



Activity 4: Making a Flipbook to describe the process of Adaptation and Extinction (Mass Extinction)

This Activity requires students to draw and complete a flipbook based on events and natural disasters which are declared by the Scientists to be the main cause of organisms' wipe out (extinction) or adaptation in the past. The activity has two events (stories) both created in fictitious settings. Each event has two organisms: one adapting out of the event and the other unable to adapt, dying off, becoming extinct and found as a fossil only.

Background Information/Curriculum Links: Within the Victorian Curriculum the topic of Fossils is covered under Evolution. One of the most important concepts in the theory of Evolution is Adaptation and Extinction. Most textbooks cover Adaptation and Extinction, especially mass extinction.

Intended Learning Outcome

- Students will explore and distinguish between Adaptation and Extinction and link these to Mass Extinctions which took place in the past.
- Student will explore and apply critical thinking to understand the stages of how an organism adapts or becomes extinct due to an extreme situation
- Students will draw adapted features essential for survival or draw fossils of extinct organisms
- Student will; using the initial ideas of adaptation and extinction; make up the final stage of how the organism should look like after the mechanism.
- Students will apply their creativity to complete a flipbook and write creative descriptions
- The repetition of the drawing in flipbook will make the students engage more in the task

Definitions

Note: All the scientific definitions are explained by our scientist Guang Shi.

What is Adaptation?

"In context of biology and evolution, adaptation is a modification of morphological (physical) features of an organism so that it is better suited to its living environment. In other words, adaptation has a purpose, it is a mechanism to enable an organism to cope in its environment better."

What is Extinction?

"Extinction is the disappearance of an organism in a short ecological time."

What is Mass Extinction?

"In palaeontology, extinction talks about mass extinction. Mass Extinction means disappearance of large amount of species from the geological record in a relatively short geological time."

Natural Selection

"Organism survives and reproduces due to the adapted features it developed to best adjust to its environment via a natural process."

What is a Flipbook?

"A flipbook is a collection of combined pictures intended to be flipped over to give the illusion of movement and create an animated sequence from a simple small book without machine." ([HISTORY, n.d.](#))

The Flipbook Activity: Teacher Instructions

In this activity, there are two stories. Each story will have two organisms, one adapting out of the situation and the other unable to adapt, dying off and becoming extinct.

The activity requires the students to draw and complete a flipbook consisting of these two fictitious events (stories) and four organisms' mechanism towards the event. Each student will have to choose one story, one organism and complete a flipbook showing and describing the

stages and the process of adaptation or extinction accordingly. The students will have to come up with their own images of the organism and show the adapted features or fossil.

Scaffolded

1. You may print out the stories or display them on the screen
2. Provide the following materials for them to do the flipbook: Rulers, Pencils, Colours, Paper (Hard paper will be better to allow for flipping of the book), Scissors and a Stapler.
3. The students will have to choose one story and one organism and complete a flipbook showing and describing the stages and the process of adaptation *or* extinction accordingly.
4. The students will have to come up with their own depictions of the organism and show the adapted features *or* previously existing organism.
5. On the paper rule out square grids so each grid will be one page of their flipbook. They should number the grids on the back so when the grids are cut out, the student does not get confused between the stages.
6. Draw in order of the start of the process of adaptation or extinction to the completely new organism. **THEY DO NOT HAVE TO DRAW OUT THE WHOLE SCENARY OF THE STORY.**
7. When finished, cut the grids and put them in order from number 1 to whatever number of grids they have come up. Staple on the left-hand side to make it look like a book.
8. Flip with right thumb each page slowly. The book should tell the story of the adapted or extinct organism.
9. They should also write down on a separate paper the process showing the new features or the extinct organism in its new environment in which it could not cope.
10. This activity will help the students visually and critically understand the mechanism.
11. The student can choose to draw and complete two flipbooks based on both the organisms from the same story.
12. If they choose to draw the extinct organism, they can draw the fossil of the extinct organism at the end of their flipbook.

The Stories

Story 1: Finchania and Kinchania

A piece of island called 'Shi' separated from its mainland called 'Guangshi' due to a natural disaster.

Island Shi had a lot of changes in its environment and it became very different from its mainland Guangshi. Its air became colder and drier. Its soil became different and drier. It did not even have all the food it had previously. All the worms died which were usually eaten by birds that survived on these worms. However, a lot of spiders flourished, and the birds had no other choice than to eat these spiders.

Isolated from the rest of the world, overtime, some of the animals and plant species on this island developed adaptations to this new environment, but some could not develop the physical features needed to survive on this new island therefore they died.

