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Brett Kingsley

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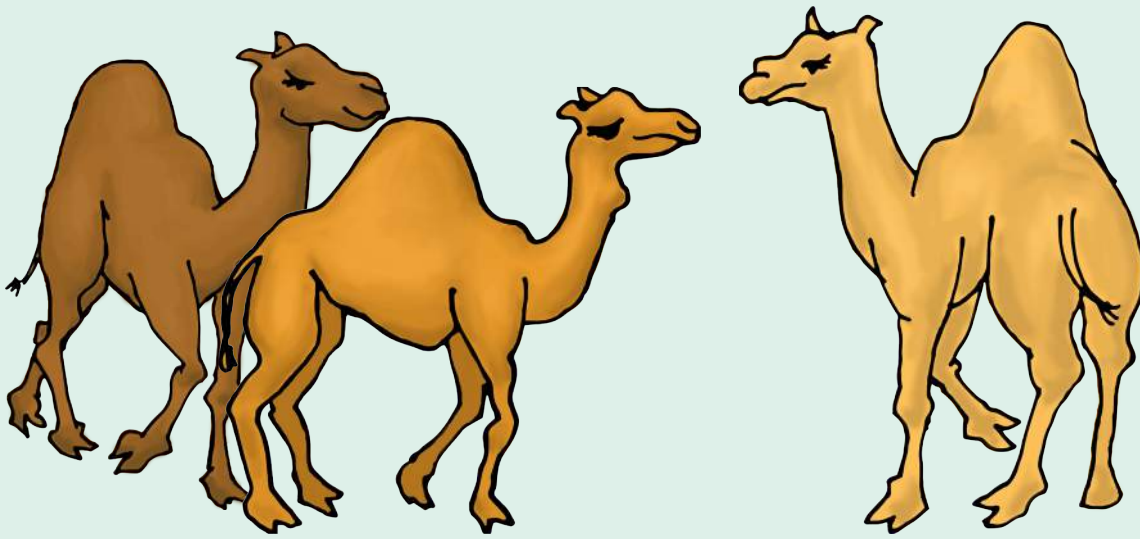
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Over the Camel's Hump

By Brett Kingsley

At some point in your childhood you probably learned that camels have the ability to go for long periods of time without taking a sip of water. Logically, people assume that camels can do so because they store water somewhere in their bodies. And what better place than that awkward hump protruding from the middle of their backs?

Yes, camels can survive for long periods of time without water. When the thermometer reads well over 100° F, camels can go from five days to a week without rehydrating. Likewise, during the winter months, camels can survive between six and seven months in the desert without taking a single drink of water. However, if you have ever ridden a camel you know that a camel's hump does not feel like a waterbed. This is because it is not filled with water at all; it is filled with something else entirely.

Fat.

A camel's hump can weigh up to 80 pounds. Arabian camels, otherwise known as dromedary camels, sport a single hump and can be found in North Africa and the Middle East. Bactrian camels, the lesser-known species, have two humps and are native to the steppes of central Asia. Having two humps which serve as fat reserves can be both beneficial and detrimental. Beneficial in the sense that the two-humped camel now has twice as much stored fat to use as fuel, but detrimental because the extra hump adds another 80 pounds for the camel to carry through the

desert, the excess weight forcing the camel to burn more energy to travel the same distance.

It should not be forgotten, however, that camels have the ability to take in large amounts of water in a short period of time. Camels can rehydrate at a faster rate than any other mammal, drinking 30 gallons of water in a mere 13 minutes. So where does all this water go? Mohamed Farid, a former researcher at the Desert Research Institute in Cairo, Egypt, suggested that water stays stored as a fluid in the rumen. The rumen is the large part of the first chamber of the camel's digestive tract. Additionally, some water remains present in the reticulum, the second chamber of its digestive tract. This is the closest thing to a "water reserve" that camels have. Camels can store water in the rumen and use it only when they absolutely need it.

After 12 days of dehydration in hot, desert conditions, Farid found that camels still retained water in their rumen. In this study, they used sheep as a comparison and found that, when raised in the same environmental conditions, camels retained water for 4 times longer than did sheep. Additionally, in 1963, Banerjee et al. conducted an experiment in which they looked at several different animals, including buffaloes, bulls, cows, sheep, goats, horses, and camels. In their experiment, they take a group of camels and cause them to fast, with no food or water, overnight.

At the end of the fast, the researchers took a blood sample from each of the camels and ran tests to determine both the blood volume and the volume of the blood plasma serum (the liquid that the blood cells are suspended in) and compared these levels to the levels of

the other animals. The study found that the camels not only had very high volumes of plasma serum and blood, but more importantly, the proportion of serum to blood was found to be greater in camels when compared with the other animals. These two factors lead to a greater total body water volume, as well as a greater intracellular water volume, meaning that camels retain more water in the plasma of their blood!

Two additional adaptations have also contributed to why camels can survive for extended periods of time without water. One adaptation is the camel's ability to fluctuate their body temperature. As humans, we maintain a relative body temperature of about 98.6° F. The body temperature of camels, on the other hand, fluctuates between 97.9° F and 107.6° F. Another adaptation that allows camels to survive in such extreme temperatures with such little water is their ability to lose a high percentage of their body fluids without introducing a strong, negative effect on their health. Camels can lose up to 40% of their body fluids before there's a risk of fatality, whereas humans become dehydrated after losing only 15%.

The mechanisms that camels have developed to adapt to their extreme desert environments remain unique, making their ability to survive for such prolonged periods of time without water an amazing attribute. Camels may not have large, squishy mounds of water on their backs, but let's get over the hump: camels conserve their resources and survive in the unforgiving desert more spectacularly than any other animal on the planet. ●