DISCOVERING ARCHAEOLOGY AND THE BRONZE AGE

drawing on sites along the English Channel and North Sea

A subject knowledge and teaching guide

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SECTION 2

What do archaeologists do?

Introduction

The archaeologist: time detective

The archaeologist's work is very varied: every period of human history is involved and many specialisms exist. But an archaeologist follows a meticulous work plan, consisting of four major stages: Desk Based Assessment, Survey, Excavation and Post-Excavation.

Desk Based Assessment is a stage which involves collating documentation for the area under investigation. The archaeologist has to search in books, in archives and in any other document for the slightest information on the area or the site where he or she is getting ready to dig. In France, one of the first documents to be studied is the *Archaeological Map of Gaul*, which maps, Département by Département, all of the archaeological discoveries of France from the Iron Age to the beginning of the Middle Ages (800 BC–800 AD). Once the bibliography has been drawn up, all the historical documents that might provide information about the site, its story and its past need to be examined. It can be a question of archive documents, old maps, or even old monastic manuscripts. The archaeologist also consults aerial photographs (produced in France, for example, by the National Institute of Geographic and Forestry Information (IGN) every four to eight years) in order to produce topographical maps which reveal, for example, the presence of land ownership in the past or Roman routes.

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Survey enables other information, which documentary investigation cannot obtain, to be collected in the field. The studied area can be surveyed in different ways, but the main aim is to collect clues that enable the archaeologist to confirm the presence of an archaeological site. Furthermore, a survey also enables a site's potential to be assessed. In France, just like the dig itself, survey must be the subject of an application to the Prefecture. It is not necessarily followed by a dig but the data resulting from the survey allows the archaeological potential of an area to be known for future development.

The excavation involves the collection of information about ancient communities thanks to the material remains they have left behind and which the archaeologist tries to interpret. This information is usually buried in the ground (but may be in rivers or the sea) and requires meticulous excavation using specialist techniques.

Post-excavation enables the archaeologists to use the data collected during the excavation and to interpret it. A team of archaeologists with various specialisms order and integrate the site data (plans, drawings) and clean and catalogue the finds. This team works in offices, libraries and/or laboratories. The finds are studied and analysed. The results as a whole constitute the basis for the final excavation report.

In England, the principal record which collates archaeological data from across the country and for all periods, is the national Historic Environment Record.

Desk based assessment

Survey

Excavation

Post-excavation

Key points!

- Desk based assessment, survey, excavation and post-excavation are the four main stages of the archaeologist's work.
- The objective of the preliminary assessment is to get the best possible knowledge of the site to be excavated from the existing documentation.
- For the assessment, the archaeologist may make use of books, archives, manuscripts, old photographs etc.

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The science of decay and survival

A lot of evidence is protected by being buried for centuries. Ruins and objects of fired clay, metals, glass and stone tend to survive well. Often the mineral part (which is mostly calcium) of human and animal bone will also survive. This is the material we see when we find a skeleton.

But many things are lost through decay. Food remains will be the first to go, broken down by small animals in the soil (ants, worms etc) especially if buried near the surface. In soil conditions where oxygen, warmth and moisture are present, objects made from organic materials e.g. natural textiles, leather, paper, wood, the soft tissue of humans and animals and the organic part of their bones (collagen), will gradually be broken down by bacteria.

If warmth, moisture or oxygen is absent there is a far greater chance of preservation. We find this on permanently frozen sites, desert sites and waterlogged sites.

The wooden Bronze Age boat survived because it lay buried in waterlogged sediments on the coast of Dover.

Roman pottery sherds (Kent, England)
© Canterbury Archaeological Trust

The Dover Bronze Age boat on site (Kent, England)
© Canterbury Archaeological Trust

