

# Science in schools: **Human Bones**



This unit provides opportunities for your students to learn about the function of the skeleton, the names of human bones and to experiment with the scientific processes used by the ancient Egyptians by mummifying a banana.

### Preparation needed

#### You will need:

- For activity 1: Print outs of the worksheets, pens/pencils, model or large image of human skeleton, images of animals-vertebrates and invertebrates, reference materials, internet access if available
- For activity 2:
  - Bananas
  - Salt
  - Plastic boxes/containers
  - Needles and thread
  - Stuffing material: could be anything like sawdust, cotton, etc.
  - Nice smelling herbs/spices (dry)
  - Old pieces of cloth (for example from T-shirts)

#### You will need to:

- Photocopy the anatomy worksheets.
- Prepare a space in the classroom where the banana peels can be left for two weeks in the salt. Make cleaning staff aware they are not to be thrown away!
- Devote time to go through the information on the ancient Egyptians and the mummification process.

**Age range:** 10-14

**Science:** Biology

**Curriculum Links:** Science, Modern Languages, History, English

#### Objectives:

- To identify that humans and some other animals have skeletons for support, protection and movement
- To learn about human anatomy, the names of human bones and the preservation process of human remains in an archaeological context.
- To compare English and French vocabulary for scientific words and see the similarities and differences.

**Skills and attributes:** Collaborating, communicating, critical thinking, creative thinking

**Learning Focus:** Anatomy and preservation.

**Language Functions:** Describing, naming, answering and asking questions

### Main Vocabulary

- Anatomy: Skull, Spine, Scapula, Sternum, Clavicle, Humerus, Radius, Ulna, Pelvis, Sacrum, Coccyx, Carpals, Metacarpals, Phalanges, Femur, Patella, Fibula, Tibia, Tarsals, Metatarsals
- Animals: Cow, Fish, Frog, Squirrel, Dolphin, Gorilla, Bat, Lion, Lizard
- Mummification, preservation, stuffing, stitching, natron, sodium carbonate, bicarbonate crystals, human tissue, dehydrate.

## Activities and teaching notes

Display a large picture or 3D model of the human skeleton and invite your pupils to give him or her a name. Human skeletons are not scary but amazing and are made up of 206 bones. Ask your pupils to think about what would happen if they didn't have a skeleton like this? Could they move or stand? What would their limbs feel like? Would their muscles work?

Encourage discussion about the reasons we have a skeleton. Skeletal systems provide support, protection for internal organs and enable movement. Did they know when they were born, they had about 300 bones but some fuse together as they grow.

Talk about other animals. Do they all have skeletons? Show some images of different types of animals including invertebrates such as an octopus that do not have an internal skeleton. Point out that many animals don't have skeletons or skeletons made of bone.



## Activity 1

Divide your class into small groups. Provide each group with **Worksheet 1** and ask them to match the name of the animal to the skeleton, giving at least three reasons for their decision to another member of the group. What similarities and differences can they see between the skeletons on the sheet? Do they all have a backbone?

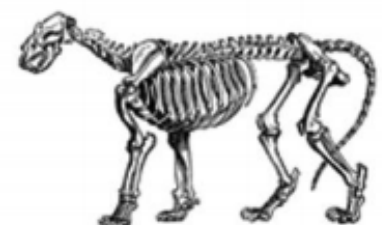
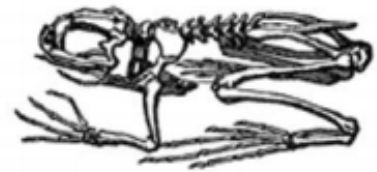
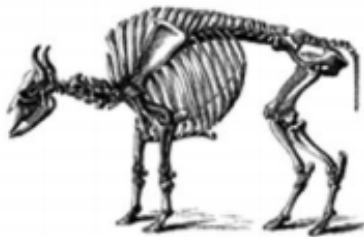
Gather the class together to discuss their thoughts and opinions after the activity.



# Worksheet 1: Spot the skeleton

Match the name of the animal to its skeleton.

