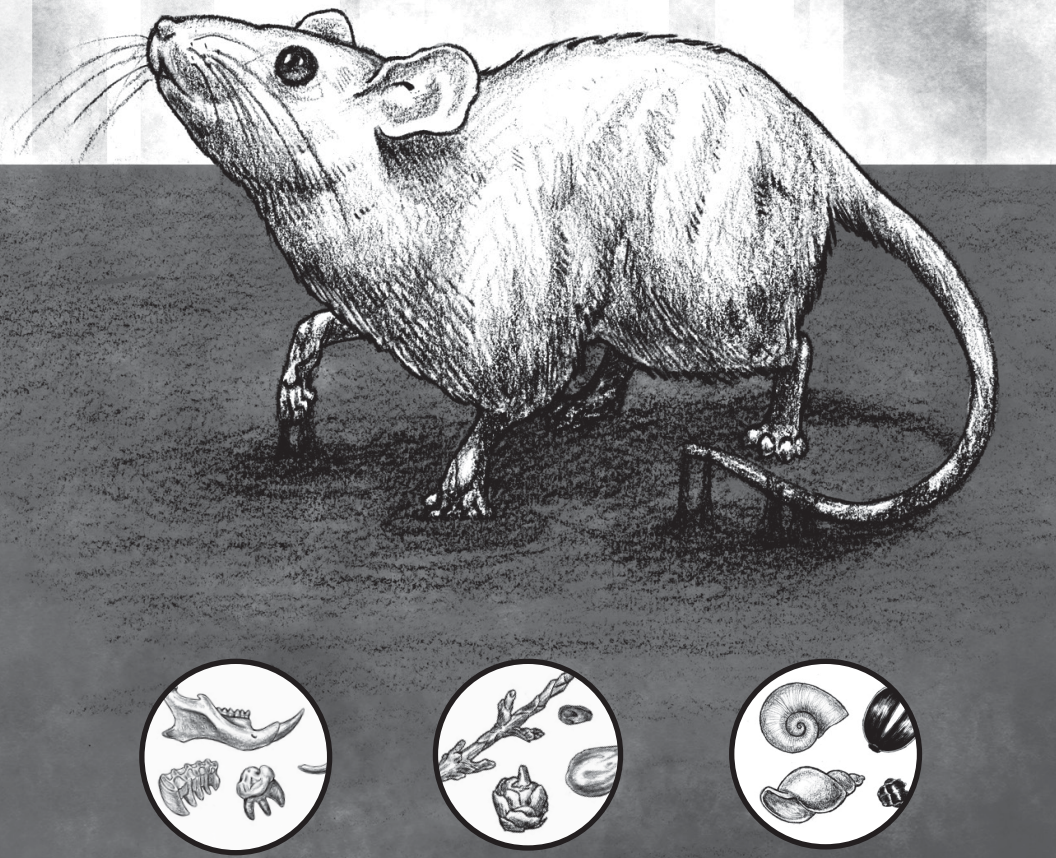
#LABREAWEBS

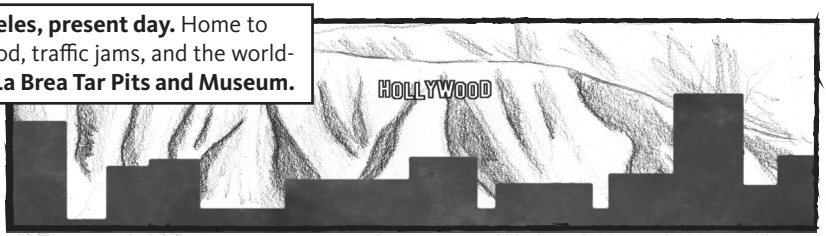
LA BREA TAR PITS & MUSEUM

IT CAME FROM THE TAR PITS!



