

FOSSIL FINDS IN THE LOS ANGELES SUBWAY

Millions of years ago, the climate of Los Angeles was much cooler and wetter than it is today. Its lush landscape teemed with ground sloths, horses, elephants and camels—a virtual kingdom of prehistoric creatures. There were even redwood trees.

How do we know all these things?

These fascinating revelations were brought to light by paleontologist Bruce Lander and his team of 28 scientists. They discovered thousands of fossils, many of them rare, during construction of the Metro Red Line subway project last year.

Most of the unearthed fossils date back to the late Miocene (24 to 5 million years ago) and late Pleistocene (10 to 1.8 million years ago) epochs.

The late Miocene discoveries contain some of the most diverse fauna ever uncovered. The types of marine fossils found show us that Los Angeles was under 1/2 to 1 mile of water.

Fossils from the Pleistocene give us a glimpse of Los Angeles during the Ice Age when the L.A. Basin was a brush-covered plain where animals such as mastodon, bison and camel roamed freely.

THE MIOCENE EPOCH



MUD PECTEN OR GLASS SCALLOP

Delectopecten vancouverensis fernandoensis

AGE: late Miocene, 7-8.5 million years ago



SEASTAR (“STARFISH”)

Zoroasteridae

AGE: late Miocene, 7-8.5 million years ago

What did the Los Angeles Basin look like 12 million years ago?

Water, water, and more water.

During the Miocene, the L.A. Basin was completely submerged in water. In fact, not only did the Pacific Ocean completely cover L.A., but it was in an entirely different geographic location—about 100 to 150 miles to the southeast. (For the past 40 million years, the San Andreas Fault has consistently been pushing the entire West Coast northward at a rate of 2 1/2 inches a year and continues to do so.)

During this epoch, the waters were subtropical and deep. Marine fossils uncovered during the excavations were of animals that could only live in extremely deep water. Toward the end of the Miocene, these creatures lived in water 1/2 to 1 mile deep!

What was the climate like during the Miocene?

Back then, there was plenty of “liquid sunshine” in southern California. The climate was subtropical and it rained...a lot. The average annual rainfall was 30-40 inches. Today, the average annual rainfall in southern California is around 12 inches.

Miocene-era fossils found during the Metro Red Line subway excavation date back 7 to 8.5 million years ago. They represent the most diverse fish fauna collection ever reported from this period. Nearly 3,000 marine fossil specimens, representing almost 100 species are included.



DEEP- SEA SMELT

Bathylagus

Anterior skeleton

AGE: late Miocene, 7-8.5 million years ago

Bathylagus remains have been found in many marine Miocene diatomite and shale deposits in southern California. It probably was similar to living deep-sea smelts, which live at depths of greater than 1,000 feet. A full-grown smelt reaches about 10 inches long and feeds on crustaceans.

Today’s smelts live in the Atlantic and Antarctic oceans, as well as the Pacific coast of Central and North America.

THE PLEISTOCENE EPOCH



EXTINCT CAMEL

Camelops hesternus

Left and right first upper molars

AGE: late Pleistocene, 10,000-280,000 years ago.



The renowned Ice Age occurred during the Pleistocene (1.8 million to 10,000 years ago). Most of the northern continents were covered by enormous glaciers or ice sheets. Beginning 1.7 million years ago, ice sheets began to develop on the highlands in North America and Europe and spread over the northern half of North America and a quarter of Eurasia.

Although it became cooler in the Los Angeles Basin during this time, the temperature remained above freezing. The weather in the Santa Monica Mountains was even cool enough for redwoods.

By this time, the surrounding mountains of the area had emerged. The glacier-type conditions so characteristic throughout the Northern Hemisphere existed on the peaks of the San Bernardino and San Gabriel mountains.

Probably the biggest change to the terrain was the Pacific Ocean; it had retreated almost to its present shoreline. In its place were flat open grassy and brush-covered plains that stretched across the basin.

Roaming the basin were some pretty amazing animals, including the mammoth, mastodon, saber-toothed cat, giant ground sloth and cave bear. Many of the animals living in this region at this time came here over the Bering Land Bridge, which connected northeast Asia and northwest North America, or from South America.

At the Metro Red Line subway, workers uncovered bones and teeth of the Great Ground Sloth and an Ancient Bison. They also discovered parts of "fossilized" cottonwood and incense cedar trees that were over 45,000 years old. Most of the animal fossils unearthed are similar to the types of fossils found at the nearby La Brea Tarpits and date back 28,000-10,000 years ago.

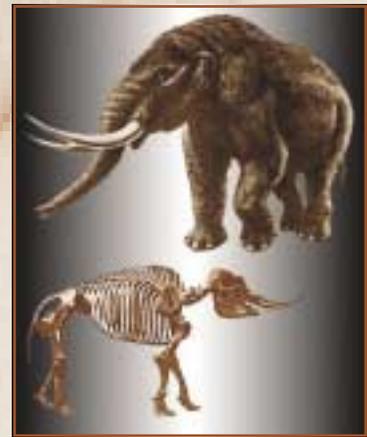


AMERICAN MASTODON

Mammot americanum

Portion of second lower molar

AGE: late Pleistocene, 10,000-280,000 years ago.



