

香港科學館 · 古生物展廳

HONG KONG SCIENCE MUSEUM · PALAEONTOLOGY GALLERY

滅絕

新生



EXTINCTION · RESILIENCE



趣味習作 · 教師指南
Activity Sheet - Teachers' Guide

小學程度 Primary Level



化石的種類

TYPES OF FOSSILS

以下哪些生物在死亡後有機會變成化石？在可能變成化石的生物加上「✓」。

Which organisms might become fossils after they die? Indicate those that might with a "✓".



化石是石？

雖然大部分化石都是名副其實的石頭，但並非所有化石都是因石化而成。例如琥珀中的昆蟲和被冰封的長毛象，就保存了生物的本體。

Are Fossils Made of Rocks?

Most fossils are rocks, but there are exceptions. Insects in ambers and frozen woolly mammoths, for instance, are examples of fossils that have the actual remains of the organisms preserved.

生命的演化

THE EVOLUTION OF LIFE

生命自37億年前出現在地球上以來，便繁衍不息。你能排列以下生物出現的次序嗎？

Life has flourished on our planet since its emergence 3.7 billion years ago. Can you arrange the sequence of appearance of the following organisms starting from the oldest?



6

鳥類
Birds



3

魚類
Fishes



2

無脊椎動物
Invertebrates



1

細菌
Bacteria



5

爬行動物
Reptiles



4

兩棲動物
Amphibians



7

哺乳動物
Mammals

遠古海洋

THE PREHISTORIC OCEANS

仔細觀察埃迪卡拉紀、寒武紀和奧陶紀時期蓬勃發展的各种動物，回答以下問題。

Take a closer look at the diverse array of animals that thrived during the Ediacaran, Cambrian and Ordovician periods in order to answer the following questions.

試列舉兩項地球上最早的動物的共同特徵。

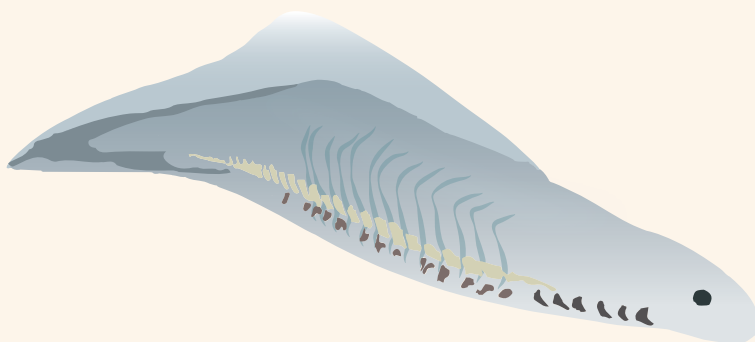
Please list out two common characteristics of the earliest animals on Earth.

- 簡單的身體結構 Simple body plans
- 柔軟的身體 Soft bodies
- 有限的活動能力 Limited mobility

哪種動物可能是脊椎動物的祖先？牠有甚麼特殊的身體特徵？（提示：觀看寒武紀動畫）

Which animal could have been the ancestor of vertebrates? And what special body feature did it have? (Hint: Watch the Cambrian animation)

昆明魚，牠擁有脊索，能供肌肉附着及支撐身體
Myllokunmingia, it had a notochord for muscle attachment



魚類時代

THE AGE OF FISHES

魚類是最早發展出多項非凡身體特徵的生物之一。試找出泥盆紀的鄧氏魚，觀察其特徵並回答以下問題。

Fishes are among the first lifeforms to develop several remarkable body features. Find *Dunkleosteus* from the Devonian period and observe its characteristics to answer the following questions.

牠在食物鏈中扮演甚麼角色？圈出答案。

What was its role in the food chain? Circle the answer.

