have swallowed whole avocado seeds and defecated them in other parts of the forest.



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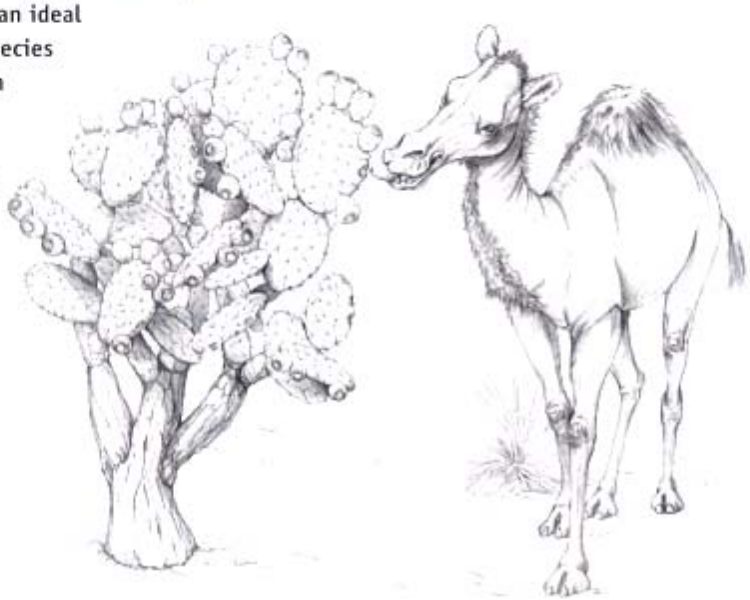
AN AMERICAN CAMEL of the Pleistocene finds cactus fruit easy to reach, right. The camel clan originated in western North America before spreading into Eurasia and Africa. Equipped with long legs and neck, *Camelops* would have been an ideal dispersal partner for tall species of prickly pear *(Opuntia)* in the deserts of North America. Today the fruit of these cacti, far right, is plucked by nonnative livestock or, once it withers and falls, eaten by scavenging coyotes and foxes. The small, tough seeds survive in their dung and soon sprout.



JACK DYKINGA

STEPHEN TRIMBLE

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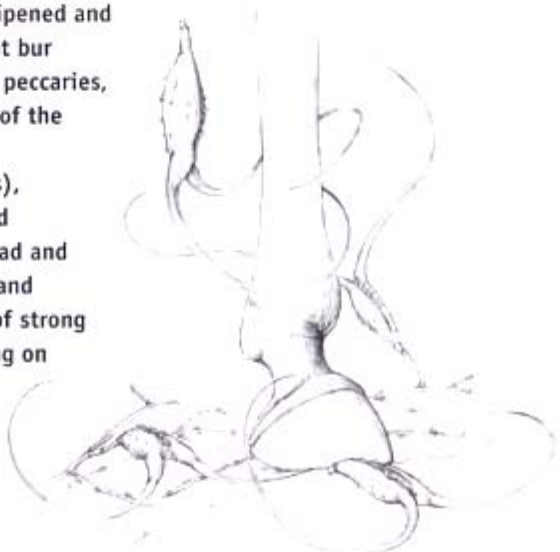
DEVIL'S CLAW *(Proboscidea)* grips the hoof, right, of an extinct American horse. In this re-creation, the animal has walked through a patch of devil's claw, or unicorn plant, after the fruit has ripened and split open and the leaves have died back. Because the giant bur cannot attach to the slender limbs of deer, pronghorn, and peccaries, the plant's range probably diminished after the extinction of the large Pleistocene mammals. Following the introduction of domesticated horses and cattle (and, later, of farm tractors), however, devil's claw rebounded, and it is now a widespread agricultural pest. The hard fruit, left, is shaped like the head and trunk of an elephant. As it ripens, its green skin blackens and dries; eventually the "trunk" pops open to become a pair of strong but flexible pointed tongs. Some seeds drop from the casing on contact with the disperser. The remainder are released when the swollen part of the woody bur has been trampled or crushed.



Thirteen thousand years ago, some big-fruited plants of the Western Hemisphere suddenly lost the animal allies that helped disperse their seeds.

GOURD-BEARING VINES *(Cucurbita)*, left, precursors of domesticated squashes and pumpkins, are found in dry washes and along roadsides in Mexico and the U.S. Southwest. Today they are spread by floodwaters and also carried on tire treads and in the blades of road graders. During the Pleistocene, the desert-dwelling Shasta ground sloth *(Nothrotheriops shastensis)* would have eaten the ripe gourds in autumn, below. Because the pulp is bitter (probably a defense against marauding insects), any animals eating large quantities of wild *Cucurbita* fruit may have had to consume clay to adsorb the toxins.