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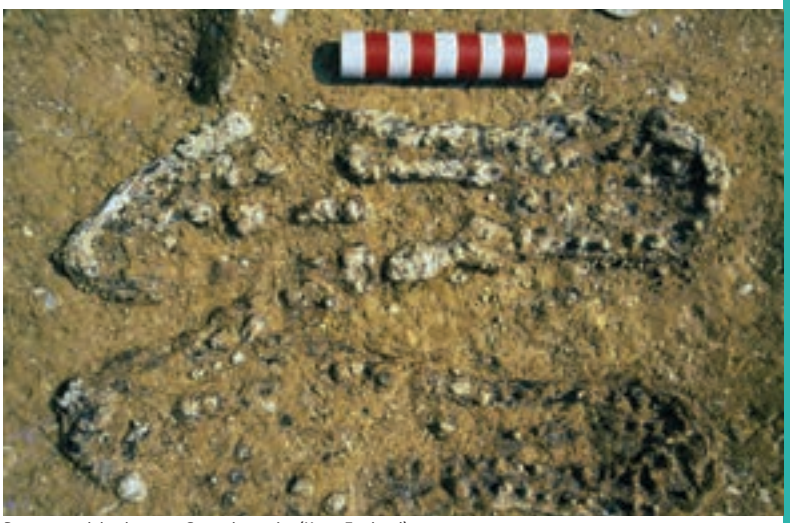
• English Heritage on the web:
http://www.english-heritage.org.uk/publications/waterlogged-wood/waterlogged-wood.pdf

Key points!

- What archaeologists find on a site is only a fraction of what once existed.
- Objects made of organic materials usually decompose in the soil.



Roman sandal soles on a Canterbury site (Kent, England)
© Canterbury Archaeological Trust

Activity suggestion no 1
Try an experiment

Objectives:
- looking at materials and how they behave over time, collecting data, making a record.

Equipment needed:
- (see below).

Digital support?
- no.

Activity (as a class and in groups).

1. Discuss
What kind of things do children think last a long time? What kind of things rot away?

Most children will have seen rotting food and some will have seen wildlife in various states of decomposition!

2. The experiment
Try burying a variety of things in the ground e.g. apple, cheese sandwich, 50p coin, animal bone, pottery, paper bag, plastic pen. Dig them up again after a few months. You should not expect to see any change in most of these things after a short period but the food should be rotten! This is not an exercise for immediate results, so. . .

Near the start of the school year, children could be told the plan and could choose some things to bury. Make sure there are a variety of materials. Discuss with them what they think will have changed and what will look the same when you dig them up after Christmas (or later).

Keep a Before and After class record noting the condition of the objects on the day they were buried and the day they were dug up. You could also take a photo of the things in their Before and After states.

We buried these things on (enter date)		We dug the things up on (enter date)
Apple	Whole, red, shiny	(Describe the condition of each object: smell, feel, appearance etc)
Cheese sandwich	Fresh	
50p coin	Shiny	
etc		

SECTION 2
CHAPTER I

How are archaeological sites discovered?

Survey methods

There are several kinds of survey: on foot (also called 'ground survey'), geophysical and aerial. Survey is a method of archaeological investigation involving the location of any archaeological traces of human activity.

Ground survey requires no particular tool, other than a keen sense of observation. On the ground, the 'surveyors' walk in a line, a few metres apart. They have to note any clue or trace which could indicate the presence of an archaeological site. Ground survey takes place for example in cultivated fields, especially after ploughing, when archaeological finds are sometimes brought to the surface. They can be pottery sherds, building materials, coins, worked stone and so on. According to their quantity, the archaeological remains are either all collected or partially sampled. The precise location of these finds is recorded thanks to a Global Positioning System (GPS), which enables a distribution map to be produced.

Aerial survey involves looking for clues of ancient human activity while flying over the survey area at low and medium altitudes. Buried ancient structures such as walls leave traces in the modern landscape. In a field, for example, a range of geometric shapes depending on the kind of structure can be revealed by colour differences in the soil or crops.

The purpose of *geophysical resistivity survey* is to investigate the subsoil by using certain principles of physics. Its main merit is that it is not destructive; we can obtain information about what is in the ground without digging it up. The principle consists of sending an electric current into the soil at regular intervals and measuring its resistivity in order to be able to detect and map any archaeological remains. The presence of archaeological remains changes the soil's resistivity: a stone wall will slow down the current and will therefore increase the resistivity, whereas a wet ditch will conduct the current better than 'normal' soil and will therefore decrease the resistivity.

Geophysical survey can be used throughout the period of excavation and is very useful when archaeological structures extend beyond the confines of the excavation area. For example, when excavations are carried out prior to motorway construction, they are limited to the confines of the road route and archaeologists are not allowed to extend into adjoining land. Geophysical survey would however give the archaeologists a picture of the overall area.

Ground survey © X.Deru

Aerial photograph of circular structures at Koekelare-Pottebezem, Flanders, Belgium © University of Ghent

Geophysical survey along the Seine-Nord Europe canal © Inrap

Key points!