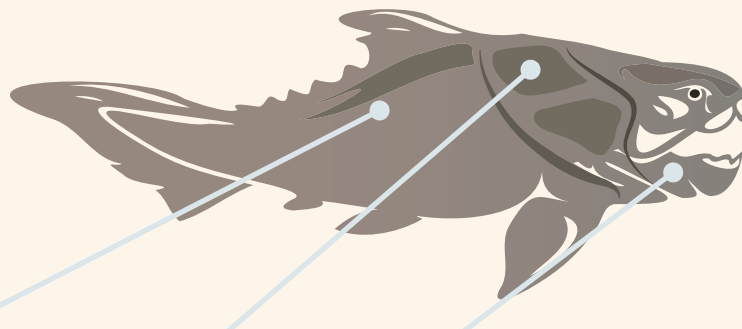
生產者 Producer

消費者 Consumer

分解者 Decomposer

配對鄧氏魚的身體特徵及其功能：

Match the body features of *Dunkleosteus* with their functions:



肌肉發達的巨大身體
Large and muscular body

盾甲
Armour

強大的頷
Powerful jaws

口腔中鋒利的骨板
Razor-sharp bony plates in its mouth

保護牠免受攻擊
Shield it from attacks

提供強大的咬合力
Deliver a powerful bite force

切割獵物
Slice its prey

提供制服獵物的力量
Provide strength to overpower its prey

從水到陸地

FROM WATER TO LAND

某些魚類和原始四足動物演化出獨特的身體特徵，讓牠們能夠從水裏逐漸過渡至適應陸地生活，試找出這些動物並寫下牠們的名字。(提示：看看「第二次大滅絕」對面牆上的文字和動物模型，以及互動展品「登陸先鋒」)

Some fishes and early tetrapods evolved specialised body features in order to transit from water to land. Let's find them out and write down their names. (Hint: Take a look at the texts and animal models on the walls opposite to "SECOND MASS EXTINCTION", and the interactive exhibit "LAND FORERUNNER")



名字 Name: **真掌鰭魚**
Eusthenopteron

牠是一種魚類，同時擁有肺、鰓以及四肢的雛形——肉鰭。

It was a fish with lungs and gills at the same time, and the precursors of limbs – lobed fins.



名字 Name: **提塔利克魚**
Tiktaalik

牠是魚類和四足動物之間的過渡物種，擁有兩者的特徵。

It was an intermediate between fish and tetrapods. It had characteristics of both of them.



名字 Name: **棘螈**
Acanthostega

牠有明顯四肢及前肢有八趾，但仍留有鰓和像魚一樣的尾巴。

It had four recognised limbs and eight digits on its forelimbs, but it still had fishy features such as gills and a fish-like tail.



名字 Name: **魚石螈**
Ichthyostega

牠是水生四足動物，有粗壯的四肢，相信能像彈塗魚般在地上爬行。

It was an aquatic tetrapod with robust limbs. It might have been able to pull itself along on land like a mudskipper.

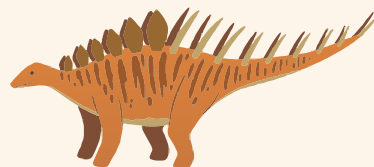
羊膜動物由早期四足動物演化而來，牠們能生產出在陸上孵化的「羊膜卵」。擁有外殼保護的羊膜卵使羊膜動物能夠在陸地上繁衍。試在羊膜動物的圓圈內加上「✓」。

Amniotes evolved from early tetrapods and developed the ability to lay a special type of egg called an “amniotic egg”. The amniotic egg is encased in a protective shell, which allows amniotes to reproduce on land. Indicate the amniotes with a “✓”.



林蜥

Hylonomus



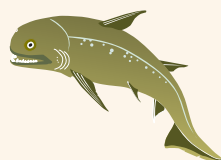
恐龍

Dinosaur



海蠍

Sea scorpion



棘魚

Acanthodian

沒有四足的四足動物

從魚鰭演化成四肢，以至出現真正能以四足行走的動物，歷時超過2,500萬年。「四足動物」包括擁有四肢的動物，以及曾擁有四肢、但後來在演化過程中改變或失去了它們的動物，例如鯨魚和蛇。

Tetrapods without Four Legs

The transition from fins to limbs spanned over 25 million years until the emergence of the first true tetrapod, capable of walking on land. Tetrapod, which means four legs in Greek, includes animals with four limbs, and those whose ancestors had them but have since modified or lost them during the evolutionary process, such as whales and snakes.

鳥類從何而來？

WHERE DO BIRDS COME FROM?

