Scientific Research in the Mono Basin

News from the Mono Basin Field Station and Beyond

Ospreys a Success at Mono Lake

Dave Marquart, Mono Lake Tufa State Reserve

"What is a fish-eating bird doing nesting at a lake that has no fish?" This is a common question asked around the shoreline by visitors. Mono Lake's off-shore tufa towers offer the isolation that nesting Ospreys desire. Mono's Ospreys are truly unique because they are probably the only tufa-nesting Ospreys in the world. Mono's population are commuters, catching fish at nearby freshwater lakes in the June Lake Loop and as far north as Lundy Lake.

Ospreys arrive at Mono Lake by April each year, and when finished nesting, depart for Central and South America in early September. Adults can leave up to a month prior to juveniles for their southerly migration.

Mono's Ospreys, which nest in various portions of the Mono Lake Tufa State Reserve, are being closely monitored by California State Park biologists. The 2005 nesting season was a good one for the local Ospreys. A total of 13 chicks were hatched in six different nests around the lake, more than double that of the previous year. Biologists are puzzled over why the success rate is so much higher at Mono Lake than at Lake Tahoe where many nests do not successfully produce chicks even though the food source is literally at their doorstep.

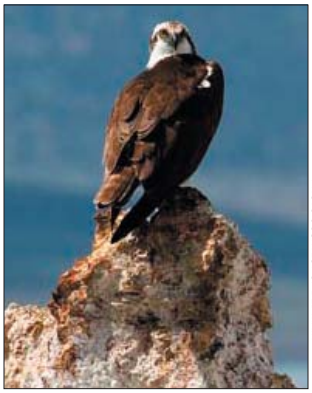


PHOTO COURTESY OF DEB MAIN

Osprey atop a tufa tower.

Nesting Ospreys at Mono Lake present unique challenges to State Reserve and Forest Service land managers who try to minimize disturbance to nesting Ospreys by keeping boaters separated from their tufa tower-perched nests. ❖

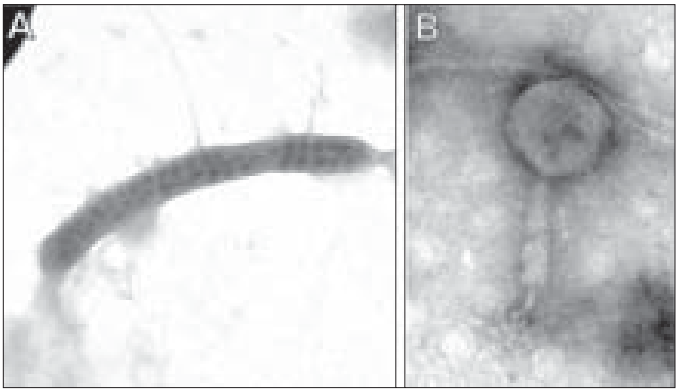
Viruses in Mono Lake

Grieg Steward, University of Hawaii

Most of us are familiar with the wide variety of viruses that can infect our own species and the diseases that result from those infections (influenza, polio, herpes, HIV-AIDS, SARS, to name but a few). However, we are not alone in our susceptibility to viral infections. Every form of life on earth, from microscopic bacteria to the mightiest whale, can all be infected by at least one, if not hundreds of different types of viruses. In light of this fact, it is not too surprising that viruses can be found everywhere in our environment from soils to oceans to lakes, and Mono is no exception. But how many viruses are in Mono Lake and what are they doing there? This is the question that our research team has been investigating.

Although we fully expected to find viruses in the lake when we began this project, we were astonished by their incredible abundance. We found that every teaspoon of Mono Lake water contains over 100 million viruses! This is many times higher than is typically found in freshwater lakes or in seawater. This does not mean the lake is polluted or a threat to human health. Rather these viruses are part of the natural lake ecosystem and almost all of them infect other microbes living in the lake. There are almost certainly some viruses infecting the brine shrimp in Mono Lake as well, although they have not yet been discovered.

As we began our research, we hypothesized that many bacteria in the lake would be infected with viruses. Using an electron microscope to examine the bacteria, graduate student Jennifer Brum revealed that many were indeed infected (Fig. 1A), but the percentage was much higher in July than at other times of the year. It is as if the bacteria in the lake have their own "flu season" in the summer! Our work now is focusing on investigating the diversity and ecology of viruses in the lake. Many of the viruses observed by electron microscopy look similar to those infecting bacteria in other ecosystems (Fig.1B), but their DNA sequence and growth patterns may reveal clues about what adaptations are required for a virus to thrive in the unusual chemical environment of Mono Lake.



PHOTOS COURTESY JENNIFER BRUM

Fig. 1. A) This sausage-shaped bacterium is infected with viruses, which are visible by electron microscopy as the dark spots inside the cell. The cell is about 1 micrometer long. For comparison, a human hair is about 50 micrometers in diameter. B) Using the electron microscope for even higher magnification, some details of a virus become visible. This virus has a head, known as the capsid, and a tail, which is common among viruses that infect bacteria. The tail is used to attach to the surface of the bacterium and also serves as the portal through which the viral DNA moves from the capsid into the bacterium.

The Mono Lake Virus Research Team is Grieg Steward, University of Hawaii, Jennifer Brum, University of Hawaii; Sunny Jiang, University of California, Irvine; and Robert Jellison, Sierra Nevada Aquatic Research Laboratory. ❖