- Cow
- Fish
- Frog
- Squirrel
- Dolphin
- Gorilla
- Bat
- Lion
- Human
- Lizard



Provide each group with **Worksheet 2** and ask the students to work together to label each bone with the correct scientific name. After their initial attempts, encourage them to use reference materials or the Internet to label those bones whose names they are unsure of.

If you are working in English as an additional language or with a partner school compare the scientific terms with your own language or the language used by your partner school. How many words are similar in both languages?

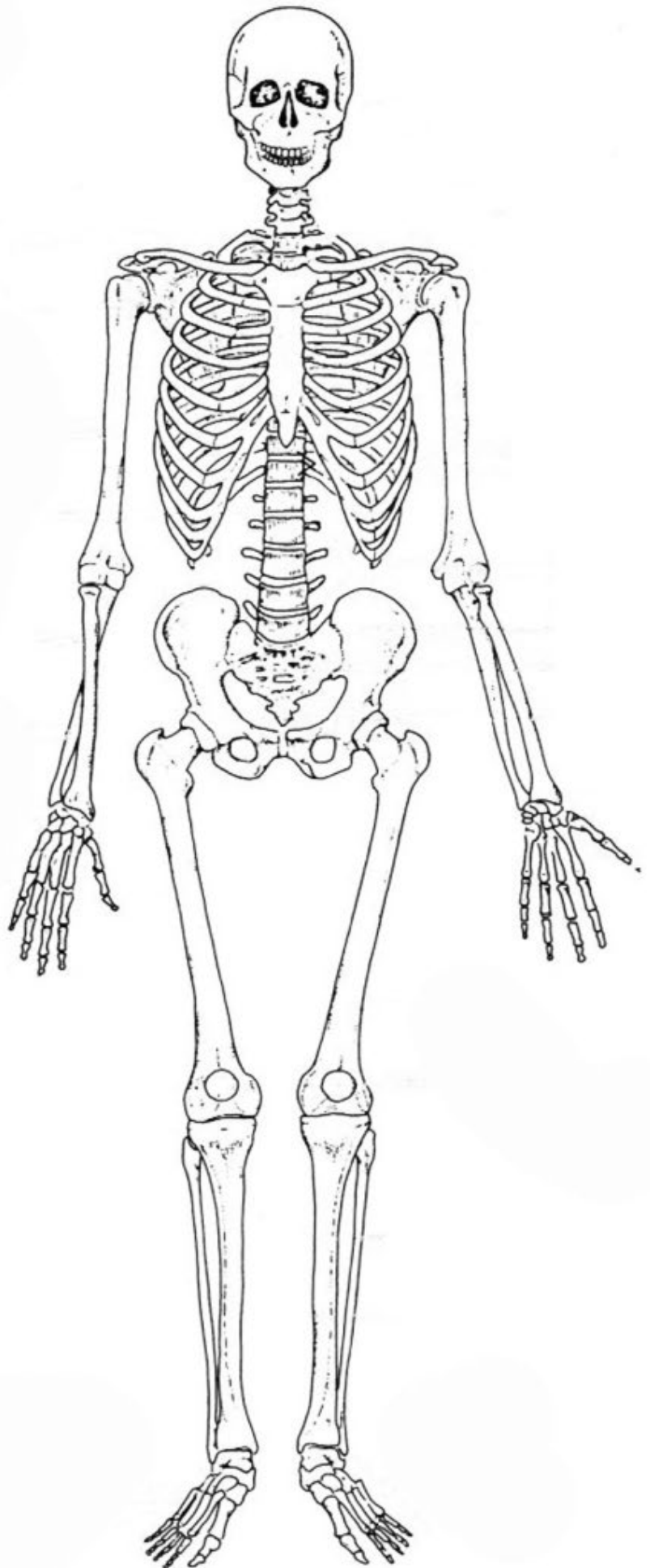




## Worksheet 2

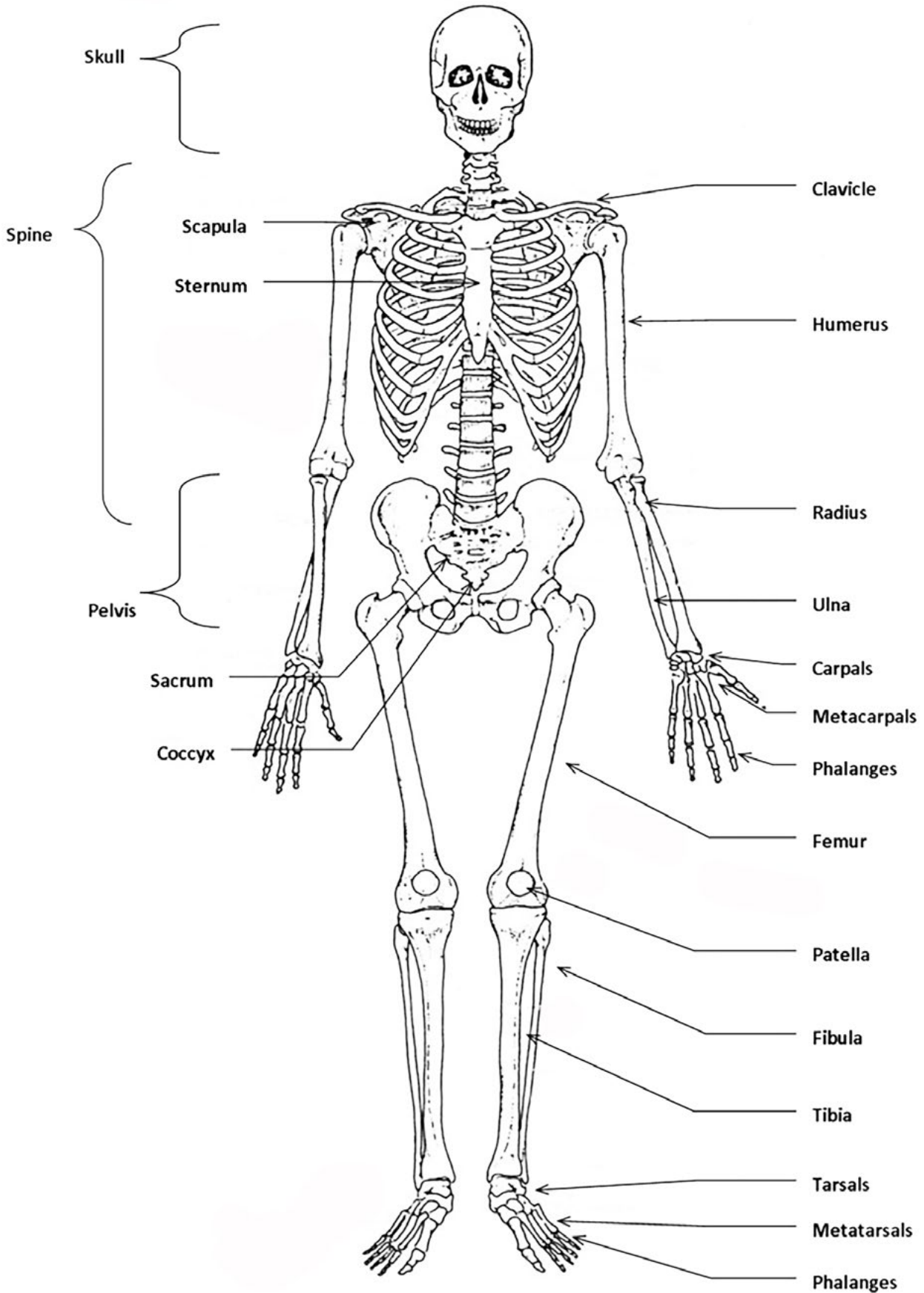
Can you label the bones on the skeleton with their correct names?

- Sacrum
- Spine
- Femur
- Tarsals
- Scapula
- Clavicle
- Ulna
- Pelvis
- Coccyx
- Carpals
- Skull
- Metacarpals
- Phalanges (1st)
- Fibula
- Tibula
- Metatarsals
- Sternum
- Patella
- Phalanges (2nd)
- Humerus



# Worksheet 2

Answers for teachers





## Activity 2: Mummification experiment

Explain to your class that the Ancient Egyptians believed that their bodies needed to be preserved, in order for them to enjoy the afterlife, so the preservation of the body became an essential part of ancient Egyptian funerary belief and practice. They developed a mummification process to preserve their dead using salt.