Surveys are undertaken on sites considered for excavation.

There are three types of survey:

- Ground survey is carried out by walking over an area looking for remains brought to the surface of the soil.
- An aerial survey can identify a site seen from a plane.
- A geophysical survey can give information about what is beneath the ground surface without having to break into it.

FR

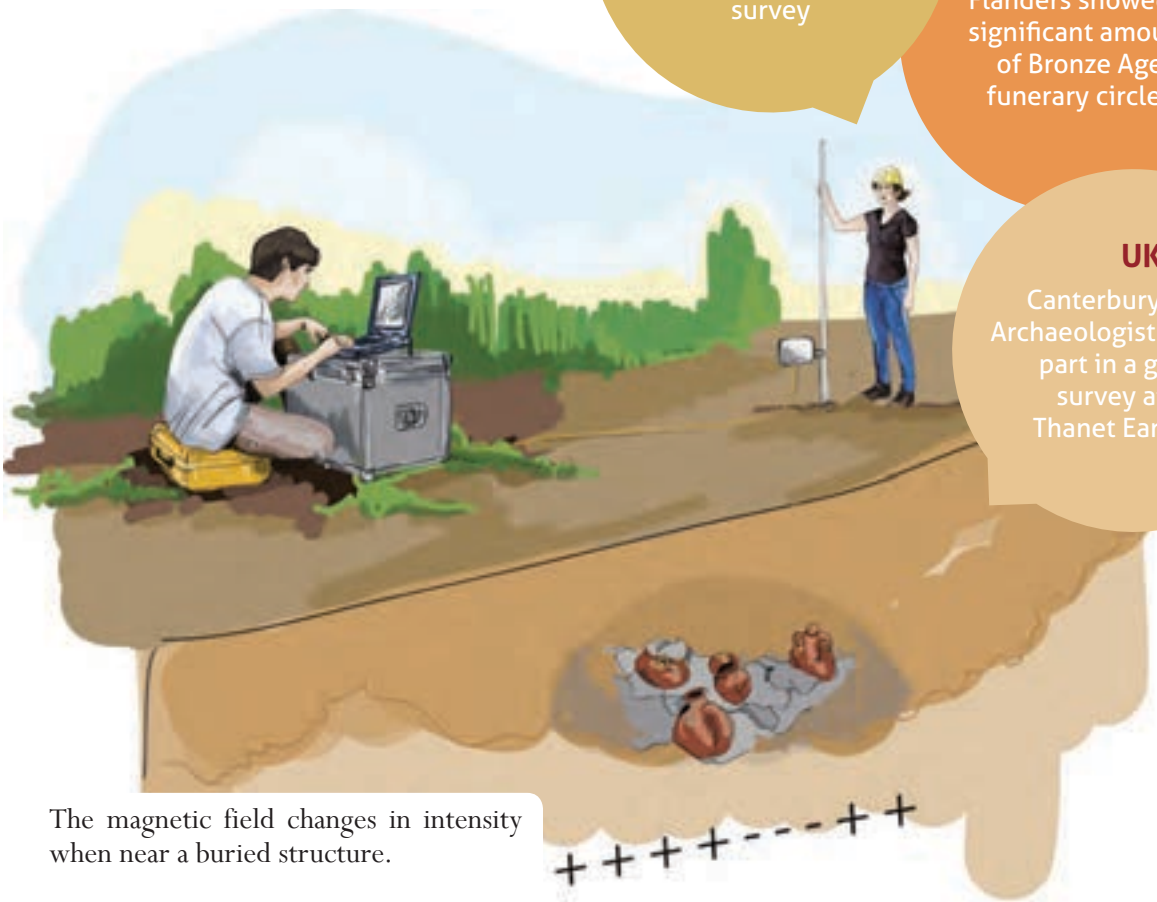
The archaeological site at Fresnes-lès-Montauban was identified by aerial survey

BE

Aerial survey in Flanders showed a significant amount of Bronze Age funerary circles

UK

Canterbury Young Archaeologist Club took part in a ground survey at the Thanet Earth site



The magnetic field changes in intensity when near a buried structure.