你知道鳥類的祖先可追溯至恐龍時代嗎？根據以下描述，推斷這是哪一種原始鳥類。
(提示：看看展品「恐龍與鳥」)

Do you know that the ancestors of birds can be traced back to the age of dinosaurs? Use the description below to work out which primitive bird species it refers to. (Hint: Check out exhibit "DINOS AND BIRDS")

- 牠的化石發現於中國
- 牠生活於 1.25-1.20 億年前
- 牠有兩條長長的尾羽
- Its fossils were discovered in China
- It lived 125-120 million years ago
- It had two long tail feathers

牠是 It is:

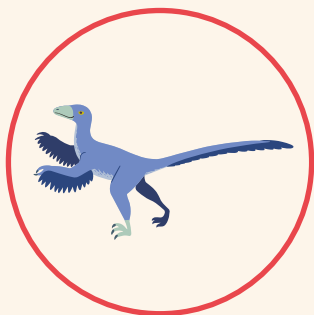
聖賢孔子鳥

Confuciusornis sanctus



鳥類是由哪一類動物演化而來？請圈出答案，並提出一項原因。

Which group of animals did birds evolve from? Circle the answer and suggest a reason.



原因 Reason:

中空的骨頭 / 有叉骨 / 雙足步行 / 寬闊且帶羽毛的翅膀

Hollow bones / Had wishbone / Bipedal / Broad feathered wings

劫後餘生

THE AFTERMATH

哪一次大滅絕事件讓不會飛行的恐龍（非鳥翼類恐龍）滅絕？原因又是甚麼？

Which mass extinction event led to the extinction of dinosaurs that were unable to fly (non-avian dinosaurs), and what caused it?

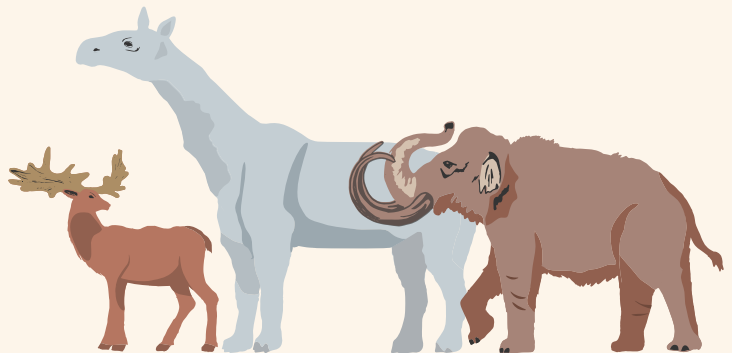
發生在 6,600 萬年前的 第五次 / 白堊紀 大滅絕導致非鳥翼類恐龍滅絕。
這次大滅絕相信是由 小行星撞擊地球 所引致。

Non-avian dinosaurs became extinct during the 5th / Cretaceous Mass Extinction, which happened 66 million years ago. This event is believed to have been caused by an extraterrestrial / asteroid impact.

在非鳥翼類恐龍滅絕之後，哪個動物群體趁機佔領主導地位？

Which group of animals became dominant after the extinction of non-avian dinosaurs?

- a) 魚類 Fishes
- b) 鳥類 Birds
- c) 昆蟲 Insects
- d) 哺乳類 Mammals**
- e) 兩棲類 Amphibians



為甚麼非鳥翼類恐龍的滅絕有利於這些動物的崛起？

Why was the extinction of non-avian dinosaurs important for the rise of the animals above?

- 哺乳動物有機會填補牠們留下的生態位空缺
Mammals had the opportunity to fill the ecological niches left empty
- 哺乳動物受到的天敵威脅減少
Reduced predation pressure on mammals

第六次大滅絕與保育

THE 6TH MASS EXTINCTION AND CONSERVATION

人類是現正進行中的大滅絕的幕後主使。參觀展廳內的展品「保育為未來」，將以下動物及保育牠們的行動配對。

Humans are the main culprit of the on-going mass extinction. Visit our exhibit “CONSERVING FOR THE FUTURE” and match the following animals with the corresponding conservation actions.