'Finchania' was a bird that survive on island Shi. Finchania had some natural superpowers when it was born. As it grew older, it developed some physical features which were best to protect it from the cold and dry weather. It could eat spiders. As Finchania had enough food, it had enough nutrients so it could reproduce and survive on the island 'Shi'.

However, 'Kinchania', which was Finchania's older bird cousin, became sick day by day. It could not eat because it did not have the feature required to get and eat spiders. It felt so cold all the time due to the weather. Kinchania could not reproduce because it had no energy without food. It became hard for it to survive. After some weeks, Kinchania could not live anymore and passed away.

Millions of years later, a palaeontologist researches about extinct animals and finds the island 'Shi' and travels to it by boat.

There, he digs into the ground to look for fossils. He finds a fossil of an organism (It is Kinchania). He observes it closely and records its physical features. He figures out that it is a bird fossil. He then looks around the island for a similar living bird. He does not find anything *exactly* like it, but he finds a very similar looking bird (a very grand family member of Finchania). They both have a lot of common features.

He brings both of them back home and observes them even more. After a lot of hard work, he figures out that millions of years ago they both were once the same species! And they both once belonged to the same family. But due to something disastrous, one has adapted, and one has died because it could not adapt to the new environment. After more research, he figures out that this island used to be part of mainland 'Guangshi'.

He likes the bird and the fossil so wants to keep them. He names them as Finchania and Kinchania.

P.S.: The story is inspired by Charles Darwin's Galapagos Finches Theory of Adaptation

Answers:

The Adapting Organism: Finchania

This bird adapted and developed a new beak with which it was able to pick and eat the spiders. It also grew extra feathers to protect it from the cold weather of this new island. Finchania also adapted to become a smaller size so it requires less food to survive.

The Extinct Organism: Kinchania

The new island was cold, did not have enough food for all, therefore the competition for food increased. And Kinchania was large in size too so required a larger amount of food to survive. Therefore, it could not eat the spiders and died due to lack of nutrition.



1 - Example of the Extinction for Story 1

Story 2: Brachiopod: True Story

Background

Name: Brachiopods

Kingdom: Animalia (Marine)

Phylum: Brachiopoda (Invertebrate)

Once upon a time, there was a shellfish called 'Brachiopod'. It lived deep down in the ocean with its family and a lot of friends. Brachiopod's shells were as two valves like an Oyster (the organism from which pearls are found). Brachiopod's two valves were attached to each other with a hinge so the valves could open from one side only like the mouth of a crocodile. The hinge had a hole in the middle so the soft part from inside the shell could take out its sticky hand to grab from a rock and attach to rocks for safety. Why? Because it got moved around if it did not stick to the ground.

The opening side of the brachiopod's shell opened and closed to help it feed and get fresh water filtered into the shell.

Suddenly a very huge volcano erupted, and the gas released in the air was absorbed by oceans which killed thousands of animals and plants, living in the ocean. Some of the family members of Brachiopod lived while the others died!

Brachiopod was so sad and depressed now. It could not take the huge wipe-out of his family. It started being ill all the time. There was no doctor to help it either. So it did not survive... Brachiopod became extinct...

But some of Brachiopod's friends survived. They were sad for losing their friend but stayed strong. They slowly adapted to the new environment and survived for a long time. Their grandchildren are still alive, but they are not as many around anymore as there used to be.

Note: If the students choose to do the adapted organism for this story, they would have to search for living brachiopod online and choose anyone and depict and describe the adapted features.



2 - Why does this brachiopod have that particular shape?

Answer:

Professor Guang says: Brachiopods are shellfish and have a hard shell outside and soft part inside. They were abundant in the geological time but are very rare in today's time. Guang's brachiopod is 2 hundred 80 million years old. It has two valves and has a three-dimensional shape.

Why does it have that particular shape?

They have two ear-like shells and it probably has undergone adaptation to survive in its time. It has some interesting morphological features along the hinge line. It has an opening in its posterior part of the hinge. This was developed to allow that any extending strong muscle coming out from the inside and attaching the brachiopod's shell to the surface of the substrate. This is important for this organism as this particular brachiopod was living as a 'Sessile Benthic' species which means once it attached to the surface, it could not move. For the brachiopod to actually capture nutrients, it has to stabilize its shell and attach to the surface of the substrate. The shell opens from the anterior side, to capture the nutrients and filter the shell's inside.

Note: If the students choose to do the adapted organism for this story, they would have to search for living brachiopod online and choose anyone and depict and describe the adapted features.



3 - This the history of Brachiopod Professor Guang Shi has explained regarding the living mechanism of a brachiopod fossil