

## Extinction mystery

### What did kill the dinosaurs?

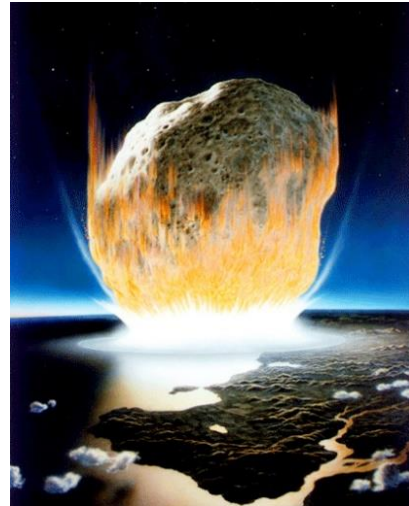
Earth scientists have proposed several different theories as to why the dinosaurs became extinct, about 65 million years ago. How can we decide between them?

Place the pupils in small groups, and give each group the same set of 14 cards (see page 3). Ask each group to choose a card giving one main cause which may have led to the dinosaurs becoming extinct. Then ask them to pick any of the other cards which might provide supportive evidence for their chosen cause and place them on the table in the order in which the event might have happened. Are there any cards which do not form part of their story? If so, why? Ask them to put all the cards that do not form part of their story on a different part of the table.

When each group has finished, invite them to explain their reasoning to the rest of the class, including discussion of the cards which they had discarded.

For the cards which they have not used, ask the pupils to suggest the sort of evidence which they would need to look for, if they wished to follow up the reason given on the card.

(Note: Suggested "main causes" have been marked with a discreet \* if you wish to point this out to the class).



Was it an asteroid impact?



Did early mammals eat all the dinosaur eggs?



Was it the result of vast volcanic eruptions?



Could humans also become extinct?

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### The back up

**Title:** Extinction mystery

**Subtitle:** What did kill the dinosaurs?

**Topic:** A card sorting exercise involving deciding which factors might have contributed to the extinction of the dinosaurs

**Age range of pupils:** 14 -16 years

**Time needed to complete activity:** 15 minutes, depending on the discussion time

**Pupil learning outcomes:** Pupils can:

- use various pieces of evidence to construct a complete story;
- build a scientific explanation;
- evaluate conclusions;
- understand that their preferred solution may not be the only possible one.

**Context:** There are many misconceptions about how dinosaurs became extinct. The mystery encourages pupils to put evidence into a sequence so that they can explain some of the possible causes of the extinction. One possible sequence leading to dinosaur extinction using the cards provided might be:

- An asteroid hit the Earth in the Gulf of Mexico
- Massive wildfires burnt plants and animals alive
- A cloud of dust obscured the skies across the world
- There was less sunlight, and temperatures fell dramatically
- Plants could not photosynthesise
- Trees and other plants died
- There was nothing for plant-eating dinosaurs to eat
- There were no plant-eating dinosaurs for meat-eaters to eat
- The dinosaurs died out (became extinct).

The same sequence might follow if there had been vast volcanic lava flows in what is now India. It is possible that both events took place at about the same time, although the meteorite impact was virtually instantaneous, whilst the lava outpourings were more gradual, albeit very rapid by the geological time scale.

Notes on the other reasons on the cards which were not used in the above sequence:

- The climate changed gradually, becoming cooler and more seasonal – there is good evidence for gradual climate change at this time, but it is difficult to say whether it is a factor in the extinction of the dinosaurs.
- There was a new disease that killed the dinosaurs – possible, what evidence might be preserved?
- Small mammals ate the dinosaurs' eggs - possible, what evidence might be preserved?
- *Homo erectus* hunted them with spears – this should not be included in any story. Humans did not coexist with dinosaurs.

#### Following up the activity:

- Discuss how the changes in environmental conditions affected the life processes and how this led to the extinction of the dinosaurs.

- Could this mystery apply to the extinctions that occur today?
- How would life be affected by a catastrophic event today?
- Use [https://www.earthlearningidea.com/PDF/Crime\\_scene.pdf](https://www.earthlearningidea.com/PDF/Crime_scene.pdf) to show the difference between the forensic evidence for the death of one individual dinosaur and the extinction of the entire group.

#### Underlying principles

- There is interdependence between animals and plants.
- Ancient environmental conditions can be reconstructed from evidence in rocks.
- As much evidence as possible must be used to build scientific explanations, make predictions and evaluate conclusions.

#### Thinking skill development:

Understanding the pattern of events involves construction. Using different pieces of evidence to reach a conclusion, some of which may not fit the pattern, may involve cognitive conflict. Explanation of thinking as each new piece of evidence is introduced is metacognition.

**Resource list:** A set of 14 cards per small group of pupils. See cards on page 3.

**Source:** Teaching Science in an Earth context – Dead and Buried?: Teaching KS4 Biology. Earth Science Education Unit

#### Sources of images

**Asteroid impact:** Wiki Public Domain,

<https://commons.wikimedia.org/w/index.php?curid=554989>.gif

**Vast volcanic eruptions:** National Science Foundation, Zina Deretsky -

[www.nsf.gov/news/mmgmedia/images/dinosaur\\_volcano1\\_h.jpg](http://www.nsf.gov/news/mmgmedia/images/dinosaur_volcano1_h.jpg), Public Domain

**Mammals eating dinosaur eggs:** Mark.Witton-Kayenta

[/www.sciencemag.org/news/2017/11/when-dinosaurs-went-extinct-many-animals-literally-came-out-dark](http://www.sciencemag.org/news/2017/11/when-dinosaurs-went-extinct-many-animals-literally-came-out-dark)

**Human extinction:** Vision in cartoon form by [Nina Paley](#) et al. [www.vhemt.org/graphics](http://www.vhemt.org/graphics) licensed under a Creative Commons Attribution 3.0 United States Licence

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**Cards provided:**

<p><b>Plants could not photosynthesise</b></p>	<p><b>There were no plant-eating dinosaurs for meat-eaters to eat</b></p>
<p><b><i>Homo erectus</i> hunted dinosaurs with spears as a source of food</b></p>	<p><b>* The climate changed gradually, becoming cooler and more seasonal</b></p>
<p><b>There was nothing for plant-eating dinosaurs to eat</b></p>	<p><b>* An asteroid hit the Earth in the Gulf of Mexico</b></p>
<p><b>* There was a new disease that killed the dinosaurs</b></p>	<p><b>* There were huge volcanic lava flows in what is now India</b></p>
<p><b>There was less sunlight and temperatures fell dramatically</b></p>	<p><b>Massive wildfires burnt plants and animals alive</b></p>
<p><b>* Small mammals ate the dinosaurs' eggs</b></p>	<p><b>The dinosaurs died out (became extinct)</b></p>
<p><b>A cloud of dust obscured the skies across the world</b></p>	<p><b>Trees and other plants died</b></p>