反盜獵巡邏、建立保護區和調解牧民與捕食者之間的衝突
Anti-poaching patrols, protected area establishment and herder-predator conflict mediation

修復受損棲息地和建立築巢區域
Habitat restoration and establishment of nesting areas

生態系統評估、重新引入、拯救和復康治療
Habitat assessment and repopulation, rescue and rehabilitation

建立保護區、反盜獵巡邏和工程調控措施
Protected area establishment, anti-poaching patrols and infrastructure adaptations

飼育、放歸和設置餵食站
Breeding, reintroduction and supplementary feeding

你知道其他瀕危物種的保育故事嗎？分享令該物種瀕臨滅絕的原因，以及我們可以採取甚麼措施來保護牠。

Do you know any conservation stories about other endangered species? Share how this species became endangered and what we can do to protect it.

接受任何合理答案。
Accept any reasonable answer.

香港化石

HONG KONG FOSSILS

香港也有化石！你知道香港曾發現哪些生物的化石嗎？在對應的圓圈內加上「✓」。

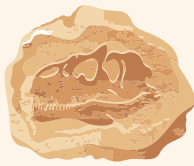
Hong Kong has fossils too! Do you know what kind of fossils have been discovered in Hong Kong? Put a "✓" in the corresponding circles below.



魚類
Fishes



植物
Plants



恐龍
Dinosaurs



菊石
Ammonoids



長毛象
Woolly mammoths



在香港哪裏可以找到化石？在地圖上圈出你認為能找到化石的地方。

Where in Hong Kong can we find fossils? Circle the locations on the map if you think there are fossils.



物種的適應力

ADAPTATION OF SPECIES

你正在進行一次探索古生物之旅，了解古生物如何適應環境求存。以下是你需要做的事情：

You are on an exploration trip to discover prehistoric organisms and their remarkable adaptations for survival. Here's what you need to do:

1. 選擇一個你感興趣的地質時期

Choose a geological period that captures your curiosity

2. 在這個時期找一種有高適應力的物種並將牠繪畫出來

Find a well-adapted organism from the chosen period and draw it out

3. 描述這個物種如何適應環境（你可以參考這些關鍵詞：捕食者、流線型身體、四肢、頷、獵物、繁殖、體型大小）

Describe how this organism adapted to its environment (Key words you may think about: predator, streamlined body, limbs, jaw, prey, reproduction, body size)

1.) 地質時期 Geological period:	2.) 物種名稱 Species name:
<hr/>	<hr/>
3.) 圖畫 Drawing:	4.) 主要特徵 Key features:
<hr/>	<hr/>
接受任何合理答案。 Accept any reasonable answer.	
5.) 這些特徵如何幫助生物適應環境及成長？ How these features helped the organism adapt and thrive?	
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未來的生命

THE FUTURE LIFE

生命一直在持續演化，試想像並畫出一種未來的物種，介紹牠演化出甚麼特徵，以及如何在棲息地中生存。

Life has always been evolving. Imagine and draw a future species, describing its evolved features and how it survives in its habitat.

接受任何合理答案。
Accept any reasonable answer.

身體特徵及功能：
Body features and functions:



如何為物種命名？

科學家使用二名法命名生物物種。每個物種的學名都包含兩個部分，例如赫氏近鳥龍 *Anchiornis huxleyi*，其中近鳥龍 *Anchiornis* (希臘語中的意思為「接近鳥類」) 是屬名，赫氏 *huxleyi* 則是種名。一般而言，我們可基於生物特徵、所在地，或紀念重要人物來命名。例子中的 *huxleyi* 是為了紀念提倡達爾文的進化論的托馬斯·亨利·赫胥黎 Thomas Henry Huxley。你能用二名法來命名你的未來物種嗎？

How to Name a Species?

Scientists use binomial nomenclature to name species. Each species gets a scientific name with two parts. Take *Anchiornis huxleyi*, a dinosaur with close similarity to birds, as an example. "*Anchiornis*" (meaning "near bird" in Greek) represents the genus, while "*huxleyi*" is the name of the species. In general, the names can be derived from the characteristics, location, or as a tribute to influential individuals. In this case of "*huxleyi*", it honours Thomas Henry Huxley, a proponent of Charles Darwin's theory of evolution. Can you name your future species using binomial nomenclature?