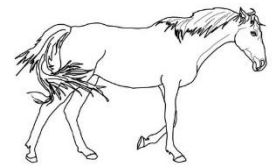


Horse Fossil Lab

How do Fossils Show Change



Name: _____ Date: _____ Block: _____

BACKGROUND INFORMATION:

Most organisms live, die and decompose, leaving no traces of ever having lived. Under certain conditions, however, an organism's remains or tracks may be preserved as a fossil. Fossils give clues about how an organism looked and where it lived. They are often used by scientists as evidence of change.

A **fossil** is the preserved remains of ancient organisms. Fossils may only be the outline of some plant, animal or other organism that is preserved in rock; however, sometimes, entire skeletons of animals that lived millions of years ago are found. The fossil record shows how organisms have changed over time or evolved.

- **Natural selection** is the process by which organisms best suited to the environment survive, reproduce, and pass their genes to the next generation.
- **Adaptations** are traits that allow organisms to survive in certain environments.

The fossil record shows how *Equus* (the modern day horse) has evolved. Fossils of *Hyracotherium* (an ancestor of *Equus* that lived 55 million years ago), *Miohippus* (an ancestor of *Equus* that lived 30 million years ago), and *Merychippus* (an ancestor of *Equus* that lived 13 million years ago) show the adaptations that have allowed natural selection to occur.

GOALS:

In this activity, students will:

- Examine diagrams of fossil horses and modern-day horses shown in their surroundings.
- Examine diagrams of the structure of the front foot of fossil horses and modern-day horses.

Note the changes in horses that have taken place over time.

KEY WORDS:

1. **Adaptation:** _____
2. ***Equus*:** _____
3. **Fossil:** _____
4. ***Hyracotherium*:** _____
5. **Natural selection:** _____

PART A: Change in Size With Time

1. Examine the diagrams in Figure 1 of *Hyracotherium*, *Miohippus*, *Merychippus*, and *Equus*.
2. Use the diagrams to fill in Table 1.

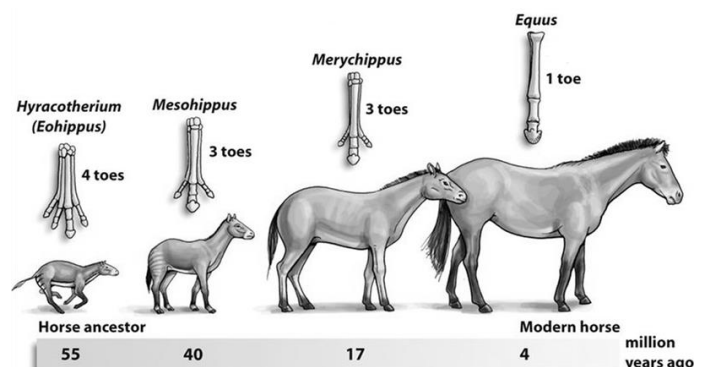
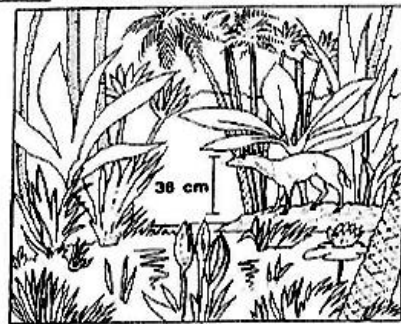
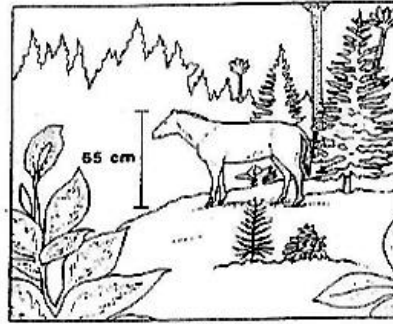
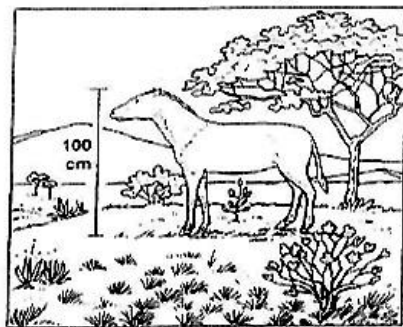
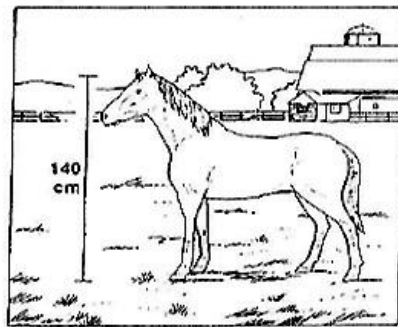


