Nature Notes

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Goodbye to 119

By Sophie A. H. Osborn

A dear friend died recently. When I received the news of her death, the ensuing emptiness settled over me with the heaviness of a winter's night. I felt like I had lost a part of myself. Our relationship was an unusual one: My friend was a California condor.

Hatched at the Los Angeles Zoo on March 15, 1995, Condor 119 was released to the wild as a two-year-old at northern Arizona's Vermilion Cliffs on May 14, 1997. She was among the first condors to be reintroduced in Arizona, where her species had been absent since 1924.

I first met 119 in April 2000 when I came to Arizona to work for a month on the field crew monitoring the newly introduced condors. By that time, the condors had traveled widely and learned to find their own food. They had also encountered a grave threat: lead poisoning. Scavengers such as eagles and condors that find hunter-killed animals may ingest lead bullet fragments or lead shotgun pellets when feeding on the carcass or discarded viscera. Hunting is extremely beneficial to condors as it provides abundant food. However, the *type* of ammunition that is typically used is often fatal to scavengers. Lead bullets can lose up to one third of their mass upon impact, leaving minute, highly toxic granules of lead in the shot animal. Since condors frequently feed together, multiple condors are likely to ingest lead bullet fragments or lead shot if they are present in a carcass.

When I arrived in Arizona, a condor had recently died of lead poisoning and biologists were working to recapture all of the condors to test their blood for the presence of lead. We soon discovered that 119 had extremely high lead levels. She was saved over the ensuing weeks through an intensive treatment known as chelation therapy, which involves injecting the condors with a substance that binds to the lead molecules and allows them to be excreted from the condor's body. On the last day of my brief stint working with the condors, I returned a fully recovered 119 to the wild. Releasing her at the rim of the Grand Canyon, I watched her spread her giant wings, float effortlessly across the canyon and

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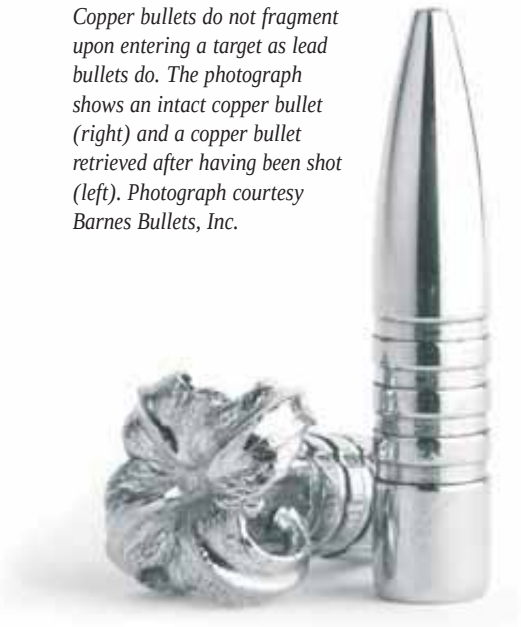
In 2001, Condor 119 (shown here with mate Condor 122) became the first reintroduced condor to lay an egg. NPS photograph by Chad Olson

land on a sheer cliff. It was a fitting end, I thought, to my time with condors in Arizona.

As it turned out, it was only the beginning. A few months later, I returned to Arizona to serve as the reintroduction project's Field Manager, a position I would hold for the next 3 1/2 years. When I returned, 119 was nearly six years old, the oldest condor in Arizona and the flock's dominant female. Biologists had waited impatiently for the reintroduced condors to reach adulthood, knowing that the recovery program would be dubbed a success only when condors were reproducing in the wild. Condor 119 was now of breeding age.

After I arrived, 119 began consorting with the flock's dominant male, Condor 123. Whereas other females vied for 123's attentions, 119 remained aloof and independent, interacting with 123 only when he sought her out. For a time, she was studiously indifferent to 123's courtship dances. Eventually though, 119 and 123 began investigating potential nest sites. The pair finally selected a cave, and it soon became 119's sole focus. She almost always remained at or near the cave, leaving only to forage for food.

On March 21, 2001, I discovered that Condor 119 had laid an egg! It was the first condor egg to be laid in the wild in 15 years and the first ever to be laid by a reintroduced condor. However, the egg was never to hatch. After it was accidentally broken, Condor 123 attacked 119 and drove her from the nest cave.



Copper bullets do not fragment upon entering a target as lead bullets do. The photograph shows an intact copper bullet (right) and a copper bullet retrieved after having been shot (left). Photograph courtesy Barnes Bullets, Inc.

News of the egg was broadcast nationally, earning 119 a place in conservation history, but my heart ached for her. Oblivious to her fame, 119 engaged in solitary wanderings throughout Grand Canyon over the ensuing months.

