Tracing the Roots of the California Condor

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At the end of the Pleistocene epoch some 10,000 years ago, two species of condors in California competed for resources amidst the retreating ice of Earth's last major glacial age. The modern California condor triumphed, while its kin expired.

In the past century, paleontologists have been unsure whether the modern California condor is different enough from a larger, extinct condor that lived during Pleistocene time to classify the two as distinct species. Now, after the most extensive study of condor fossils and skeletal remains to date, Caltech senior undergraduate Valerie Syverson has documented evidence that confirms the two are different enough for the distinction.

Her findings will be presented on October 28 at the annual meeting of the Geological Society of America in Denver.

To solve the puzzle, Syverson teamed up with Donald Prothero, a paleontologist at Occidental College and a guest lecturer in geobiology at Caltech. They studied bones from recently dead condors and compared them with those found in the extensive bone pile of Los Angeles's Pleistocene-aged La Brea tar pits. What they found, Syverson says, is that "there's definitely one species distinction, and possibly two."

Syverson began her study by examining bones from condor skeletons housed at the Los Angeles Museum of Natural History, the Museum of Vertebrate Zoology at UC Berkeley, and the Santa Barbara Museum of Natural History. One interesting finding was that among these modern

birds, Gymnogyps californianus, there was no distinction in bone size between males and females.

After looking at modern condors, Syverson turned to La Brea. She examined Pleistocene specimens from various tar pits, the oldest 35,000 and the youngest 9,000 years old. The record thus provides a glimpse into a long time variation within a species restricted to one location. Over the entire 26,000-year record, Syverson found no change in condor morphology. Although this had been previously discovered in a similar study of golden eagles from La Brea, Syverson says it's remarkable to see that the drastic climate change accompanying the end of the last ice age had no impact on the size of the species that lived through it.

When Syverson plotted her measurements of modern and Pleistocene condor bones, she found there was a definite size distinction between the two. "The ancients are decidedly bigger," she says, and the difference is especially notable in the femur, or thigh bone. These birds were heavier, with a longer, narrower skull and beak than the modern California condor. At first blush, they seem to belong to the species Gymnogyps amplus, first described in 1911 based on a broken tarsometatarsus, a bone found in the lower leg of birds.

In fact, that type specimen suggests that the Pleistocene condors at La Brea may be a third distinct condor species. The broken tarsometatarsus--housed in the Berkeley collection--is larger than any other condor bone Syverson studied. "It would've been an outlier from either species," she says. "Based on the fact that the type specimen is outside the range for both of the groups, I wonder if we need to define a third species for the extinct La Brea condor."

This study also documents evidence that ancient and modern condors coexisted for some time, and that the Pleistocene species may have lived at the same time as humans in western North America. Several

tarsometatarsi of the older, bigger species were found in the youngest pit at La Brea. This pit also contains the remains of the La Brea woman, the only prehistoric human discovered in the tar pits. Another piece of evidence pointing to the same conclusion comes from the Berkeley museum collection. It is a bone from a Native American midden--a garbage heap--in Oregon, and it falls into the size range of the ancient group. Although its age is unknown, it must have lived at the same time as the people who disposed of it.

Syverson hopes to use radiocarbon dating to determine the age of the Oregon specimen. She'd also like to apply the technique to date the G. amplus type specimen, to see if its age does indeed distinguish a third condor species.

Source: Caltech