After F.Dieulafai, *Copain de l'archéologie*, Toulouse : Éditions Milan,1999, p.25

Activity suggestion no 2
Soil, a conductor of electricity

Objectives:
- to see a demonstration of electrical conductivity in the classroom;
- to put this in the context of geophysical survey on an archaeological site.

Equipment needed:
- light bulb;
- scissors;
- 4.5 volt battery;
- demineralised water;
- 2 electrical wires;
- cooking salt;
- glass beaker.

You will find in the teaching kit all the necessary equipment for performing and demonstrating this activity with your class.

Digital support?
- no.

Activity (as a class or in groups)**:**

1. fill a glass with some demineralised water;

2. place a different electrical wire on each post of the battery and connect them to the bulb
→ the bulb lights up, the current is passing through;

3. with scissors, cut one of the two wires
→ the bulb goes out, the current is no longer passing through;

4. plunge the two ends of the wire that you have just cut into the glass of water
→ the bulb remains unlit, the current is still not passing through;

5. put some salt into the glass beaker and wait until it dissolves in the water
→ the bulb lights up, the current passes through due to the mineral (salt) in the water.

Activity suggestion no 3
Archaeology seen from the sky

Objective:
- to find out about aerial survey.

Equipment needed:
- DVD in the kit, *Fingerprints of the Past: Introduction to Aerial Archaeology*. DVD. Amiens: CRDP, 2006. Ref. 800DVD01;
- DVD player;
- digital projector and whiteboard.

Digital support?
- yes.

Activity (as a class)**:**
- watching and discussing the film.

Excavation during development work

The nature of archaeological activity has evolved considerably since the beginning of the 20th century, particularly with the development of commercial archaeology where investigation is carried out prior to new building development schemes such as: industrial estates, roads, houses or shops.

Archaeological Regulations

In France, the State Department issues archaeological regulations of two kinds: regarding evaluation and regarding excavation.
An evaluation seeks to assess the archaeological potential of a piece of land before the development work begins (road, car park etc). Mechanical investigation is preferred and archaeologists have to adapt to circumstances. Only the area affected by the development work is explored and not adjoining areas, except in the event of the results requiring further investigation in the context of a research excavation. Moreover, the presence of archaeology does not necessarily necessitate an excavation. There are four possibilities:

- the evaluation is negative and the State authorises the developer to undertake his work;
- the evaluation is positive, i.e. some archaeological remains have been discovered, but the State considers that they are not of major scientific interest and the developer is authorised to undertake his work;
- the evaluation is positive and the State considers the archaeology to be of scientific interest and in a good state of preservation. It can decide that an archaeological excavation should go ahead;
- the evaluation has found a discovery of exceptional archaeology that will have to be conserved in situ. The State asks the developer to integrate the remains in the development or to relocate the construction project.

In Belgium, archaeology is a regional matter as local laws apply for each region. Surveys and archaeological conditions are imposed by the archaeological curators of Agentschap Onroerend Erfgoed (Archaeological Heritage Agency), appointed by the Flemish government. The first step is checking the data available in the databank of CAI Flanders. Based on specific information and knowledge available about a threatened zone, a desktop investigation and/or trial trenching investigation and/or a drilling investigation could be undertaken by the relevant archaeological curators. Based on the results obtained it is then decided to release the area following a negative evaluation or to order an excavation if archaeological traces have been identified with sound scientific potential. The Flemish archaeological curators impose conditions on archaeologists and they are also responsible for writing a schedule of requirements, which may coincide with recommendations from existing regional archaeological services. Decisions concerning archaeological research are made on site.

In England, the planning departments of local government authorities decide on a site-by-site basis if archaeological intervention is necessary prior to building works. The national record of archaeological data for all periods is the Historic Environment Record and this is consulted by the planning authorities to decide if evaluation of the site in question is required. This work is usually carried out by commercial

archaeological companies employed by the developer. If significant archaeology is found to be present, then every attempt is made to avoid damage to the historic environment by changing the development plans. Only if this proves to be impractical will archaeological excavation take place.