Tell the class that they are going to carry out an experiment exploring the same scientific process as the Ancient Egyptians but using a banana! The salt makes the banana peel so dry that it cannot rot and therefore stays preserved. Describe to your pupils how they did this and why salt was so important using the information opposite.

### Background information about Ancient Egyptian burial practices and the science of salt

1. The body was washed in water from the Nile to clean it. The water was mixed with natron to make it salty, which would have helped to preserve the body and act as antiseptic to clean it.
2. The brain was removed through the nose!
3. A cut was made on the left side of the body, and the stomach and intestines removed. Next the lungs and liver were taken out and all the organs were dried and each put in special Canopic Jars.
4. The body was packed with stuffing and covered with natron for 40 days. The body would turn a darker colour and become lighter in weight as it dried out.
5. The stuffing was taken out. The body was rinsed, dried and then stuffed with linen. The slit was stitched up and the body 'anointed' with oils, spices, beeswax and other nice smelling things.
6. The body was bandaged up (this took 15 days) and magical spells were spoken over the body.
7. A mummy mask was fitted over the head and shoulders of the mummy.



## The Science of Salt

Natron is a salt (a natural mix of sodium carbonate and bicarbonate) that could be found as crystals along the edges of salt lakes in ancient Egypt. Salt absorbs water, via osmosis, in mummification, it removes moisture from the body, causing the tissues (the skin, muscles etc.) of the body to dehydrate, but stay flexible. This means that the body will be preserved. If a body is not mummified then bacteria in, and on the body will start to cause the body to decay. However, bacteria cannot live in very dry conditions.

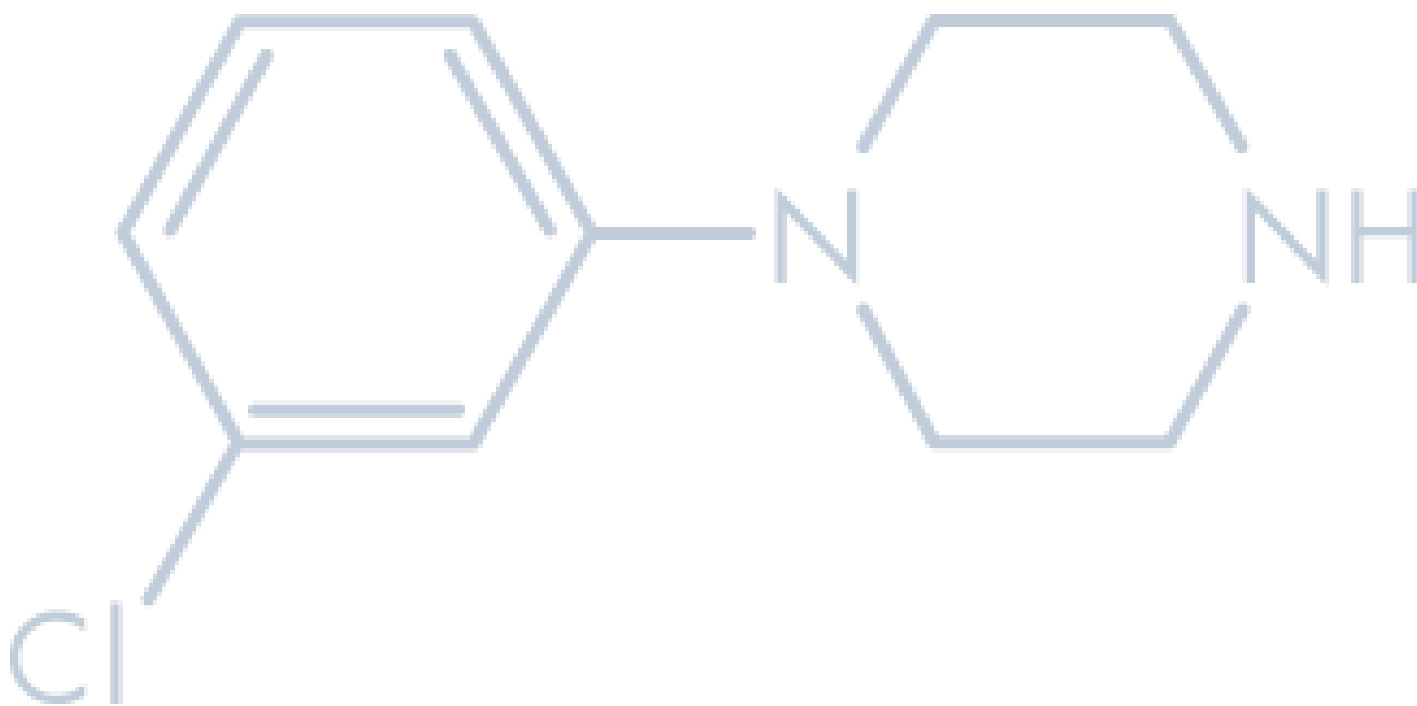
Nowadays, we would use a freezer to preserve a body, as very cold temperatures also have the same effect.