THE **ORIGIN STORY** OF **MICROFOSSILS**
AND HOW TO SORT THEM

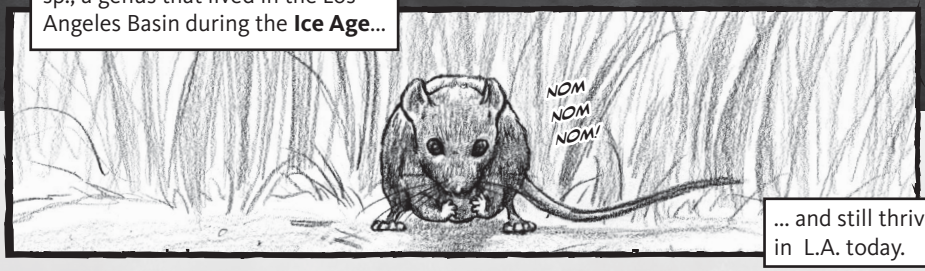
Los Angeles, present day. Home to Hollywood, traffic jams, and the world-famous **La Brea Tar Pits and Museum.**



Los Angeles, 40,000 years ago, near the end of the **Pleistocene epoch**...

... home to *danger.*

This is a deer mouse, *Peromyscus* sp., a genus that lived in the Los Angeles Basin during the **Ice Age**...



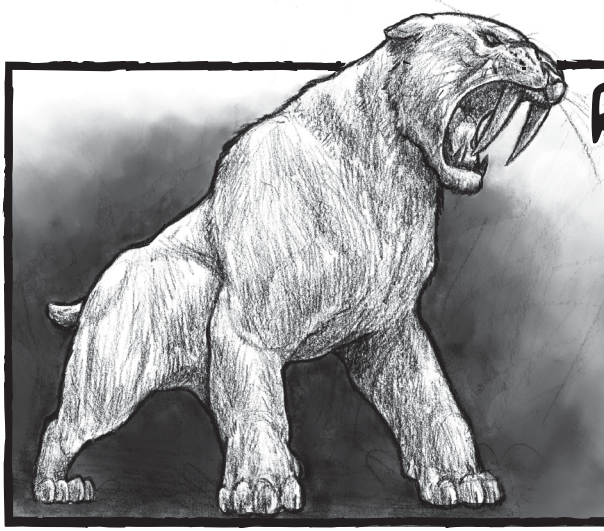
... and still thrives in L.A. today.

She's foraging for food like berries, insects, and seeds.

PLEISTOCENE EPOCH: A SPAN OF GEOLOGIC TIME, RANGING FROM ABOUT 25 MILLION TO 10,000 YEARS AGO, ALSO KNOWN AS THE ICE AGE.

A young bison, *Bison antiquus*, charges into the clearing!

LARGE HERBIVORES LIKE THIS WERE THOUGHT TO HAVE **MIGRATED** THROUGH THE LOS ANGELES BASIN IN SEARCH OF FOOD.



RAAAWRR!!!

The migrating herbivores attracted large carnivores, like the saber-toothed cat, *Smilodon fatalis* -

- who were *also* in search of food.

SQUEAK!!!

MIGRATE: TO MOVE FROM ONE REGION OR HABITAT TO ANOTHER, ESPECIALLY REGULARLY ACCORDING TO THE SEASONS.

The excitement of the chase abruptly ends as they realize they're stuck in **asphalt**, a sticky crude oil, often called tar.

THOUSANDS OF ANIMALS AND PLANTS HAVE BEEN TRAPPED AND PRESERVED IN 'TAR PITS' LIKE THESE.

Fossils of these animals can be found at La Brea, but not *all* of these species went **extinct**.

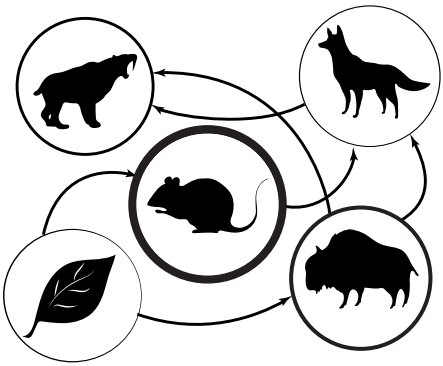
RAWR?