TABLE 1:

HORSE	<i>Hyracotherium</i>	<i>Miohippus</i>	<i>Merychippus</i>	<i>Equus</i>
Size				
Describe the Surroundings				

Figure 1: Evolution of the Horse

*Hyracotherium*
55 million years ago*Miohippus*
30 million years ago*Merychippus*
13 million years ago*Equus*
Today

PART B: Changes in Bone Structure With Time

The changes in horses over the last 55 million years have been shown by studies of large number of fossils. The earliest kind of horse (*Hyracotherium*) was small and had teeth that were adapted to eating young shoots of trees and shrubs. These early horses were adapted to living in wooded, swampy areas where more toes were an advantage. The modern-day horse (*Equus*) is much larger and has larger teeth that are adapted to grazing on the tough leaves of grasses. The single- hooved toes of the modern-day horse allow it to travel fast in the plains.

1. Examine the diagrams in Figure 2 which shows fossils of the front foot bones and teeth of horses. The foot bones at the upper right of each diagram indicate the relative bone sizes of each kind of horse.
2. Look for and color the following kinds of bones for each fossil horse.

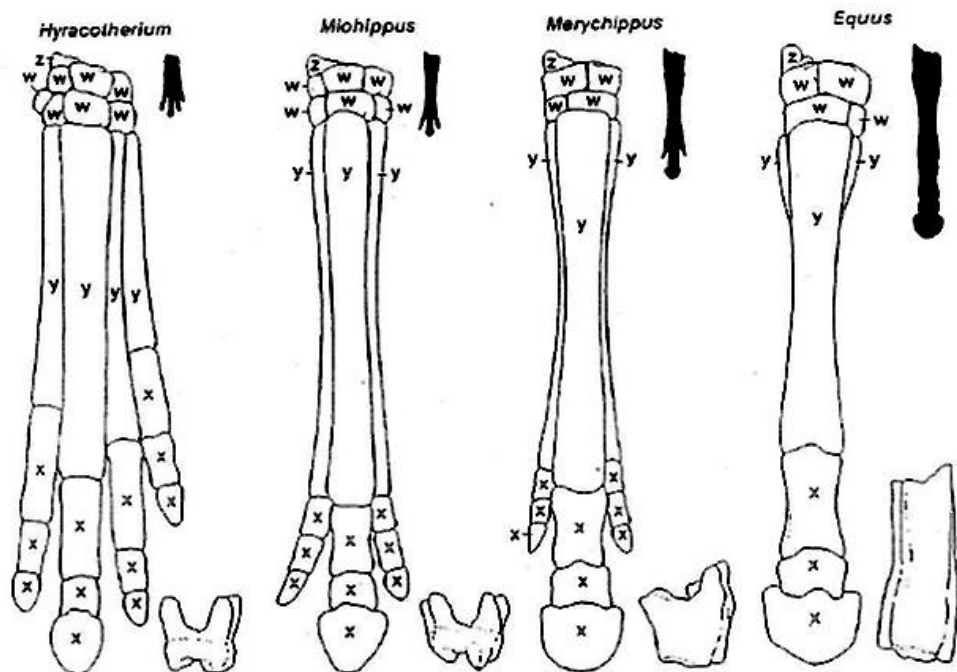


FIGURE 2. Forefoot bones and teeth of horses

1. Color the toe bones red. These are marked with an X.
2. Color the foot bones blue. These are marked with a Y.
3. Color the ankle bones green. These are marked with a W.
4. Color the heel bones yellow. These are marked with a Z.

TABLE 2:

Kind of Horse	<i>Hyracotherium</i>	<i>Miohippus</i>	<i>Merychippus</i>	<i>Equus</i>
# Toes				
# Toe bones				
# Foot bones				
# Ankle bones				
# Heel bones				
Total # bones				
Length of foot (Measure inset diagrams in mm)				
Height of teeth (Measure in mm)				

QUESTIONS:

1. What changes occurred in the surroundings of horses from *Hyracotherium* to *Equus*? _____

2. What change occurred in the shape of the horse from *Hyracotherium* to *Equus*? _____

3. What changes occurred in the size of the horse from *Hyracotherium* to *Equus*? _____

4. As the surroundings changed, what happened to the teeth of the horse? _____

5. Describe the overall changes in foot length, number of toes, and size of toes in the horse over time. _____

6. How would natural selection have caused changes in the size, feet, and teeth of the horse?