During this time, she made the South Rim her home, becoming a familiar sight on the pinnacles and cliffs below Grand Canyon Village. Whenever I was at the South Rim, I instinctively sought 119 out, checking her favorite perches or listening with a portable receiver for the signals emitted from her radio transmitters. I watched 119 become an adult that younger, inexperienced condors followed. She frequently found the food the other birds ate and chose the roost where they all slept. She couldn't possibly know that the future of her species rested on her shoulders, yet she behaved with a seriousness of purpose that gave the impression that she knew.

In addition to watching over her, I found myself fighting for her life with alarming regularity. Condor 119 was exceptional at finding carcasses both inside and outside the park, but in doing so, she occasionally ingested dangerous amounts of lead. Each time we trapped her, tested the lead level in her blood and, if necessary, treated her for lead poisoning, I held her in my arms. I loved seeing her vibrant colors up close, but hated seeing the fear in her increasingly wild eyes and feeling her labored, stressed breathing as we handled her. Each time I returned her to the skies, I desperately hoped that hunters would use nonlead ammunition so she would never again experience lead poisoning.

After two more unsuccessful nesting attempts in 2002 and 2003, Condor 119 and her new mate Condor 122 finally produced their first chick in May 2004. The nest cave could be viewed from the canyon rim, and countless visitors, fascinated by the drama of the condors' daily lives, came to know 119, 122 and their nestling, Condor 350. The successful fledging (leaving the nest) of Condor 350 on Thanksgiving Day 2004 was celebrated throughout the national park.

I no longer work with the condors, but my thoughts frequently return to them. I was looking on the breeding season of 2007 with hope that my beloved 119 would again raise a chick.

And then I received the devastating news: Condor 119 had died December 29, 2006, after ingesting a massive dose of lead. Never again would she fly over the Grand Canyon, thrilling tourists and warming the hearts of the park employees who had come to know her. Never again would she partake in courtship, egg laying and chick rearing. Never again could I visit the South Rim and expect to see her familiar form on a favorite perch or catch sight of her drifting into view over the canyon's vast emptiness.

Condor 119 was viewed by those who worked with condors in Arizona as the program's matriarch. She symbolized our hopes for the future of condors in Arizona and our faith in their ultimate success. Her loss leaves an aching void for all those who have looked out over the Grand Canyon with the certainty that she was somewhere in that timeless canyon landscape. With her loss, the resounding belief that condors will survive and thrive in Arizona that carried me through the loss of so many condors has faltered. As long as lead ammunition is used in the condor's range, the recovery of the species is unlikely. The Arizona Game and Fish Department has made copper-based bullets available to hunters the last two hunting seasons, although the use of such ammunition is not mandated. We no longer use leaded gasoline or lead-based paint. Surely switching to nonlead ammunition is preferable to condemning the magnificent California condor to extinction.

Sophie A. H. Osborn is the author of Condors in Canyon Country: The Return of the California Condor to the Grand Canyon Region, *which was just published by GCA. Please see the back page of* Canyon Views *for more information about the book.*

Getting to Know Eddie McKee:

Grand Canyon's First Resident Geologist

By Wayne Ranney

Grand Canyon boasts a long lineage of professional geologists who have toiled here for nearly 150 years unraveling the canyon's many closely held secrets. Most of these well-recognized "geology All-Stars" never called the canyon home, but one of the most famous did. Edwin "Eddie" McKee, who was also the founder of the Grand Canyon Natural History Association, lived in the park full-time for ten years. McKee's love for and long affiliation with the Grand Canyon inspired the stellar career that earned him the respect of his fellow North American geologists.

McKee's link to Grand Canyon began in his hometown of Washington, D.C., and was initiated by his Boy Scout Troop Master, François Matthes, himself one of the canyon's well-known geologists. In 1927, Matthes arranged a summer internship for McKee at the canyon with the famous paleontologist John C. Merriam. McKee's interest in geology sprouted while he interned, and he later enrolled in the geology program at Cornell University. Tragedy, however, brought him back to the Grand Canyon in 1929, when park naturalist Glen Sturdevant drowned while crossing the Colorado River on patrol. The park asked McKee to fill that park naturalist vacancy. As it turned out, the canyon would change McKee's personal as well as professional life; by the end of 1929, he married botanist Barbara Hastings, who worked across the canyon on the North Rim. Ironically, McKee courted Miss Hastings by hiking up the North Kaibab Trail—the same trail that François Matthes had pioneered on his mapping survey in 1902.

As park naturalist, McKee developed wide-ranging scientific interests at Grand Canyon. His contributions to Grand Canyon science included studying the park's butterflies and birds, collecting and cataloging Havasupai basketry, and developing lectures on the Grand Canyon that he presented to park visitors. McKee was the "discoverer" of the Grand Canyon pink rattlesnake; he came upon one while hiking on the Tanner Trail. He carried the live specimen out of the canyon and drove to Grand Canyon Village with the snake at arm's length out the car window.

Geology became McKee's primary passion, as his many field excursions brought him into close contact with the most immense and beautiful exposure of stratified rocks on Earth. As a result of his time spent at the Grand Canyon, McKee became one of the foremost experts on stratigraphy (the study of rock layers).