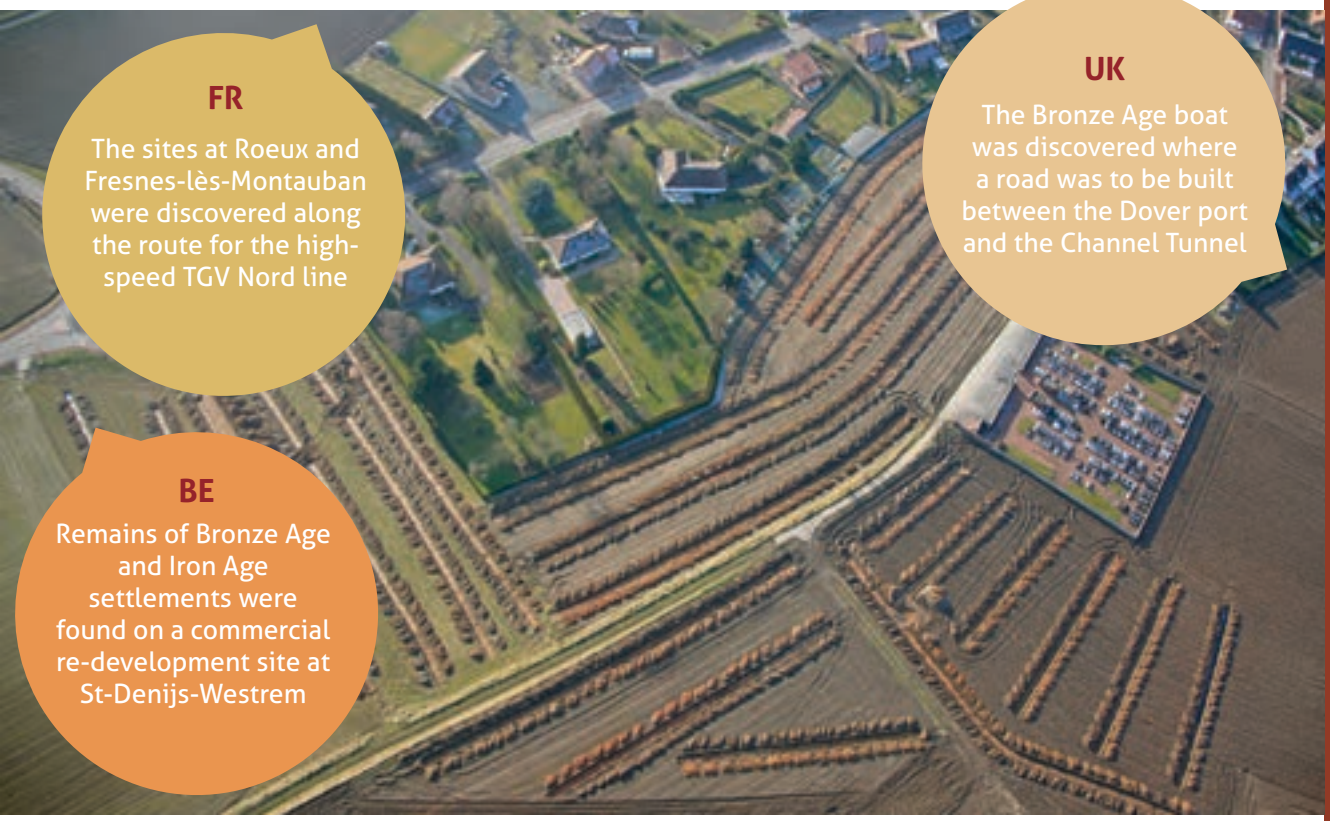
Building development works © Communauté d'agglomération du Douaisis - Direction de l'archéologie préventive

Key points!

In France, 'preventive' excavations take place as a result of building development works.

In Belgium, archaeology is a regional matter where local laws apply for each region. Surveys and archaeological conditions are imposed by the archaeological curators of Agentschap Onroerend Erfgoed (Archaeological Heritage Agency). The first step is checking with CAI Flanders for any available data for the area. Depending upon results and perhaps trial trenching, a decision is made whether an excavation is necessary.

In England, the planning departments of local government authorities decide on a site-by-site basis if archaeological intervention is necessary.



Aerial photograph of the Estrées (France) site © P.Frutier - Altimage

SECTION 2
CHAPTER II

The excavation site or ‘dig’

Tools and safety

Some of the work of the archaeologist takes place outside, often in the presence of site machinery. He or she uses tools specific to the profession, sometimes handling dangerous materials or digging in dangerous areas. An archaeologist must therefore wear specific equipment and have training in the basic rules of health and safety. Personal safety equipment is provided for the excavators and it is compulsory to wear it whilst digging.

