

## Teeth Telling Tales (Gr. 3-8)

### DESCRIPTION

Join us as we replicate a day of research inspired by Dr. Darin Croft, Paleontologist with Case Western Reserve University and the Cleveland Museum of Natural History. Specializing in mammals that went extinct millions of years ago, Dr. Croft studies how careful measurements of fossil teeth can help scientists build a picture of entire ancient ecosystems. Using calipers and casts of specimens found during recent South American fieldwork, your amateur Paleobiologists will learn how ancient teeth tell tales!

### OBJECTIVES

- Learners will use tools, specimens, and data in order to understand the patterns that scientists use to make conclusions about ancient ecosystems and behaviors of extinct animals.
- Learners will be able to analyze patterns in data as evidence to support their arguments about the eating style of extinct, ancient mammals.

## OHIO'S LEARNING STANDARDS

### Grade 3

Science: Life Science – Behavior and Growth Changes

- Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.

### Grade 4

Science: Life Science – Earth's Living History

- Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.
- Fossils can be compared to one another and to present-day organisms according to their similarities and differences.

Mathematics: Measurements and Data

- Know relative sizes of the metric measurement units within one system of units.

### Grade 5

Science: Life Science – Interconnections within Ecosystems

- Organisms perform a variety of roles in an ecosystem.
- All of the processes that take place within organisms require energy.

### Grade 6

Science: Life Science – Cellular to Multicellular

- Living systems at all levels of organization demonstrate the complementary nature of structure and function.

## Grade 7

Science: Life Science – Cycles of Matter and Flow of Energy

- Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

## Grade 8

Science: Life Science – Species and Reproduction

- Diversity of species, a result of variation of traits, occurs through the process of evolution and extinction over many generations. The fossil records provide evidence that changes have occurred in number and types of species.
- Every organism alive today comes from a long line of ancestors who reproduced successfully every generation.
- The characteristics of an organism are a result of inherited traits received from parent(s).

## Before your Program & How to Set Up your Room

- **Set-up requirements:**
  - **Your educator will need access to an outlet and a blank wall or screen to project a PowerPoint presentation. We are also able to use existing classroom equipment if available.**
  - **Please be prepared to divide your class into a maximum of 6 even groups (each group will have at least 3 people).**
  - **Students will need desk space to fill out worksheets and explore museum materials with their groups.**
- Please have student desks clear before the program begins.
- Please provide an empty desk or small table for the museum educator to set up display items.
- If booking multiple programs in a row, transitions will be easier if museum staff sets up in only one location.
- Introduce the vocabulary and additional resources below.

## VOCABULARY

**Bivariate plot** – a graph of the relationship between two variables that have been measured on a single sample of subjects.

**Buccal** – (in tooth placement) directed toward the cheek.

**Calipers** – device used to measure the distance between two points on an object.

**Carnivore** – an animal that eats only meat.

**Cast** – a precise physical copy of a fossil specimen that captures small details.

**Cementum** – the bonelike connective tissue covering the root of a tooth and assisting in tooth support. In some animals, like horses, cementum can also cover the sides of the tooth crown.

**Cusp** – pointed structure on the chewing surface of a tooth.

**Distal** – (in tooth placement) farthest from the middle and front of the jaw; toward the molars.

**Enamel** – layer of material that surrounds and protects the dentin of the crown of a tooth.

**Ecosystem** – the members of an ecological community and their interactions with each other and the environment.

**Food chain** – a single-line example of how nutrients and energy flow from one organism to another.

**Food web** – a web-like illustration of how nutrients and energy can flow through an ecosystem.

**Habitat** – the place in which plants and animals get their resources (water, shelter, sunlight, nutrients, etc.) in order to live.

**Herbivore** – an animal that eats only plant material

**Hypsodonty** – the relative measure of how tall an animal's teeth are; a hypsodont animal has teeth with crowns that are taller than they are wide

**Lingual** – (in tooth placement) directed towards the tongue

**Litoptern** – member of an extinct group of South American hoofed mammals that lived from about 60 mya to 10,000 years ago. Many litopterns had fewer than five toes. Three-toed and even a one-toed horse-like form lived in South America.

**Mesial** – (in tooth placement) situated toward the middle of the front of the jaw along the curve of the dental arch; toward the incisors

**Mesowear** – the form a tooth cusp takes after many months of eating a particular food item. It records an animal's diet on a time scale intermediate between that of hypsodonty (many generations, thousands to millions of years) and microwear (days to weeks).

**Microwear** – very small pits and scratches on a tooth that indicate what an animal ate during the past few days or weeks. In a fossil, it indicates what an animal ate just before it died.

**Mya** – million years ago.

**Notoungulate** – member of a diverse order of extinct South American hoofed mammals that lived from 65 mya to 10,000 years ago. There were many species of notoungulates, some as small as a rabbit and others as large as a rhino. They displayed a wide range of lifestyles.

**Omnivore** -- an animal that will eat both plants and animals.

**Population** – all of the individuals of one type of organism living in a particular location at a particular time.

**Predator** – animals that actively hunt other animals (prey) for food

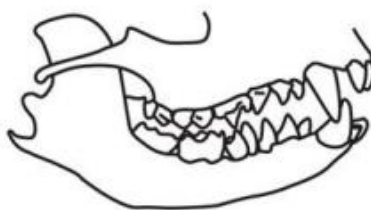
**Ungulate** – an animal with hoofed feet.

## EXTENSION ACTIVITIES

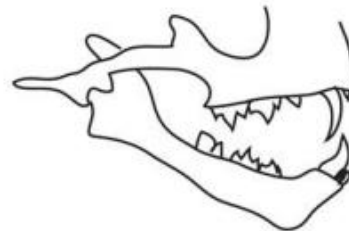
Ask your students if they can figure out what an animal eats by the shape of its teeth. Try looking at the three diagrams below and discussing the different tooth shapes your students can describe. Mesowear studies look at physical changes on herbivore teeth, so this comparison can be a good “warm-up” exercise.



**Beaver - Herbivore**



**Raccoon - Omnivore**



**Cat - Carnivore**

## ONLINE RESOURCES FOR TEACHERS AND STUDENTS

Click the link below to find additional online resources for teachers and students. These websites are recommended by our Museum Educators and provide additional content information and some fun, interactive activities to share with your class.

CMNH Educators regularly review these links for quality. Web addresses often change so please notify us if any links have issues.

Cleveland Museum of Natural History <http://www.cmnh.org>