GRUNT?

SQUEAK?

MANY SMALL MAMMALS, INSECTS, REPTILES, AMPHIBIANS, MOLLUSCS, PLANTS AND BIRDS LIVED HERE YEAR-ROUND, JUST LIKE THE LITTLE MOUSE, AND ARE STILL **EXTANT**.

Their remains can reveal important information that can help scientists understand ancient **food webs** (who was eating what) -

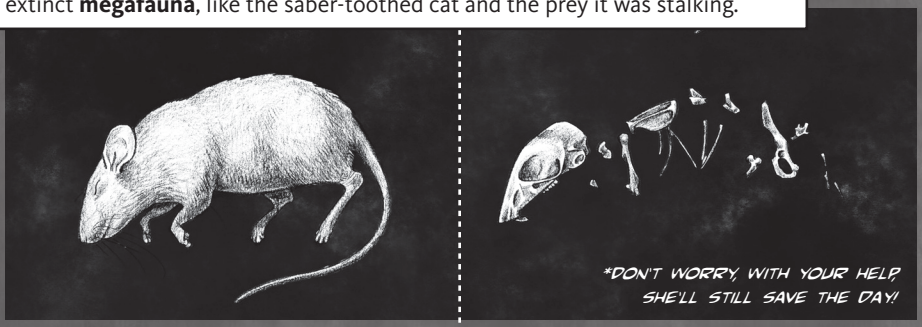


- and provide clues about **how and why some animals went extinct**, and why others were more resilient to a changing environment.

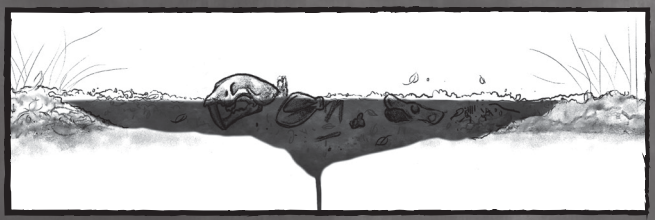
EXTINCT: WHEN A GROUP OF ORGANISMS NO LONGER EXISTS AND HAS NO LIVING RELATIVES

EXTANT: STILL IN EXISTENCE

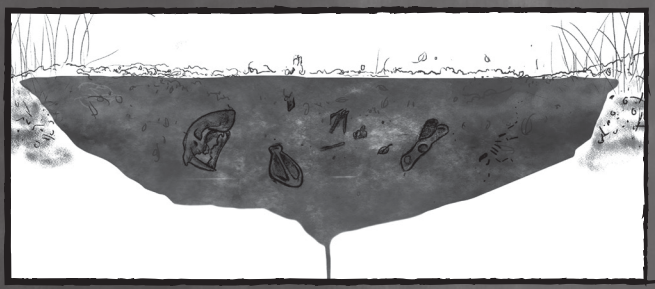
Deprived of water and food, the trapped mouse eventually dies* along with now extinct **megafauna**, like the saber-toothed cat and the prey it was stalking.



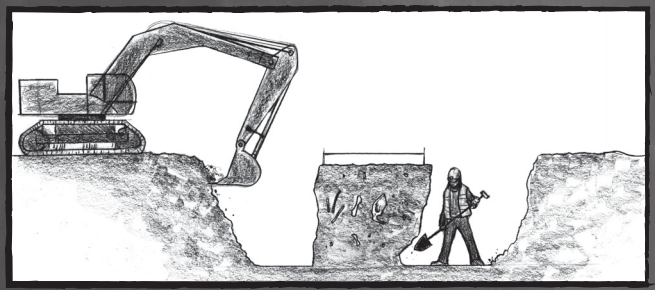
The asphalt continues to seep up and cover the animals' remains. Soft tissues like muscle, fat, and fur are eaten by **microbes** that live in the asphalt.



However, bones, insect exoskeletons, and plants become saturated with the asphalt and preserved in the sticky goo.