Equipment

This consists of a *hard hat*, which must be worn wherever there is a risk of falling objects, like near site machinery or working in a trench. According to the fieldwork being done, people can wear *safety gloves* to protect their hands when using tools or when the soil on the dig is polluted. *Safety shoes* support their ankles and protect their feet, safeguarding the arch of the foot and the toes with steel toecaps. They can be swapped for safety boots in muddy conditions. During work on polluted sites or on ones where there is a risk of gas, vapour or dust inhalation, the diggers are supplied with respirators. Safety *glasses* are worn when conditions are dusty or there is a risk of flying debris.

When working with site machinery the archaeologist can also wear *ear protectors*, particularly when noise levels exceed 85 decibels, as can be the case working alongside a mechanical digger during topsoil stripping.

It is above all very important that an individual can be seen on an excavation site. A *high visibility vest or jacket* is mandatory when working in the vicinity of plant machinery.

Safety Rules

Near a machine, archaeologists should not remain in blind spots nor come within range of the machine without warning the operator and checking that they have properly understood. There are also traffic rules on a site, which itself must be secured and marked out with orange netting or fencing.

When cutting excavation trenches, it is forbidden to go deeper that 1.3 metres without special arrangements.

Public visits are not allowed without prior notification to the Site Health and Safety Officer. In areas that have experienced bombing, such as northern France, archaeologists can come across dangerous discoveries such as unexploded devices that are still live. In this case, the archaeologist must alert the authority's special services and set up a safety zone of 100 to 150 metres until civil security officers can intervene.

Excavation of an archaeological site © Communauté d'agglomération du Douaisis - Direction de l'archéologie préventive

Tools

To excavate the site and record what they find, archaeologists use specific tools, often tools of other trades like the gardener, dentist, mason and construction worker! The most symbolic tool of the trade is obviously the *trowel*, undoubtedly the one that is most used on an excavation. It allows the excavator to remove just a few centimetres of soil. The earth is scraped off little by little, enabling very small objects to be found. This tool can also be used to remove soil from newly unearthed objects. There are various sizes of trowel, the smallest being used for the most meticulous work. For fine work, on a grave, for example, there is a whole variety of *dentist's tools*. The *brush* is also emblematic of the trade, used to remove sediment. But the archaeologist doesn't only do meticulous work.

To uncover structures hidden under several square metres of soil, the archaeologist uses a shovel and a pickaxe. To make sure that no finds (especially the smallest) are missed in the excavated soil, the archaeologist puts it into *buckets*, in order to pass it through *sieves*. He or she also uses a sieve to find organic remains such as charcoal (for Carbon-14 dating for example), or seeds.

In order to record the features in the ground and to create plans and drawings the archaeologist needs a *tape measure*, a *plumb bob* and a *site level* to measure height above OD. A *theodolite* or *tacheometer* allows the level of the site to be calculated relative to sea level. The levelling staff, along with the site level permits the relative level of each point on the site to be recorded.

Key points!

- Archaeologists have a profession that can sometimes be dangerous and they take safety seriously.
- They must wear a hard hat, safety gloves and boots; when necessary they also wear a hi-viz jacket, respirator, ear defenders and goggles.
- They never run on a site. There are strict rules about this.

Activity suggestion no 4
The excavation site

Objective:
• to identify the archaeologist's professional equipment.

Equipment needed:
• USB pen in the kit;
• computer;
• digital projector.

Digital support?
• yes.

Activity (as a class)**:**
to show photographs of a site during excavation and to discuss the equipment and tools used by the archaeologists.

Activity suggestion no 5
The archaeologist's tools

Objective:
• to find out and memorise the name of each tool.

Equipment needed:
• game supplied in the kit.

Digital Support?
• no.

Activity (in groups)**:**
to start the game, place all the shuffled cards face down on the table so that the images are not visible.

The first player turns over two cards. If they are identical, he or she wins them, if not, they are turned face down again. The next player then turns over two cards and so on.

The goal is to try to memorise the position of the various cards in order to turn over a pair of identical cards. The pupil will try to name the tools appearing on the cards that he or she turns over.

When a player wins a pair, it gives him or her the right to play again.

The game is over when all the pairs have been found. The player who has won the most cards has won the game.

