| Student Worksheet | *A Fossil Community* |
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**A FOSSIL COMMUNITY – CHANGES OVER TIME**

**Purpose:** To infer from fossils, the changes in populations and habitats over time.

## PART A: Fossil site in America

In eastern Colorado and western Nebraska in the United States, there are extensive deposits of fossils in rocks that are approximately 30 million years old. Known as the White River deposits, these rocks were formed from fine silts in which there were streaks of gravel. The fossils represent, among others, the following organisms:

- grasses, reeds, hickory trees, trees of the elm family
- freshwater mussels, several kinds of freshwater fish, frogs, snakes related to pythons, and several species of large land tortoises
- mammals such as sabre-toothed cats, dogs, members of the camel family, four species of horses, and several rhinoceros species

Some of the rhinos were much like those living today. Others had long, slender legs much like those of horses. Still others were much like living hippos and had heavy bodies with short legs and large feet.

1. Work in groups. Using the evidence above, briefly describe the fossil community represented by the White River deposits. On what do you base your interpretation?
2. Compare your interpretation with those of other groups.
3. Do you agree? If there is any disagreement, then by discussion, support your interpretations in places where it differs from others.
4. What additional evidence would give further support to your interpretation?

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(Adapted from *Biological Science: Web of Life*, Part 2. Australian Academy of Science, Canberra.1989)

## PART B: Fossil site in Australia (Mt. Etna, near Rockhampton, Queensland)

Near Mt Etna in central-eastern Queensland there is a series of cave systems that formed as part of an ancient reef system some 350-400 million years ago. This area is called Limestone Ridge. It is made of limestone blocks that have been rolled, squeezed and pushed up over hundreds of millions of years of tectonic activity.

In these deposits, well-preserved fossil specimens have been found. Fossils that are similar to living species are assumed to have lived in the same type of habitat and climate. Therefore these fossils are used to infer past habitats.

Habitats can be grouped into the following categories:

1. **Hydric** habitats where water is abundant. e.g. tropical rainforests
2. **Mesic** habitats where there are moderate levels of water. e.g. dry vine forests to open woodlands
3. **Xeric** habitats where water is scarce. e.g. open woodlands, arid grasslands and shrubland

In sites **older than 280,000 years** the fossils represent, among others, the following organisms:

- Large numbers of frogs including tree frogs and the extinct giant frog *Etnabatrachus maximus*
- Lizards like Komodo-dragons, monitor lizards and goannas; freshwater turtles and an extinct group of crocodiles called mekosuchines; giant pythons; and blind snakes
- Owls; mammals such as *Macroderma gigas* (Ghost Bat); large numbers of arboreal (tree-living) leaf-eaters such as *Dendrolagus* (tree kangaroos), and possum species including the greater glider, sugar glider and feather-tail glider; *Thylogale* (pademelons); large numbers of bandicoots; some marsupial lion and marsupial tapir specimens and a giant wallaby; and many rodents and rat-like species

In sites dated **between 280,000 and 205,000 years ago** the following were found:

- Local extinction of several frog and lizard species; appearance of new forms such as *Cyclorana* (a water-holding frog)and *Neobatrachus*, (a burrowing ground frog)
- Reptile species richness increased with fossils of new forms such as *Tympanocryptis* (earless dragon) and *Pogona*; as well as other dragon lizards
- Mammalian species decreased from 33 to 21 species. Some species increased such as *Macropus* (kangaroos); *Petrogale* (rock wallabies); ringtail and brushtail possum species; koalas; bilbies; pig-footed bandicoots; striped faced dunnart; desert-hopping mice and bush rats

In sites dated between **205,000 and 10,000 years ago** the following was noted:

- Local extinction of more than 65% of small to medium-sized mammalian species and approx 38% replacement with new species with an overall decrease from 21 to 13 species
- Frog and lizard species remained stable with some dragon lizards replaced by new forms such as *Diporiphora bilineata* (two-lined dragon), *Chlamydosaurus kingii* (frilled-neck lizard), and *Pogona barbata* (bearded dragon)
- Arrival of humans
- Extinction of megafauna

1. Work in groups. Using the evidence above, briefly describe the fossil community represented by the Mt Etna deposits. What changes occurred over time? On what do you base your interpretation?
2. Compare your interpretation with those of other groups.
3. Do you agree? If there is any disagreement, then by discussion, support your interpretations in places where it differs from others.
4. What additional evidence would give further support to your interpretations?
5. Do you think it is correct to assume that fossil species that are similar to living organisms must have lived in the same type of habitat? Explain.