Over time, leaves, debris, and **sediment** also get stuck in the asphalt, building up to create a cone or funnel shaped deposit.

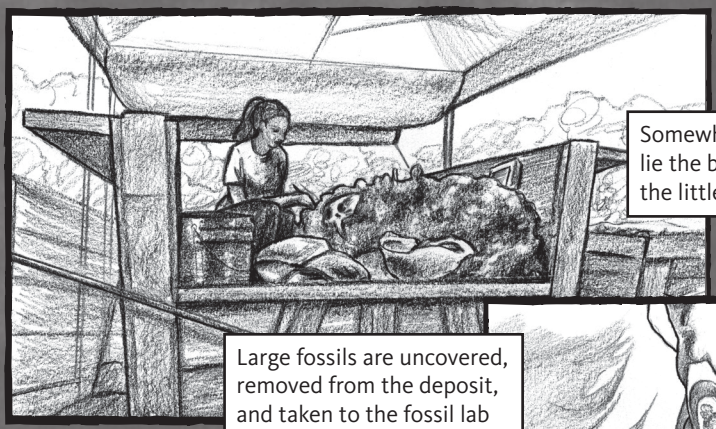


Thousands of years later, excavators at the **La Brea Tar Pits** dig into the asphalt saturated sediments to find...

FOSSILS!

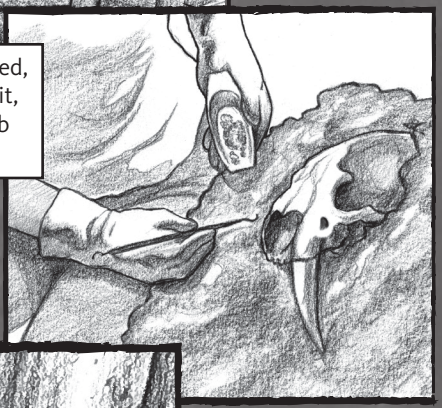
MEGA = BIG, **FAUNA** = ANIMALS
MICROBES: MICROORGANISMS, LIKE BACTERIA
SEDIMENT: DECOMPOSED, BROKEN DOWN ROCKS, PEBBLES OR SAND.

La Brea Tar Pits, present day. This is **Project 23**, a collection of 16 hardened asphaltic fossil deposits that have been taken out of the ground in 23 separate boxes, and carefully excavated above ground.



Somewhere in those boxes lie the bones of our hero, the little deer mouse.

Large fossils are uncovered, removed from the deposit, and taken to the fossil lab for cleaning.

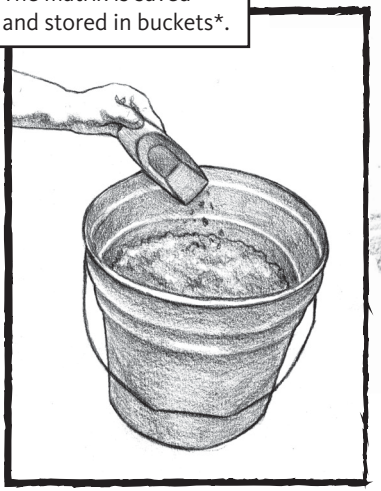


THE SEDIMENT AND ROCKS SURROUNDING A FOSSIL IS CALLED **MATRIX**.

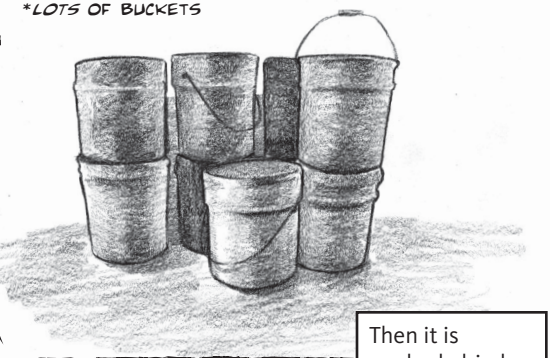
IT IS IN THE MATRIX THAT EXCAVATORS AND FOSSIL PREPARATORS WILL FIND TINY BONES, TEETH, JAWS, INSECTS AND PLANTS!