For home learning, ask your pupils if they can find anything in their home that has been dried to help preserve it?

Provide each pair of students with the following materials and a set of instructions on **Worksheet 3** to carry out their mummification experiment.

They will need:

- A banana
- Salt
- Plastic boxes/containers
- Needles and thread
- Stuffing material: could be anything like sawdust, cotton, etc.
- Nice smelling herbs/spices (dry)
- Old pieces of cloth (for example from T-shirts) They may need to practice their sewing skills first on the cloth.



## Worksheet 2: How to Mummify a Banana



1. Peel open the banana - eat the inside if you like (they are very good for you) and keep hold of the skin.

2. Put the open banana skin in table salt. Make sure all the skin is covered.

3. Leave the banana in the salt for at least a week - 2 weeks would be best. Be patient!

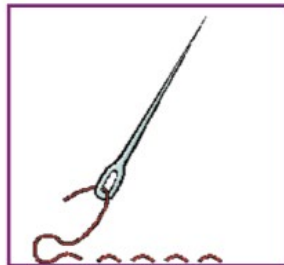


4. When the banana is dry, try to brush off the salt. Now you need to sew up the banana skin! Start from the bottom and leave a gap at the top.

5. Stuff the skin with sawdust and nice smelling herbs and spices. Now finish sewing up the skin so that the filling doesn't fall out.



6. Wrap the stuffed banana skin in strips of cloth; maybe use an old t-shirt if you don't have any plain cloth — now it really looks like a mummy!



7. Wait a few weeks and you will have a dry, lovely smelling, mummified banana that won't go rotten! (Unless you get it wet!).

8. After two weeks, gather the class together to examine their mummified bananas and find out who achieved the most successful results.

Discuss why some may have worked better than others.

## Additional activities

- Ask your pupils to carry out further research about the belief systems and the scientific discoveries of the Ancient Egyptians.
- They could get creative and reinforce their knowledge making giant skeletons by drawing around members of the class and using cylinders of card to represent their bones. Alternatively they could create tiny skeletons using different types of pasta as bones.



Can they still remember and label the names of all the bones they identified?

## Find out more

These activities are adapted from the Skeleton Science Teachers Resource Pack booklet created by Dr Kirsty McCarrison of Durham University's Library Learning Team and Professor Charlotte Roberts of Durham University's Archaeology Department. Additional materials by Alison Willmott

## Further information can be found at:

- <http://skeletonscience.weebly.com>
- [http://www.bbc.co.uk/schools/gcsebitesize/pe/appliedanatomy/2\\_anatomy\\_skeleton\\_rev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/pe/appliedanatomy/2_anatomy_skeleton_rev1.shtml)
- <https://www.dur.ac.uk/archaeology/research/impact/dead/>
- Information to help students understand how and why artificial mummification was developed by the ancient Egyptians and the processes involved in mummification can be found at: [http://www.britishmuseum.org/learning/schools\\_and\\_teachers/resources/all\\_resources-1/resource\\_mummification.aspx](http://www.britishmuseum.org/learning/schools_and_teachers/resources/all_resources-1/resource_mummification.aspx)

## Partner School Activities

If you are working with a partner school you could:

- Exchange examples of scientific vocabulary that are similar in both languages
- Share photographs and blogs about the progress of your experiments and your research into Ancient Egyptians beliefs and discoveries
- Swap photographs of any bone related artwork