Prehistoric San Ramon Valley

FOCUS:

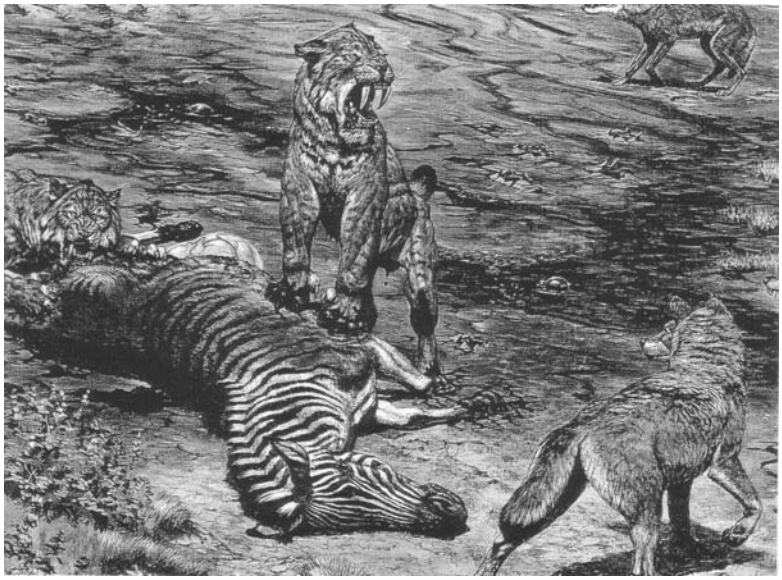
What did the San Ramon Valley look like millions of years ago?

MAIN IDEA:

Use the information provided and research materials to learn about how the land of the San Ramon Valley was formed and what animals existed millions of years ago

VOCABULARY:

prehistoric	faults
extinct	volcano
fossil	erosion
earthquake	predator



Student Pages

Prehistoric Times

Prehistoric times are times before there was any written history.

Millions of years ago the San Ramon Valley was covered with sea water. How do we know this? There were no people around to write things down or take pictures of what the area looked like, but scientists have found **fossils** of sea animals and plants on Mount Diablo and Las Trampas hills.

Fossil prints are the prints of animals or plants found on a rock long after the leaf or the animal has disappeared.

It is thought that the seas covered Contra Costa for 16 million years. That's a long, long, time. After that period the earth began to move and change. **Earthquakes** shook the earth and **volcanoes** erupted causing changes in the earth. Places that were flat were pushed up and **erosion** smoothed out other areas. Some scientists think that the forces belonging to the San Andreas **Fault** caused a plug composed of many different kinds of rocks to rise and form our Mount Diablo.

Earthquakes are the shaking of the earth's crust.

Erosion occurs when water or wind blows or washes away the soil.

Faults are cracks in the earth's crust.

Volcanoes are openings in the earth's crust from which molten rock and steam issue and a hill or mountain composed wholly or in part of the molten rock.

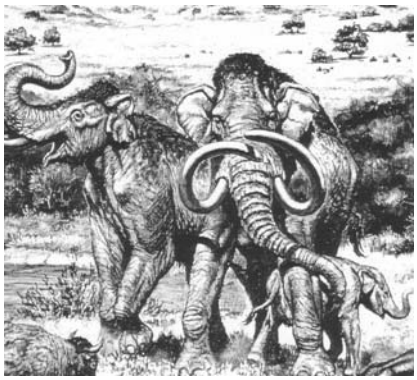
After the water went away and the land had changed, there were animals in the San Ramon Valley. Some think these animals walked across a land bridge connecting North America and Asia. These animals kept walking until they arrived in our valley. These animals found a low grassy plain dotted with lakes and streams. It seemed like a nice place to live, so these animals stayed.