Although they had tusks and a trunk, mastodons are only distantly related to modern elephants. Mastodons originated in Africa and migrated to North America about 15 million years ago. They survived in North America until the end of the last Ice Age about 10,000 years ago.

PALYNOLOGY

THE STUDY OF POLLEN



While a relatively unknown science, palynology, is one of the best way to understand ancient environments and their climates. Through modeling, this information helps us to understand future weather and environmental patterns.

As standard practice, pollen is separated from ancient fossil sediment and from the earth in the immediate vicinity of fossil finds. The specimens are then sent to a lab for analysis.

At the Metro Line subway dig, pollen samples of "mormon tea" (as well as other arid-adapted plants) were found. Today "mormon tea" can be found in the Mojave Desert. Such a find tells us that the climate Los Angeles 9,000 years ago was drier and more extreme, with hotter summers and colder winters than today.

For more information about the fossil subway, call Metro Transportation (MTA) Media Relations at 213-922-2712/

Visit MTA's Underground website at www.MTA.net for pictures and learn more about the excavation.

The fossils are permanently displayed at MTA's

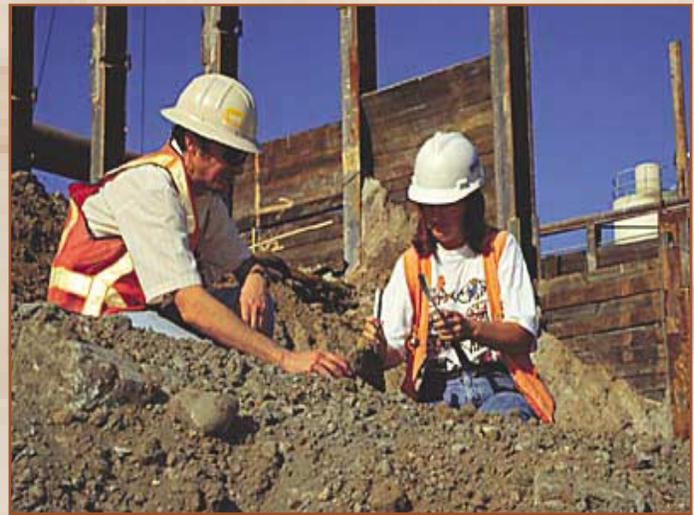
**MTA Headquarters
One Gateway Center
15th floor
Los Angeles, CA
90012**

WHAT IS IT LIKE TO BE A PALEONTOLOGIST?

Dr. Bruce Lander is a paleontological and environmental consultant. He has been instrumental in recovering, preserving and analyzing fossil specimens throughout Los Angeles.

Q. What does a paleontologist do?

A. Well, first of all, paleontology is the study of ancient life through the search and discovery of fossils (a remnant, impression or trace of an animal or plant of past geologic ages that has been preserved in the earth's crust). As a paleontologist, my job is to recover, preserve and analyze all types of fossil specimens found under the earth's surface.



Q. What does it take to be a good paleontologist?

A. I think patience. A lot of patience. Paleontology is painstaking and often very monotonous work. It requires a great deal of observational skill. A fossil isn't very useful without recording an enormous amount of minute data. Where was it found? What position was it found? What was the fossil found with? Every small detail can offer the most invaluable clues of what the environment was like millions of years ago.

Q. When planning a dig, what are some of the things you need to take into account?

A. Step one in planning a dig is to determine whether or not there is a high likelihood that any fossils exist in the spot that has been selected for digging. This is usually done through a review of geologic maps, scientific literature and museum records. Next we need to determine the approximate depth where the fossils are most likely to be found. (At the subway site, most fossils, including a mammoth tusk were found only 35 feet beneath the earth's surface. In one case, a mastodon skull was discovered barely 6 feet beneath the surface.) We usually arrive at the excavation site only after construction has hit a predetermined depth. A monitor is on site for the duration of construction to examine freshly exposed rock and to meticulously comb through the material excavated by construction equipment.

Q. What is the significance of the Metro Red Line subway discoveries?

A. The fossils recovered from the subway are scientifically important because they represent in some cases, the first or oldest record of their respective species. For example, we found the largest collection of marine species ever unearthed in the Los Angeles area. We also learned—through some of the deep water fish species recovered—that during the late Miocene epoch Los Angeles was submerged more than a half mile underwater.

Q. What significance do the findings of ancient fossils have on the present?

A. We don't live in a historical vacuum. The climatic history of humankind runs in cycles. So what occurred thousands of years ago (like the Ice Age), could very well happen again. Studying the past enables us to develop models to help us adapt and prepare for similar events that may occur.

Q. What advice can you give those who want to become a paleontologist?

A. Our jobs are unfortunately the ones that are in peril when funding cuts occur. However, if somebody wants to become a paleontologist, I would recommend getting the broadest base of science education possible. For example, don't just limit yourself to studying paleontology. Include such topics as biology and geology as well. I would also encourage students to obtain as many computer skills as possible.

Information from the Metro Red Line Metropolitan Authority Relations, 922-2700.

Los Angeles website to see fossil excavation project.

periodically TA's library:

quarters
ay Plaza
loor
es, CA
12