Marine Scene Expands for Early Americans

A prehistoric mound of fish bones and other food remains has provided the first evidence confirming that some of North America's earliest settlers arrived by boat and possessed an advanced maritime culture, according to a team of archaeologists at Washington State University in Pullman.

The traditional archaeological view is that the first inhabitants of the New World crossed a land bridge from Asia to Alaska toward the end of the last Ice Age and moved south through an ice-free corridor in western Canada about 11,500 years ago (SN: 10/31/87, p.284). Over the last 25 years, several islands off the coast of Alaska and the Pacific Northwest have yielded evidence of human occupation as long as 9,300 years ago. However, the remains are predominantly stone flakes and blades that reveal little about the inhabitants' way of life or whether they took to the sea after trekking to the New World by foot.

But the Washington State investigators, working recently on an island off the coast of southeastern Alaska, came upon invaluable archaeological evidence: prehistoric garbage. In 1985 they surveyed an extensive portion of Heceta Island, near the southeastern Alaskan city of Ketchikan, prior to timber harvesting on the island. They discovered several prehistoric sites, the most important of which contained a midden, or refuse mound. Charcoal and burned shells in the mound date back to about 8,200 years ago, archaeologist Robert Ackerman said in an interview.

The midden contains numerous fish bones, including those of Pacific cod and other deep-water fish. Charcoal from wood fires appears to have been used to steam shellfish found in the refuse pile. "The site may have been much like a prehistoric clambake," says Ackerman, who directed the research team.

A small portion of the remains belong to seal, sea lions and sea birds, with a few bones from beaver, mink and deer.

"The animal remains show that these people were experienced in offshore fishing and made extensive use of water transportation," says Ackerman. "Clearly these were not interior people adapting to a marine way of life."

For example, boats, fishing lines and hooks are needed to catch Pacific cod, which usually live 60 feet below the surface. And some type of harpoon, with a line attached to a spear, is required for seal hunting.

Despite the strong evidence for a full-blown maritime culture at Heceta Island, no remains of any seagoing vessels were found. "Boats, and wooden artifacts in general, just don't preserve well," explains Ackerman.

But he says the remains strongly indicate that the advanced vessels suggested by the remains would have to have been developed early on – perhaps 15,000 to 20,000 years ago – when the continuous land bridge first formed across the Bering Straits. At that time, he says, there was a two-pronged migration from Asia to the New World, consisting of hunters who took an inland route and people who traveled down the coast by boat, exploiting the marine environment.

At that time, points out archaeologist Knut R. Fladmark of Simon Fraser University in Burnaby, British Columbia, a relatively mild coastal climate and access to abundant marine food sources would have greatly benefited maritime immigrants, compared with hunters crossing a bitterly cold corridor between massive sheets of ice.

Ackerman further suggests that, since outer islands were the first to be freed of ice at the end of the Ice Age, navigators such as those at Heceta Island gradually moved to the mainland and gave rise to the culture of Northwest Coast Indians.

"But the difficulty is that there's almost no archaeology for this area," he says. "Our work is in its infancy." – *B. Bower*

Heat wave at the K-T boundary?

The widespread death of microscopic ocean plants 65 million years ago could have triggered an extreme global heat wave that helped kill off roughly half the existing species of plants and animals, including the dinosaurs, at the Cretaceous-Tertiary (K-T) boundary. This scenario, derived from new calculations by scientists at New York University, is helping to bring into focus the series of climatic plagues that were dramatically changing the living conditions on earth at that time.

Scientists have spent years debating what catastrophic event led to the events at the K-T boundary. According to the leading-candidate theory proposed in 1980, a comet or meteor collided with earth, creating a global dust cloud that blocked out sunlight and cooled the planet for a period of up to several months.

More recently, however, researchers have realized that the climatic troubles would not have ended when the lights came back on. "What we're seeing is that the K-T boundary was a pretty complex event," says NYU's Michael Rampino. He and Tyler Volk have examined how the elimination of one type of life would have affected the climate.

According to the researchers, a catastrophic impact could have triggered the death of floating one-celled ocean plants, called calcareous nannoplankton. This, in turn, would have weakened the earth's ability to reflect radiation from the sun, raising surface temperatures by 6°C for several hundred thousand years. Such a rise would finish off many species that had survived the earlier changes in climate.

It was only recently that scientists discovered a connection between nannoplankton and the earth's climate (SN: 12/5/87, p.362). These plants exert a strong cooling effect on the earth by producing a sulfur compound, which helps form water particles in marine clouds. The water particles reflect sunlight and prevent radiation from reaching the earth's surface. Rampino and Volk, reporting in the March 3 NATURE, are the first to use this relationship to explain events at the K-T boundary.

"What's interesting is that people have been talking about climatic changes that cause mass extinctions. Looking at it another way, here is a mass extinction that would have affected the climate," says Rampino.

A warming of 6°C (about 12°F) would have been a "major shift in climate," says James Coakley of the National Center for Atmospheric Research in Boulder, Colo. "You look at the kinds of changes that occurred during the ice ages, for example. It was 6° but it was in the other direction."

The fossil record does indeed suggest that ocean temperatures rose by 5°C to 10°C for tens of thousands of years beyond the K-T boundary. As well, the record shows that more than 90 percent of the calcareous nannoplankton species went extinct at that time, and that most life disappeared from the upper portions of the ocean for almost a half million years, an effect geochemists call the "Strangelove Ocean."

The plankton may have been killed off by a lack of sunlight needed for photosynthesis or by the acid rain that would have followed a meteor impact. Recent studies have suggested that rain as corrosive as battery acid would have lowered the pH of the surface waters of the world's oceans. In acidic water, the plankton's calcareous shell would dissolve. – *R. Monastersky*