The animals that lived here a million years ago are **extinct**, but we know that they lived here because we have found their bones. On the south slope of Mt. Diablo there is a place called the Blackhawk Ranch Quarry. This was once a watering hole where animals came to drink. Many of these animals got stuck in the mud and died. Scientists took their bones and put them together like we put together a puzzle. This is how we know what these animals looked like.

When an animal is **extinct**, it no longer lives on earth.

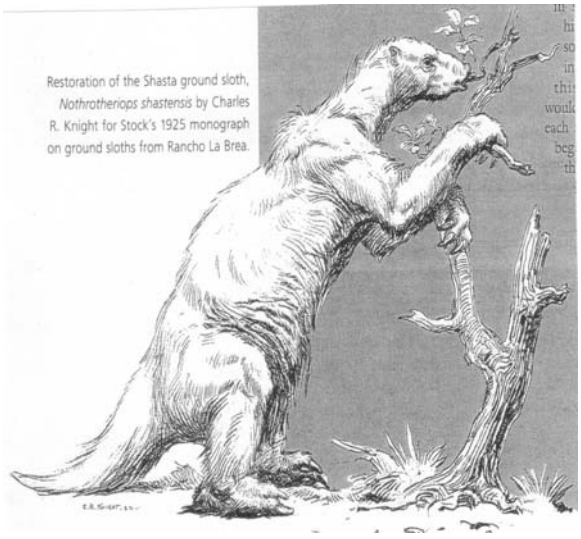
Some Prehistoric Animals of the San Ramon Valley

Let's go back millions of years and take a look at some of the animals that lived within the San Ramon Valley.

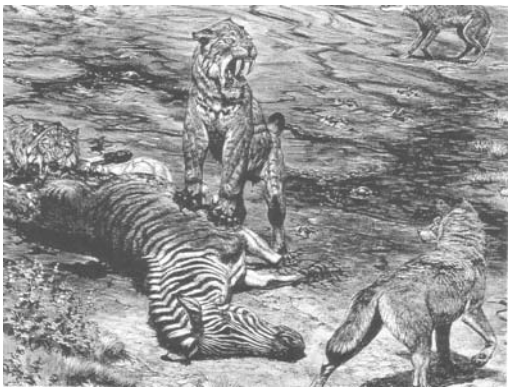


We have all seen elephants in the zoo, but long ago there were prehistoric elephants living in our valley called **mastodons** (*Gomphotherium simpsoni***)**. The prehistoric **mastodon** was not as large as the elephant that you have seen at the zoo, but it had gigantic double tusks that were as much as nine feet in length. This animal ate grass. (With a partner take a ruler and measure how long nine feet is)

Another animal that lived in our valley was the giant **sloth** or *Megatherium* (Meg-uh-THEE-ree-um). This animal was as large as an elephant. Most of the time this animal sat on its haunches feeding on the leaves of trees. The **sloth** couldn't run or walk very fast because it walked on the sides of its feet. Most **predators** didn't go after this animal because it was so large and had big powerful claws. The **sloth** was not easy to eat because it had a heavy coat that contained small bony plates.

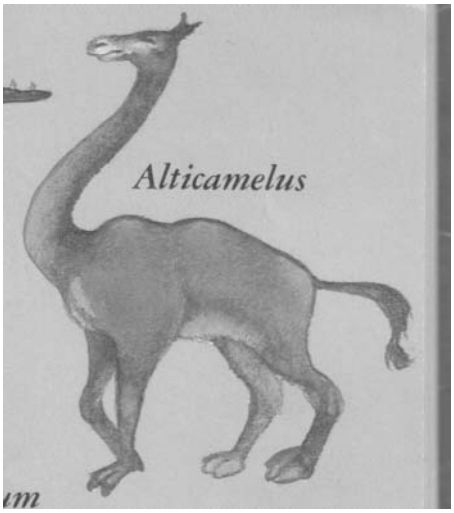

Restoration of the Shasta ground sloth, *Nothrotheriops shastensis* by Charles R. Knight for Stock's 1925 monograph on ground sloths from Rancho La Brea.