PROJECT 23 IS SUPER COOL! LEARN MORE ABOUT IT AT WWW.TARPITS.ORG.

The matrix is saved and stored in buckets*.



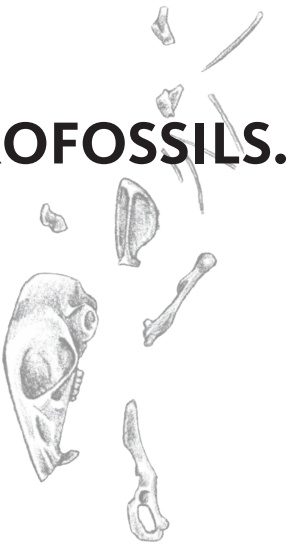
*LOTS OF BUCKETS



Then it is washed, dried, bagged, labeled-

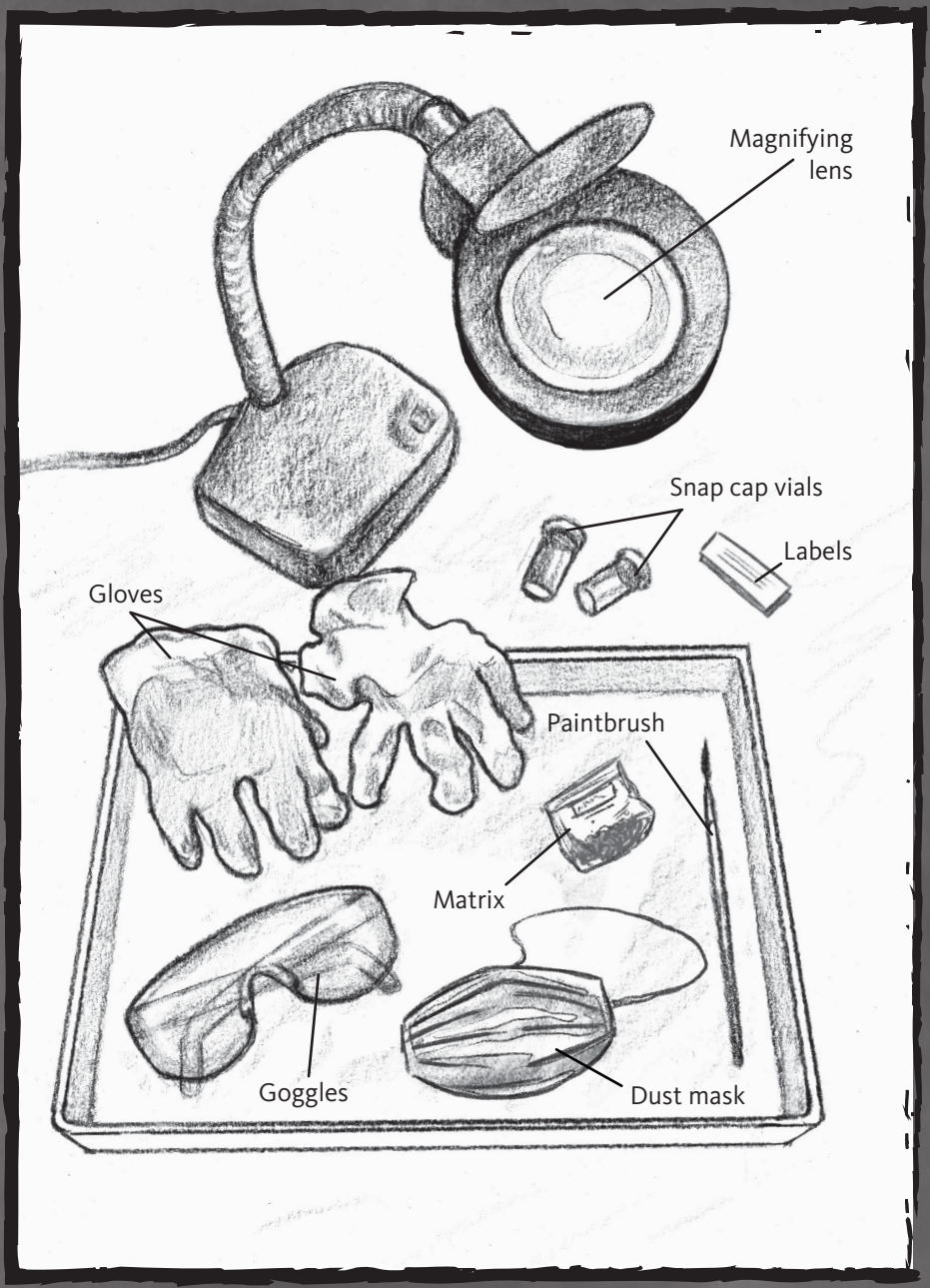
and sent to **YOU** to look for...

