



Creating the Nation's first BioPark

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Letter from the Desk of David Challinor
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"Camels spit when annoyed," I was told on my first camel ride in Egypt in 1975. Until then I had thought little about these beasts, but the warning aroused my curiosity and reminded me that at the time the National Zoo had two-humped Bactrian camels on exhibit. The one-humped dromedary, however, is more familiar, not only to cigarette smokers, but to circus-goers and crowds at Shriner parades.

Despite the fact that both species have lived in the Old World for two or three million years, all camels originally evolved in North America and grazed on the Great Plains until ten or twelve thousand years ago. They disappeared from there rather abruptly in what is known as the Pleistocene megafauna extinction, along with horses, giant ground sloths, mammoths, and woolly rhinos. Scientists do not know exactly what caused these mammals to vanish, but hypotheses abound: that they were slaughtered by the newly arrived humans from Asia, or that there occurred a subtle climate change or disease, but whatever the reason for the camel's disappearance from North America, they still survived elsewhere. Two camel groups left the New World about 3 million years ago, travelling in different directions: one journeyed west across the Bering land bridge to Asia, while another group migrated south about the same time across the recently formed land bridge (the Panamanian isthmus) to South America.

The Asian migrants survive as two species: Camelus dromedaris and C. bactrianus. The dromedary has not existed in the wild during historic times. Remnant herds of wild Bactrians still live in the Gobi desert of Mongolia and nearby China, totalling less than 500 animals -- legally protected but dwindling.

The dromedary is a desert animal domesticated for 6,000 years. Human use of them has extended the range of dromedaries across North Africa and east to Turkey and Afghanistan, where their range overlaps that of domestic Bactrians. The two species interbreed but their progeny are infertile. The dromedary, with human assistance, continued to expand its range through the 19th century. Jefferson Davis, Franklin Pierce's Secretary of War (1853-57), imported Moroccan camels to Texas to carry supplies to forts along the Rio Grande. Army mule skimmers had difficulty adapting to their new charges which, when swatted by a muleteer, spat at him instead of responding with a kick as had the mules. In frustration soldiers released many camels to wander in the west Texas desert; there they easily adapted to eating the



foliage of the local plants which scientists think may have been present when the original camels vanished twelve thousand years ago. The progeny of Jeff Davis's camels survived in west Texas until after the turn of the century when the last feral camel was shot. They were unpopular with the local citizens, who claimed they scared their horses.

In Australia camels were introduced in large numbers starting in the 1840's to explore the great central desert. They, too, were eventually abandoned by their owners, and having evolved to tolerate little rain and sparse vegetation, they have thrived in the remote parts of the outback. An estimated 25,000 dromedaries now live in an area so inhospitable to other grazers that the feral camels do not compete with sheep, cattle or even kangaroos for forage.

Scientists have long studied camel physiology to learn how they manage to survive such long intervals (up to 9 days) without water. They found that a camel's body temperature can fluctuate several degrees F., and thus a camel's temperature rises up to 104 degrees F. when it gets hot, thereby reducing the need to sweat. The animal, furthermore, even when under stress from dehydration, can retain the water content of its blood, allowing it to circulate freely to dissipate body heat. The camel has yet another defense against dehydration. When low in body water, filtration through a camel's kidneys is reduced and sodium and urea concentrate in its blood at levels that would be lethal to other mammals. When water becomes available to a thirsty camel, this amazing animal can rapidly replenish its internal water supply by drinking up to 35 gallons in ten minutes. In humans and many other mammals, when the water content of blood decreases, blood becomes so viscous that it cannot circulate properly to bring body heat to the surface to cool the body through the evaporation of sweat. Such a failure of circulation leads to fatal heat stroke.

Camels, however, have some offsetting disadvantages as domestic animals. Although horses, cows, and sheep are bred for various uses and thus appear very different from their wild ancestors, the camel's appearance has changed very little since domestication because they have not been bred for disparate domestic uses. Their breeding is hard to manage because a female does not breed until she is about 4, has a short annual breeding season (normally February and March), and has a long gestation (12 - 14 months). Only recently have scientists tried selective breeding by using artificial insemination and embryo transplants to produce racing camels for prosperous sheiks in the Saudi peninsula. The success rate of such artificial techniques is low, at least compared to that enjoyed by cattle breeders. People have been breeding cattle to be hyperfertile for thousands of years; further, barren cows are too expensive to keep and are

eaten, thereby removing them from the breeding population. Camels have evidently not been subject to such long-term selective breeding pressure for the above reasons.

Selective breeding in the past few thousand years has been more successful among the North American camels that migrated to South America. Two wild humpless camels exist today in the high ranges of the Andes: the guanaco (Lama guanicoë) and the vicuna (L. vicugna). The domestic llama, used as a pack animal, and the slightly smaller alpaca, raised for its wool, are both descended from the guanaco, which has a longer breeding season than the dromedary (4 months) and a shorter gestation (11 months). The South American camels are well adapted to the harsh conditions of the altiplano -- a high elevation, treeless, rocky area. Their coats are thick and their flexible cushioned footpads give them sure footing in the rocky terrain. Split upper lips are ideal for grazing the short grass of the area, as well as being useful for spitting like their larger relatives in the Old World.

The vicuna is the smallest South American camel and appears almost gazelle-like. It is fawn-colored with dainty legs and big eyes, and its coat can be spun into remarkably soft material. It is hard to shear, however, and wild animals are driven into stone-walled traps where they are shorn and released. The production of vicuna wool is labor-intensive and thus accounts for the luxury status of a vicuna coat or scarf.

The use of domestic members of the camel family is becoming an increasing luxury throughout most of their range because they can seldom compete with trucks for moving cargo; they are too slow and have a limited carrying capacity. However, there is a continued demand for them in circuses, parades and recently as racing animals. Llamas, too, are enjoying unprecedented popularity as pets in North America, and there is a thriving market for good breeding stock.

Zoos also play an important role in perpetuating animals domesticated from the wild such as camels, elephants, and llamas. Educating the public about them increases interest in these useful and once economically important beasts. Zoos study these animals' behavior and physiology to help preserve them for future generations. The National Zoo, I am proud to report, has long been a leader in this field of research.

As a footnote in closing, and for the sake of accuracy, the sloth in our Amazonia exhibit is a two-toed one, not three-toed as reported in my last letter. The two-toed is considerably easier to maintain in zoos because of its less restrictive diet.

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