Predators are animals that eat other animals.



The **saber-toothed cat**, called *Smilodon* (SMY-low-don), also roamed our valley. This animal was shorter than lions we see in the zoo, but it was heavier and more powerfully built. It couldn't run very fast but was good at hunting and killing large prey. The cat had fangs that were nine inches long. These fangs were used to stab and slash the cat's prey. Scientists have not figured out how the cat chewed its food with such long teeth. Imagine trying to eat with fangs or teeth that are nine inches long! (Look at nine inches on your ruler.)

Prey are animals taken for food for predators.



Camels, also called *Alticamelus* (ALL-tee-ka-MEE-lus), lived in the San Ramon Valley. The camel looked like a llama, but it was as tall as a giraffe. It was the tallest member of the camel family and measured eighteen feet. Imagine seeing an animal that measured eighteen feet from the ground to the top of its head! It was so tall that it could eat leaves at the tops of trees. (With a partner take a ruler and measure how long eighteen feet is.)

About 60 million years ago, the first ancestor of modern **horses** appeared in North America. They were quite small, about the size of a large pet cat today. They are known as *eohippus* or dawn horses. The *eohippus* were fairly common in our valley for many years. Eventually some of them migrated over an ancient land bridge which once connected North America and Asia.

The **horses** in Asia continued to develop through millions of years. However, the ones that stayed in North American completely died out. **Horses** (modern ones) were reintroduced by the Spanish explorers about 500 years ago.

A very strange **rhinoceros** lived in the San Ramon Valley. It was called *Teloceros* (TELL-oh-sair-us). It had very short legs which seemed too small to hold up its heavy body. This early animal did not have a horn, but it had a little bump or knob at the end of its nose. This animal was covered with a thick coat of long hair. Today's rhinos are nearly hairless.

Gail Kamerer, 2004

Teacher Pages

Student activities:

1. Create a prehistoric zoo of animals that lived in the San Ramon Valley. Use paper mache to create animals. Take your buddy from a lower grade on a tour of the zoo and tell them about each animal. Or take large pieces of butcher paper and draw both sides of the animal. Stuff the animal with newspaper and staple together. Hang it from the ceiling in your classroom.
2. Use modeling clay to make a diorama of the San Ramon Valley
3. Make a mural of the prehistoric period of the San Ramon Valley. This mural could accompany other murals that could be put out at open house to show the different historical periods of our area.
4. Make fossils.
5. Write a story about what it would be like to have a prehistoric animal as a pet. What would be the problems? What might be the advantages? What would you name him? Where would you keep him? What would you feed him?
6. Use a chart to compare prehistoric animals to their present day cousins. How are they alike and how are they different?

Field Trips (See special section on field trips.)

- **Family field trips:** Oakland Museum, Natural Sciences level
  Museum of Paleontology at UC Berkeley campus at the Valley Life Sciences building

- **Passport opportunity**: Museum of the San Ramon Valley: mastodon jaw

History/Social Science Standards

- Summarizes key events and explains the historical context.
- Identifies and interprets the multiple causes and effects of events.
- Applies a variety of writing types, genres of literature, oral speaking and drama to historical events.

Reading and Social Studies

Houghton Mifflin Literary Readers, *Book 3* "Digging up Dinosaurs", pages 159-177
Poem: "The Museum" Page 178

Additional Resources

Essays

Prehistory in the San Ramon Valley
"The Beginnings"

Pictures *Prehistoric animals*

Websites

- ucmp.berkeley.edu (especially Discover the History of Life; K-12 classroom resources.
- http://elib.cs.berkeley.edu/photos/ - Calphotos

SUBJECT SEARCH TERMS FOR LIBRARY CATALOG:

- PALEONTOLOGY
- CALIFORNIA
- CONTRA COSTA COUNTY

Books:

PREHISTORIC SAN RAMON VALLEY ANIMALS

- J560 – SUBJECT LOCATION FOR FOSSILS
- 563.1 SMITH – Lower Tertiary foraminifera from Contra Costa County, California
- 564 FIRBY -Pliocene non-marine mollusks from Contra Costa County, California
- 569.67 WARD – The call of distant mammoths
- 569.72 RICHEY - Lower Pliocene horses from Black Hawk Ranch, Mount Diablo, California
- 569.74 MACDONALD - The Pliocene carnivores of the Black Hawk Ranch Fauna
- 569.74 RICHEY - Osteoborus diabloensis, a new dog from the Black Hawk Ranch fauna, Mt. Diablo, California
- J569.75 HEHNER – Ice age sabertooth
- RJ591.0321 BURTON – International Wildlife Encyclopedia
- J599 PARSONS – Amazing mammals
- J599.31 SQUIRE – Anteaters, Sloths, and Armadillos
- J599.668 & J599.728 - SUBJECT LOCATION FOR RHINOCEROS
- J599.70913 LANDAU – Tropical Forest Mammals
- J599.725 CROWELL – Dawn horse to Derby winner
- J599.736 – SUBJECT LOCATION FOR CAMELS
- J636.1 – SUBJECT LOCATION FOR HORSES

- Daniel Cohn, *Prehistoric Animals*, Doubleday, 1988
- Ann McCord, *Children's Encyclopedia of Prehistoric Life* (London: Usborne Publishers, Ltd.), 1977
- Roi Peers, *Geology of Mt. Diablo* (Walnut Creek: MDIA), 1998. Brochure.
- William S. Steele *The First Mammels* (World Publishing Co.), 1955.

Geology of the San Ramon Valley

- 557.94 PAMPEYAN - Geology and mineral deposits of Mount Diablo, Contra Costa County California - 557.94
- 979.463 HISTORY – History of Contra Costa County California

SUBJECT SEARCH TERMS FOR LIBRARY CATALOG:

CONTRA COSTA COUNTY

The Beginnings

Millions of years ago, the San Ramon Valley and Mount Diablo were beneath the sea. One Indian creation account states that the Mountain was once an island surrounded by a vast body of water. Today fossilized shells can be found throughout the valley.

Geologically speaking the valley, Las Trampas and Mt. Diablo are complex. A Franciscan rock core punched through Cretaceous and Miocene formations millions of years ago during the formation of Mt. Diablo. The mountain towers above the surrounding lands to a height of 3849 feet. Once a sacred place for local Indians as well as a principal landmark for early Europeans entering San Francisco Bay, today Mt. Diablo is the principal reference point for American land surveys in northern and central California.

Information from the permanent exhibit in the Museum of the San Ramon Valley

205 Railroad Ave. (in the restored Danville depot)
925-837-3750 ~~ museumsrv.org Open hours: 1-4 Tu-Fri, 10-1 Sat
Visit the museum to learn more about the valley's geology.

Prehistoric Information
About the San Ramon Valley

The Valley is young, geologically speaking, and boasts a significant fossil quarry which continues to be explored by scientists from the University of California's Museum of Paleontology in Berkeley. Throughout the valley there are many areas where one can easily observe interesting geological elements, including rock outcroppings and shell fossils. Mt. Diablo and Las Trampas ridge is particularly interesting to geologists.

Mount Diablo is not a volcano

Mount Diablo at 3849 feet is the dominant physical feature of the area. It is not a volcano, which some people still believe. Mount Diablo was formed by the pressure of tectonic plates and subduction. According to geologist Oliver Bowen, "the core of the twin-peaked mountain consists of jumbled massive rocks of the Franciscan formation which literally have been punched through the once-overlying Cretaceous and Miocene formations from below." At the top is the principal reference point for all U.S. land surveys in most of California and all of Nevada.

"Most of the rocks involved in the Mt. Diablo regime are less than 10 million years old," according to geologist Ron Crane. There are several earthquake faults in the San Ramon Valley and vicinity. The nearby Calaveras and Greenville Faults have been particularly important in recent history, as have the better known San Andreas and Hayward Faults.