MICROFOSSILS.

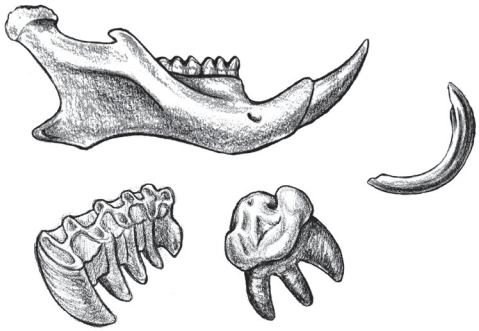


MICRO = SMALL, **FOSSILS** = FOSSILS

USING TOOLS SIMILAR TO WHAT YOU SEE HERE, YOU'LL BE ABLE TO SORT AND IDENTIFY A VARIETY OF MICROFOSSILS.

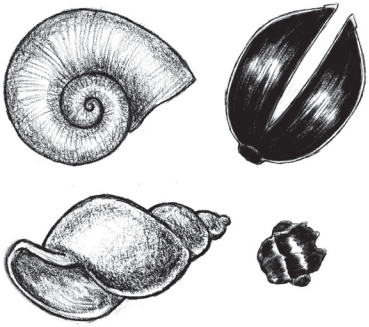


YOU'LL FIND TEETH AND BONES OF SMALL MAMMALS, TWIGS, LEAVES, SEEDS, AND MORE.



Bones
Teeth
Jaws

Plants
Leaves
Wood
Stems
Seeds



Shells
Insects
Unidentified
specimens

THE DISCOVERIES MADE FROM THE FOSSILS **YOU** SORT TODAY CAN HELP SCIENTISTS UNDERSTAND WHAT **PLANTS AND ANIMALS** WERE PRESENT AT DIFFERENT TIMES DURING THE LATE **PLEISTOCENE.**

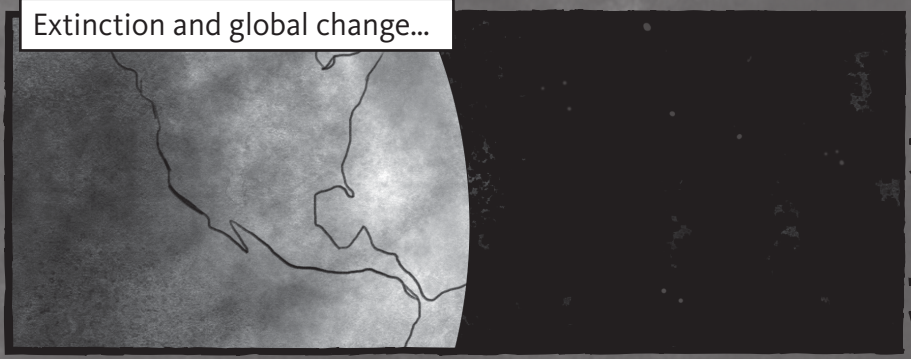
THEY WILL USE INFORMATION ABOUT MODERN SPECIES INTERACTIONS TO RECONSTRUCT **ANCIENT FOOD WEBS**, WHICH WILL HELP ANSWER QUESTIONS ABOUT...

