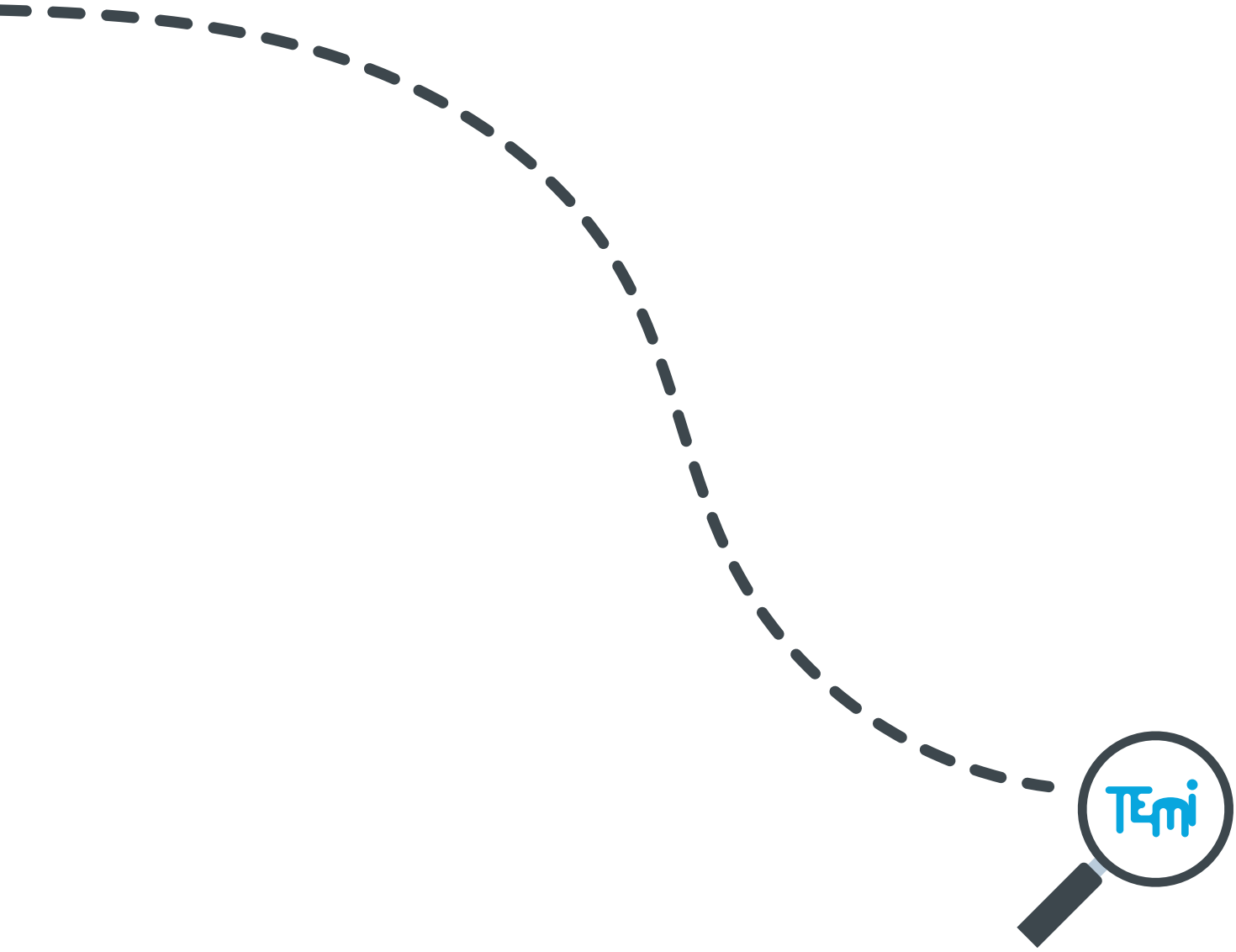
Why did mammoths become extinct?

CLASSROOM SCIENCE ACTIVITY TO
SUPPORT STUDENT ENQUIRY-BASED LEARNING



This classroom-tested teaching plan uses the four innovations of the TEMI project, as detailed in the Teaching the TEMI Way (TEMI, 2015).