The region is still very active tectonically and more earthquakes can be expected in the future, as the land continues to change. Cluster earthquakes are regular occurrences. Crane says that the hills are moving together and will shrink the valley floor -- in several million years.

Geologic History of the Blackhawk Ranch Fossil Quarry

Since the 1930s the U.C. Museum of Paleontology has been studying a rich fossil quarry area which was found on the Blackhawk Ranch. Here is information about the period when the quarry was first created.

About 9 million years ago the East Bay was composed of low, rolling hills with streams draining westward toward what was then a southward-extending ancestral San Pablo Bay. The countryside was a savanna with heavier woodlands along the courses of the streams. There was a range of hills west of what is now called the "San Pablo embayment," more or less in the position of the present-day San Francisco Bay. So, just locally in this part of California, an almost unimaginable change of landscape has evolved in only the past 9 million years.

The Blackhawk Ranch Fossil Quarry is in a pocket of deposition in one of those westward flowing streams. Swift waters and seasonal floods carried and jumbled up many animal bones, jaws, and teeth as they were being deposited along with rock pebbles in this pocket. Much later, after the depositional pocket was consolidated, de-watered, and converted into pebbly rock, the older rocks in the core of Mt. Diablo were pushed up much higher than its current elevation of 3849 feet.

The overlaying strata, including the fossiliferous bed at the Quarry, were tilted to very steep angles by the up-thrust of this huge plug. Many of the strata, even those at the Quarry, have been overturned from the vertical by as much as 30 degrees. The overturning has been increased by gravity-slumping of beds near the earth's surface on steep hillsides. This simplistic description leaves no doubt that the Mt. Diablo-Blackhawk Ranch district is a fascinating example for students to study. It demonstrates geologic faulting, mountain-making, earthquakes, and tremendous surface changes in the California Coast Ranges over the past few million years.

Only a small segment of the hillside spur has been excavated, and no one knows how deep under the present surface of the Quarry the fossiliferous deposit may extend. The present excavations aim to determine the extent of the deposit.

Fossils from the Blackhawk Quarry

More than 3400 museum-numbered specimens of animals and plants have been obtained at the Blackhawk Ranch Quarry. Most of these fossils were collected by a Works Progress Administration crew in the mid 1930s and later, but classes and field groups from the University of California and from other schools and institutions continue to collect in the quarry each summer.

The fossils include skulls, long bones, teeth, tusks, ribs and foot bones of a great variety of animals, as well as many plants. The animals include mammals, reptiles and fish. Common vertebrates found are mastodons (*gomphotherium*), beavers, mice, squirrels, foxes, hayaenoid dogs, cats (including a saber-toothed variety), skinks, weasels, otters, horses, camels, rhinoceros, llamas, antelopes, salmon, turtles, and cranes, among others. Plants recovered include leaves of poplar, willow, oaks, elm, sycamore, mahogany and sumac. The Quarry biota is a good representation of the larger animal and plant life in the East Bay region 9-10 million years ago.