Past environments...

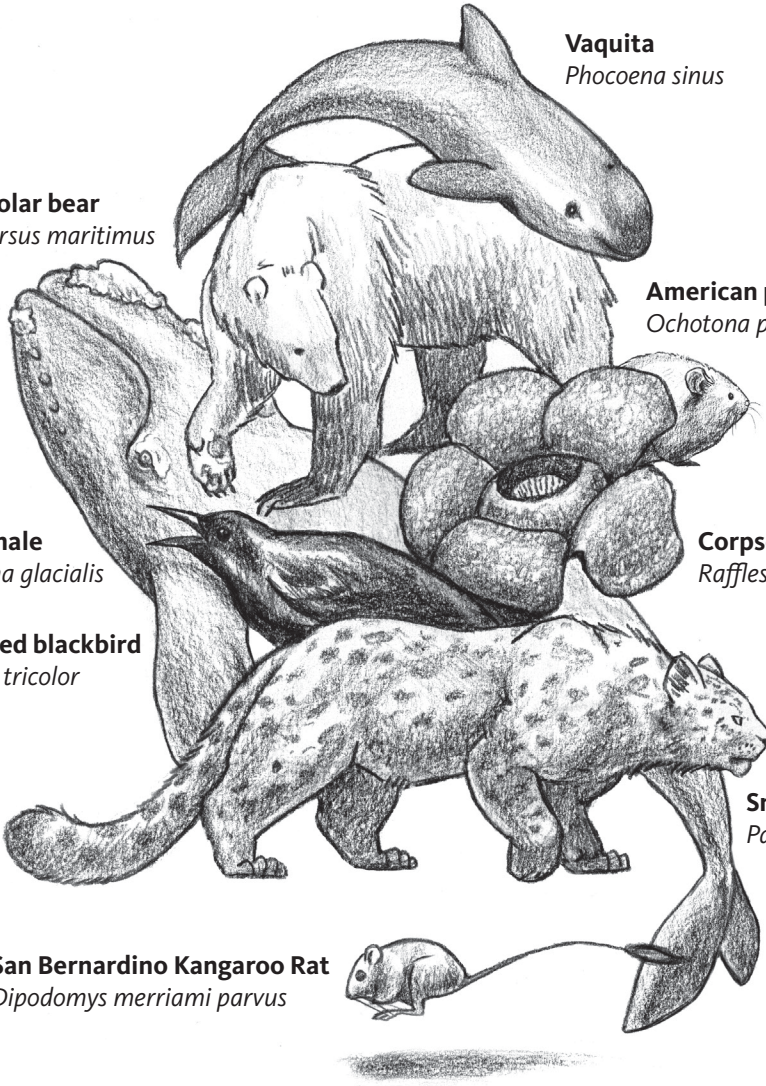
Plant and animal evolution...

FOSSILS FROM THE **TAR PITS** INDICATE THAT OVER TIME, **COYOTES** MIGHT HAVE EVOLVED A **SMALLER BODY SIZE** IN RESPONSE TO SELECTIVE PRESSURES.

Extinction and global change...



YOUR WORK TODAY CAN EVEN HELP SCIENTISTS **PRESERVE AND PROTECT** EXISTING ANIMALS!



Vaquita
Phocoena sinus

Polar bear
Ursus maritimus

American pika
Ochotona princeps

Right whale
Eubalaena glacialis

Corpse flower
Rafflesia arnoldii

Tricolored blackbird
Agelaius tricolor

Snow leopard
Panthera uncia

San Bernardino Kangaroo Rat
Dipodomys merriami parvus

THE MYSTERY OF WHAT **ICE AGE FOOD WEBS** WERE LIKE AND WHAT THEY CAN TELL US STARTED 40,000 YEARS AGO WITH A LITTLE MOUSE AND SOME PLANTS...