You should read this companion book to get the most from your teaching. The **TEMI** techniques used in this teaching plan are: **1)** productive science mysteries, **2)** the **5E model** for engaged learning, **3)** the use of presentation skills to engage your students, and **4)** the apprenticeship model for learning through gradual release of responsibility. You might also wish to use the hypothesiser lifeline sheet (available on the **TEMI** website) to help your students document their ideas and discoveries as they work.

To know more about **TEMI** and find more resources **www.teachingmysteries.eu**

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teachingmysteries.eu

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Why did mammoths become extinct?

What's the mystery?

Why did mammoths become extinct? Scientists have presented two claims: climate change or human hunters. In this lesson students apply their knowledge of evolution and study evidence to decide which claim is best supported.

DOMAIN(S)

Biology.

SUBDOMAIN KEYWORDS

Adaptation, extinction, natural selection, climate.

AGE GROUP

11 to **14** years old.

EXPECTED TIME FOR THE MYSTERY

Approximate time for teacher preparation:
20 min.

Approximate time in classroom:
one 50 min. lessons.

SAFETY/SUPERVISION

Normal classroom supervision.

Disclaimer: the authors of this teaching material will not be held responsible for any injury or damage to persons or properties that might occur in its use.

PREPARATION AND LIST OF MATERIALS

- Arrange colour print outs of student sheets 1-5 around the room.
- Provide each student with their own copy of the Construction Explanations Lifeline.

LEARNING OBJECTIVES

Critique claims: Use evidence to support or refute claims for why mammoths became extinct.

Evolution: Explain how a change in the environment can leave a species less well adapted which may lead to extinction.

Guidance notes for teachers

THE 5E MODEL

Please refer to the slide presentation "Why did mammoths become extinct" on the TEMI slideshare page
www.slideshare.net/temiEC/

Engage

CAPTURE STUDENTS' ATTENTION

Slide 2: Display the mystery question 'Why did mammoths become extinct'? If you wish you can show students a video clip to show the efforts gone to by a film crew to recreate a mammoth (see the Resources section below).

Slide 3: Ask students to discuss their ideas about why mammoths may have become extinct.

Slide 4: Show the objectives.

Explore

COLLECT DATA FROM EXPERIMENTS

Slide 5: Introduce the two claims the students will be studying.

Slide 6: Organise students into small groups and provide each with a "Construct explanations lifeline". Ask the students to circulate round a 'conference' to gather evidence from scientists. Students complete the Lifeline using the evidence. Students should complete the final column after EACH piece of evidence to explore how they decide which claim is more probable. Reassure students that there is no 'right' answer. What is important is that students within their group discuss and evaluate which claim seems more probable at that point and recognises when they do and do not change their view on this.

Ask each group of students to talk through their Lifeline. Ask questions about how students decided which claim they supported overall, if they had changed their mind at any point and why.

Explain

WHAT'S THE SCIENCE BEHIND THE MYSTERY?

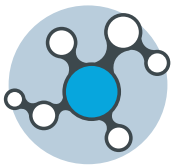
Slide 7: Scientists have been analysing data relating to how many large mammals became extinct in different areas of the world. Allow pairs to study the map. Explain the correlation (or lack of) between the extinction map and the temperature change map. Students should notice that whilst an area such as North America showed a high level of extinction and significant temperature change the same cannot be said of South America. This casts doubts upon the climate change claim.

Slide 8: Ask students to consider the second map. Explain that this shows how man gradually spread across the world. Earliest man (e.g. Homo erectus) lived in Africa whereas the first humans to reach North and South America were modern humans Homo sapiens). There seems to be a correlation between high levels of extinction and areas of the world where the first human species to arrive was modern man.

Slide 9: Explain the science behind the human hunters claim. Discuss how animals may be adapted to avoid becoming prey to a predator. Ask how human hunters were different to the predators that mammoths were used to. What advantages may modern man have had that could have led to much higher levels of extinction? Why might more mammals have survived where they were used to living with early man?

Slide 10: Explain the science behind the climate change claim. Discuss how a change in climate can affect the environment. Make sure students understand that it is not simply a matter of an increase in temperature or ice melting. Plant life and animal life changes which means that the food supply for the mammoths may have changed. As animals are adapted for a specific environment a lack of an ability to adapt can lead to extinction.