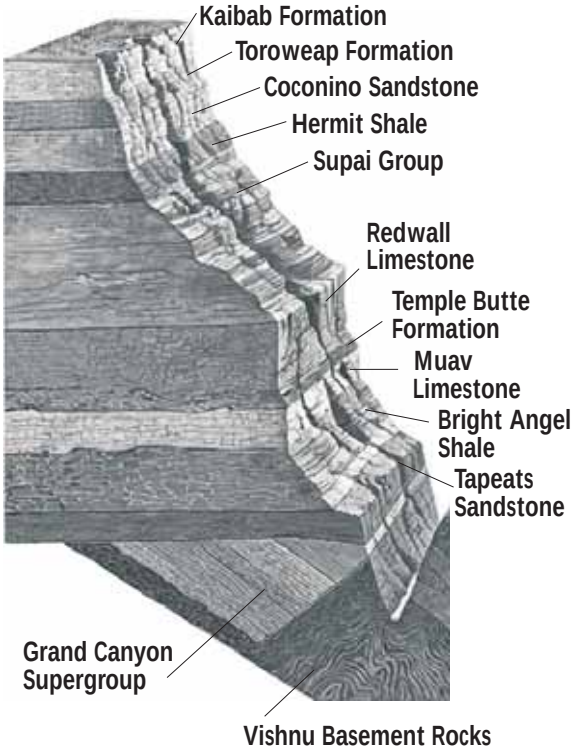
His first scientific paper, "The Coconino Sandstone: Its History and Origin," was published in 1933. McKee was most likely influenced in this endeavor by Dr. David Gilmore, one of McKee's supervisors during his 1927 internship and the first paleontologist to study the reptile trackways along the Hermit Trail. These tracks strongly suggested that the Coconino Sandstone was a deposit of terrestrial origin, specifically in an eolian (wind-blown) dune setting.

His 1938 paper, "The Environment and History of the Toroweap and Kaibab Formations in Northern Arizona and Southern Utah," was among the first studies to document the subtle changes in texture and composition that a rock layer sometimes exhibits when examined at separate locations. These observations helped define the concept of "facies change" in sedimentary rocks, whereby obscure lateral changes in rock composition and texture record the subtle environmental changes that occurred in the ancient past. In this study, McKee showed that the Toroweap and Kaibab seas originated in a setting with deeper ocean water to the west, which, over time, slowly transgressed (spread) to the east.

Emboldened by his stratigraphic studies near the rim of the canyon, McKee turned his attention to the Tonto Group near the river, research published in the paper "Cambrian History of the Grand Canyon Region" (1945). (The Cambrian Period began 544 million years ago.) Close examination of the fossils and strata revealed that the age of a particular rock formation in one part of the canyon was noticeably different elsewhere in the canyon. He determined that the Tonto Group was "time-transgressive," that is, at any one time three different environments existed across the Grand Canyon region. From west to east, the environments were deeper water (Muav Limestone), shallow water (Bright Angel Shale) and shoreline settings (Tapeats Sandstone). McKee also determined that these ancient environments migrated in lock step toward the east through time. Each environment left a specific sediment type, such that when the Muav was being deposited near today's Grand Wash Cliffs, the Bright Angel Shale was being deposited near the area of Supai Village and the Tapeats in the vicinity of Grand Canyon Village. These observations had implications for the science of geology far beyond the realm of Grand Canyon.

In 1964 McKee convened the first symposium on the origin of the Colorado River, and he published a paper from the symposium, "Evolution of the Colorado River in Arizona," three years later. His passion for eolian sand deposits, which began with his studies of the Coconino Sandstone in Grand Canyon, led him to field research in the Sahara, Namib and Gobi deserts, research he later published as "A Study of Global Sand Seas" (1979). His last major project at Grand Canyon integrated his interest in sandstones with his affection for the Havasupai people, research he published as "The Supai Group of Grand Canyon" (1983). In this paper, McKee detailed the depositional history of

Eddie McKee descends the Hualapai (Havasu) Trail on the way to Supai Village, 1929. Photograph courtesy of the GCNP Museum Collection



Grand Canyon Geologic Column showing rock layers. McKee became one of the world's foremost authorities on stratigraphy, the study of strata.

these delta and river deposits, and he named three newly identified formations within the Supai Group after Havasupai family names.

McKee's work remains influential among geologists, but his personal relationship to the Grand Canyon is sometimes overlooked. This May, the National Park Service will install new geology displays in Yavapai Observation Station. John C. Merriam directed the construction of the museum on Yavapai Point in the 1920s, and Eddie McKee inspired many park visitors with geology talks he presented there. As the Grand Canyon Association celebrates its 75th anniversary in 2007, it seems appropriate to honor the association's founder, as well as his many contributions to geologic knowledge.

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