Beverly Lane, 2004

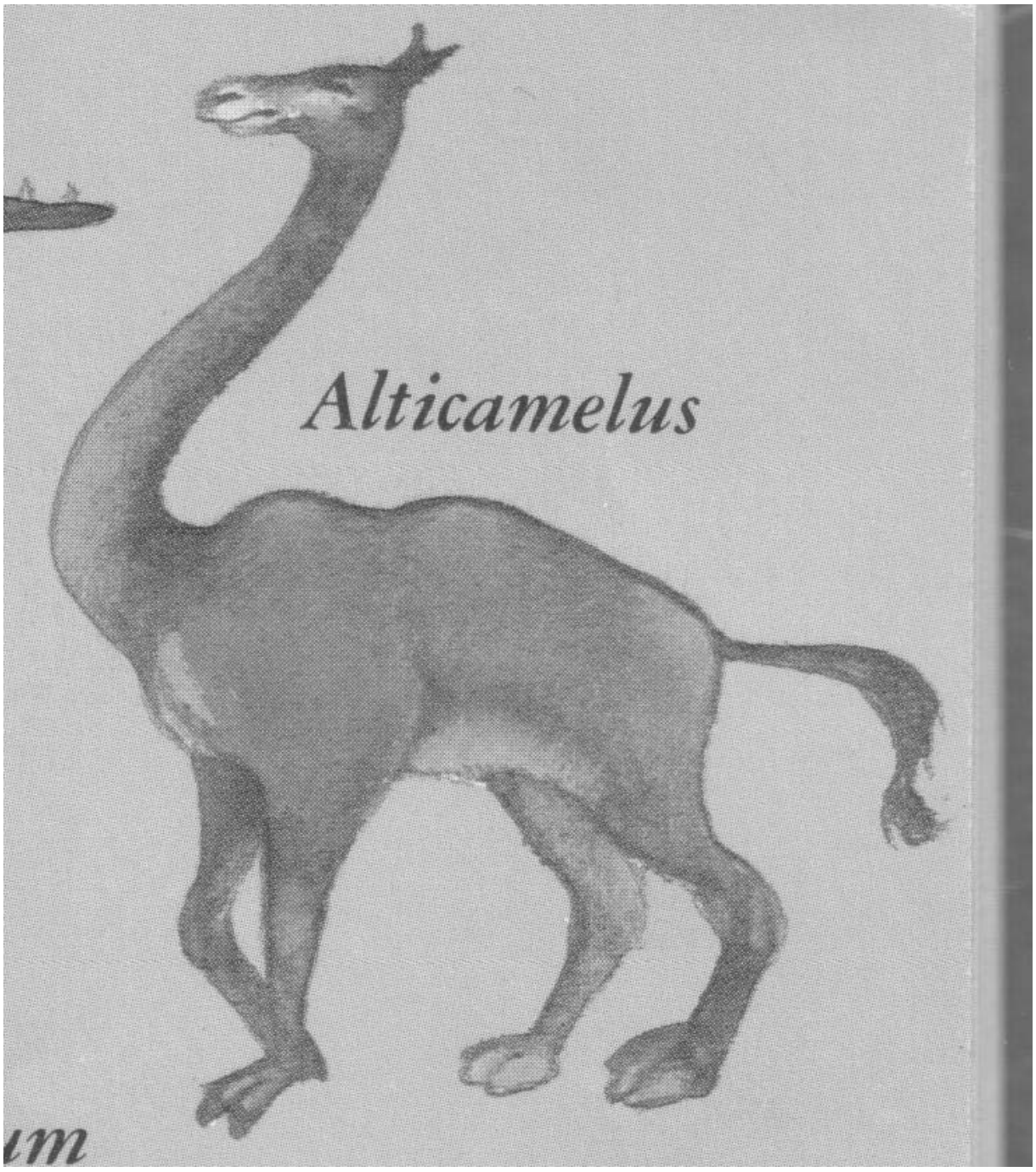
SOURCES

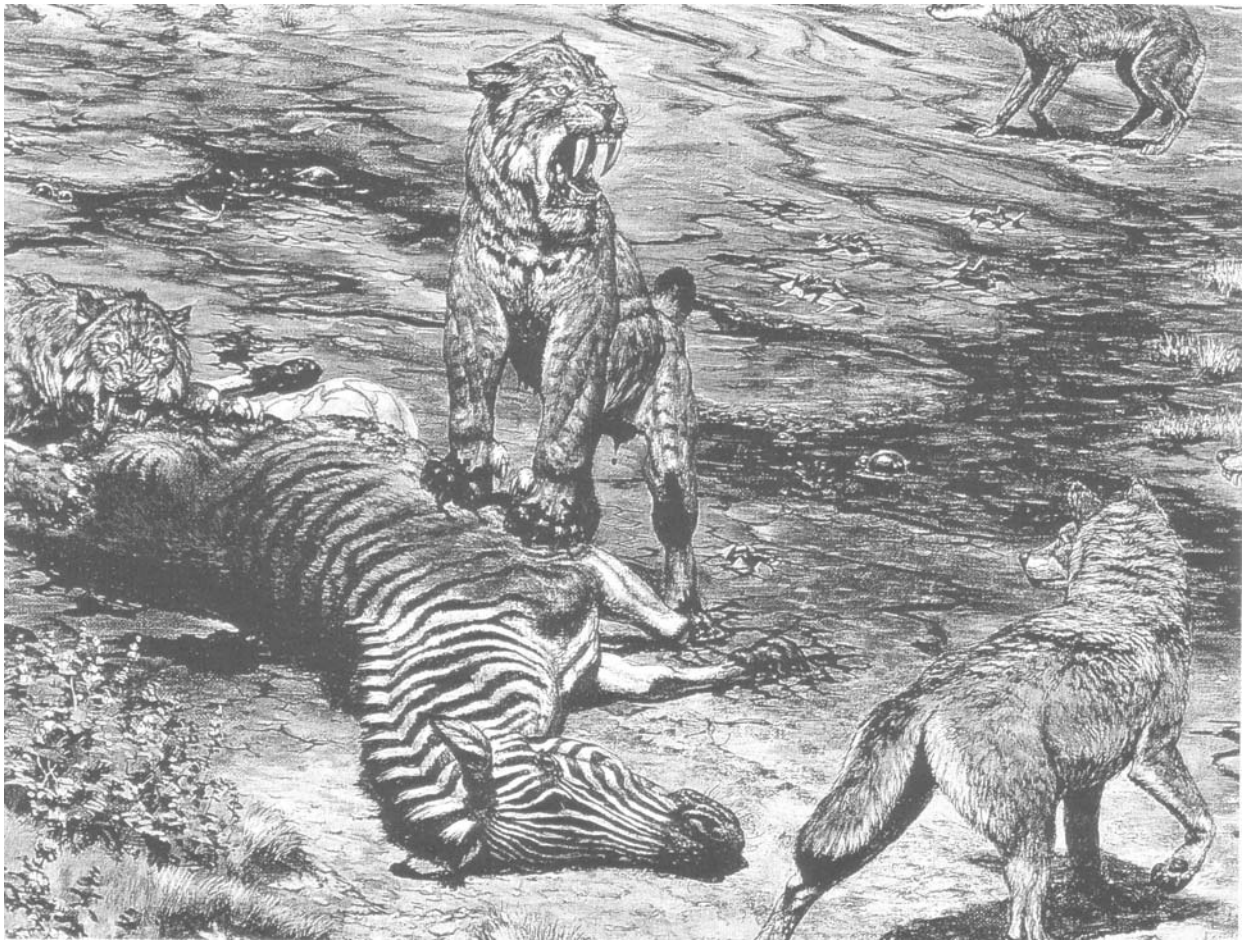
Contra Costa County Watershed Atlas, Contra Costa County Community Development Department (Martinez, CA: Contra Costa County), *Nov. 2003, 151 pp.*