... AND THAT MYSTERY STARTS GETTING SOLVED WITH **YOU**, RIGHT NOW!

YOUR MISSION...

Thanks for contributing to our research on Ice Age food webs by helping us sort microfossils. Each microfossil provides valuable information about the small organisms that inhabited Los Angeles tens of thousands of years ago. In this kit, you will be sorting matrix sediment, the "dirt" surrounding larger fossils, into different categories, just like we do in the lab at La Brea Tar Pits.

GETTING STARTED

1. **First, find a partner and get one kit for the two of you.**

2. **Next, take a quick inventory of the supplies you'll be using. Kits will differ among classes, so check off the supplies you have in your kit:**

- ☐ **Sorting tray**
- ☐ **Sorting sheet**
- ☐ **Paintbrush**
- ☐ **Magnifier lens**
- ☐ **Small labeled plastic bags**
- ☐ ***It Came from the Tar Pits* comic**

NOW, LET'S DIG IN!

FIND FOSSILS!

3. Place the paper sorting sheet in the tray. Your teacher will then place a scoop of matrix into your tray. Use the paint brush provided to help you separate each thing you find under your magnifier.

   Please do NOT use your hands, pencils, etc. to pick up the specimens as they are very delicate.

4. Use the guide on the following pages to help you identify each item and then use the paintbrush to place them in the corresponding bag. You will be sorting the material into individually marked plastic bags labeled as follows:

BONES

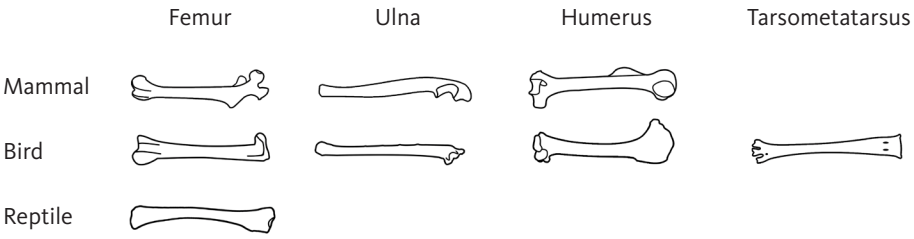
PLANTS

OTHER

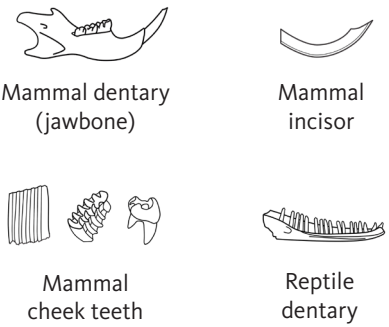
The asphalt, rocks, and minerals can be returned to your teacher. Once you have sorted all your material in the appropriate bags, please return all materials to the kit. Return to step 2 and double-check that all materials are accounted for. You may keep the tar pits comic!

BONES

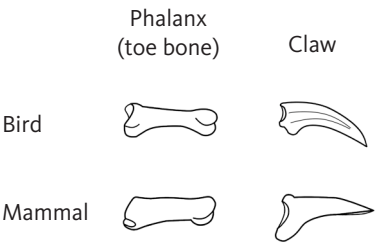
LIMB BONES



TEETH



PHALANGES



RIBS

VERTEBRAE

PLANTS

Juniper stem

Juniper seed

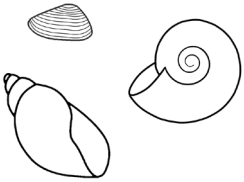
Acorn cap

Oak leaf

Pieces of wood

OTHER

FRESHWATER SHELLS



INSECTS/ARTHROPODS

Beetle elytron
(wing cover)

Beetle head

Millipede
segment

NOTES & OBSERVATIONS

If you would like to keep up with this research project online, follow #labreawebs on social media, or check out the blog at www.labreawebs.wordpress.com. To learn more about the La Brea Tar Pits and Museum, visit www.tarpits.org.

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