Slide 11: Explain to students that unfortunately we do not yet know the answer to this mystery as scientists still cannot agree. Further studies have added evidence for each claim. Emphasise to students that this is an ongoing area of scientific research. Eventually scientists may reach a consensus.



Extend

WHAT OTHER RELATED AREAS CAN BE EXPLORED?

Slide 12: Inform the students that the blue whale is at risk of extinction.

Evaluate

CHECK THE LEVEL OF STUDENT SCIENTIFIC UNDERSTANDING

Ask pairs to discuss possible reasons why the blue whale is at risk of extinction.

After listening to their ideas discuss that human hunting was almost stopped by the introduction of a ban on whale hunting. However, climate change is now a big threat. The warming of the oceans is reducing the krill population on which the blue whale feeds.

Humans are still a threat to the survival of the blue whale for other reasons such as toxic materials in the ocean, ship strikes and being tangled in fishing nets.

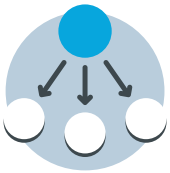
THE 5E MODEL

Showmanship

TIPS ON HOW TO TEACH AND PRESENT THIS MYSTERY

Use the film clip to engage students and ask the question 'Why did mammoths become extinct?'

An optional extra is to discuss the question 'If scientists did clone a mammoth how could they ensure that the mammoths survived this time? What would scientists need to know?'



GRR

TEACHING SKILLS USING GRADUAL RELEASE OF RESPONSIBILITY

Demonstrated Enquiry (Level 0): Teacher as model, you use the 'Critique Claims Lifeline' to work through the example, which shows how to judge two possible explanations - claims - for an observation. The one which best explains the evidence is the one we should accept.

Structured Enquiry (Level 1): 'We do it', students complete their Lifeline independently as they circulate around the mammoths conference and read about the evidence for different claims. They discuss which claim is best supported by the evidence overall.

Solving the mystery: Following the revealing of the latest research students are led towards an explanation of the mystery as to which claim for the extinction of mammoths is best supported the evidence.

Resources

Look for the slide presentation **"Why did mammoths become extinct"** on the TEMI slideshare page www.slideshare.net/temiEC/

Mammoths recreated:
http://entertainthis.usatoday.com/2015/02/11/watch-awesome-woolly-mammoths-come-to-life-in-this-exclusive-game-of-thrones-clip/

Why did mammoths become extinct?

STUDENT WORKSHEET

Thousands of different species that once lived on Earth no longer exist - they are extinct. One example is the mammoth which died out around 3600 years ago. Scientists are unsure what happened.

Can you solve the mystery: Why did mammoths become extinct?

Engage

WHAT'S INTERESTING?

Task: Discuss with a partner why you think mammoths may have become extinct. Arrange your theories in order from the most likely to the least likely.

Explore

WHAT'S HAPPENING?

Task 1: Walk around to each conference table and read the information from the scientists (Slides 1-5). For each scientists complete one row of your Lifeline.

Task 2: Discuss the last column with your group and try to agree which claim you think is most probable based on the evidence so far.

Task 3: Now read the latest research provided by your teacher. Add this to your Lifeline. Do you change your mind on which claim is more probable?

Explain

WHAT'S CAUSING IT?

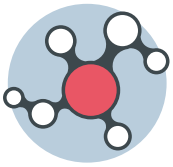
Task: Read the information.

Prey animals are adapted to escape. The arrival of man introduced a new predator.

If mammoths were not able to adapt then the numbers of mammoths killed would have increased and this could have led to their extinction.

Climate change resulted in a change in the mammoth's habitat from grassland to forests. If mammoths were unable to adapt to this new diet then this could also have led to their extinction.

Scientists are collecting more evidence all the time. Some recent evidence suggests that human hunting may have been to blame but not all scientists agree.



Extend

WHAT'S SIMILAR?

Task: The largest living mammal today, the blue whale, is threatened with extinction. What does this mean?

Evaluate

WHAT'S MY UNDERSTANDING?

Task: Research the answers to the following questions:

a) What has caused this fall in the blue whale population over history?

b) What is still a threat?