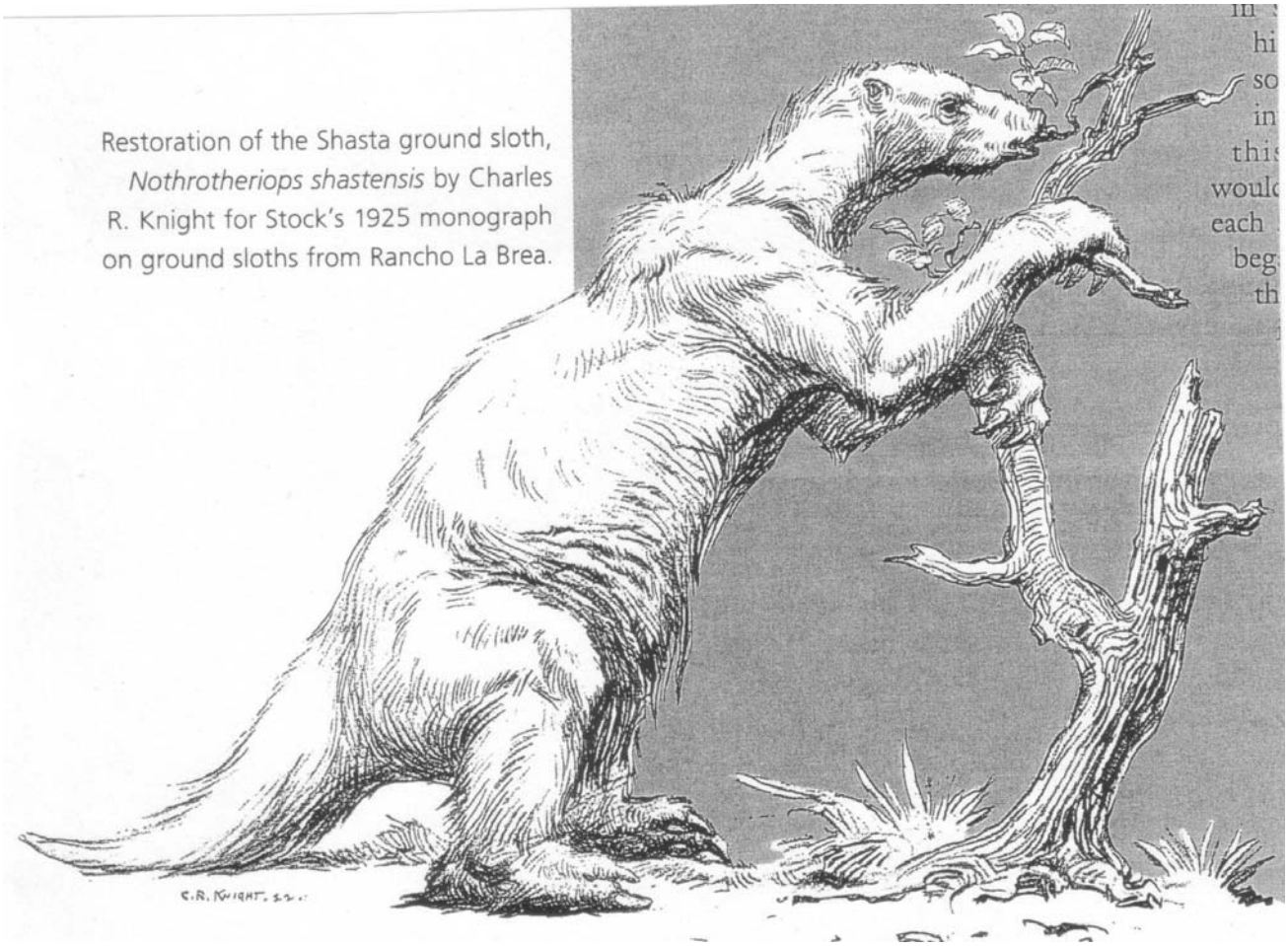
Crane, Ron and Kevin Crane, *Geology of the San Ramon Valley*, A personal account of the Present Geologic Knowledge of the Area, computer produced, 2002. 65 pp.

Jenkins, Olaf P., *Geologic Guidebook of the San Francisco Bay Counties*, San Francisco: Dept. of Natural Resources, Dec. 1951. Bowen, p. 161

UC Museum of Paleontology, various materials on the Blackhawk Quarry


Alticamelus





Restoration of the Shasta ground sloth, *Nothrotheriops shastensis* by Charles R. Knight for Stock's 1925 monograph on ground sloths from Rancho La Brea.