UK

At Thanet Earth, soil stripping revealed the brick steps of a subterranean World War ll structure in one area of the site

Topsoil stripping

The archaeologists are kitted out, the site's safety arrangements are in place and so topsoil stripping can begin. This is the first concrete action that marks the beginning of a dig. The stripping of an area consists of removing the surface layer of earth until the archaeological levels are reached.

This operation, which varies in duration according to the size of the site and the thickness of the soil, is carried out by means of a large mechanical digger equipped with a bucket between 2.5 and 3.0 metres wide. It is essential that the soil is stripped in flat and regular successive phases so that features can be detected. It is the archaeologist, positioned opposite the mechanical digger, who guides the machine operator. He or she lets him know whether he should go down more deeply or not and stops him if features appear. Good coordination and a good understanding between the archaeologist and the machine operator are essential.

The quantity of earth removed can vary from 20 centimetres to several metres, as is the case on some prehistoric sites. In the case of very deep discoveries, stripping in stages is necessary for safety reasons: the site then resembles an upside-down pyramid.

Topsoil stripping is a tricky business since we need to know how to remove as much earth as possible without damaging the archaeology. The archaeologist has several ways of spotting remains. The first clue is a variation in colour of the soil: a darker mark, brown to black, usually indicates an archaeological structure. Texture is an additional pointer: the earth around an archaeological structure is often less compact than the natural subsoil. The appearance of objects (fragments of pottery, bones, flint tools, etc) or masonry indicates an imminent discovery.

After the mechanical digger, we often need to move to a finer stripping phase. The archaeologists use a small hoe, a much smaller tool, the end of which must be sharp. They clean the surface of the archaeological layer so that it is really flat. Rain or drought can cause the marks of archaeological structures on the surface to disappear. For this reason, fluorescent paint is often used to mark the outlines of features before excavating them. As the stripping progresses, the gradual appearance of features makes it possible to see the human occupation on the site. The archaeologist can then begin the excavation.

Soil stripping at the paleolithic site at Étricourt (Seine-Nord Europe canal) © Inrap

FR

At Fresnes-lès-Montauban, soil stripping brought to light 5 circular enclosures, not all the same size; the smallest measured 10 metres in diameter, the biggest 25 metres

Marking a feature on the Thanet Earth site (Kent, England)
© Canterbury Archaeological Trust

Key points!

- Soil stripping entails removing layers of earth until you reach the archaeological levels.
- It is carried out with the help of a big mechanical bucket, then a skimmer for a finer strip.
- The ground must be stripped in successive phases, regular and flat.
- There are several ways remains can be detected; variations in soil colour and texture; and appearance of objects or masonry.

BE

The dig at St-Denijs-Westrem brought to light several wells

Topsoil stripping
© CG62

Stratigraphy

The concept of stratigraphy was borrowed from geology in the 19th century. It is the science of describing stratigraphic units, otherwise known as strata or geological layers and studying their form, their chronological sequence and their history. The basic principle of stratigraphy is that the oldest layers are thought to be the deepest. But things are not so simple! Stratigraphic units are not formed by the action of nature alone, but also by the actions of people, by 'cultural' activities, which leave behind many traces.

The majority of archaeological sites were successively occupied over time, with each phase of occupation representing a different period. These strata of human occupation are examined in detail. For the archaeologist, interpreting them can be a complicated business.

Archaeological traces can have several origins:

- *Construction.* When a building is constructed, the ground must be levelled and foundations or post holes will be dug. It is the traces of these actions that allow the archaeologist to say if there had been a building on the site. How do we know if there had been a post in this or that place if it has completely disappeared? We know because the hole dug for holding the post has left evidence of its previous existence. Its presence is visible as a 'negative feature' in the strata. The archaeologists can see that the soil is of a different composition and colour. This is known as an 'anomaly'.
- *Occupation.* The inhabitants organised their living space and used various kinds of objects, the traces of which, usually fragmented, were abandoned or thrown away. We can find these traces in the stratigraphy.
- *Infilling.* This involves bringing in earth, for example, to fill in a ditch or a hole or to level the ground. But the soil used may itself contain remains that pre-date the time of the infilling. The layers formed by these infillings will then contain a mixture of material derived from quite different periods.
- *Destruction.* Archaeologists infer that destruction has occurred when they find, for example, traces of fire or a collapsed roof.
- *Abandonment.* A site can be said to be abandoned when human activities are no longer present. Nature quite simply continues its work, and layers of sediment will build up.

Stratigraphy is a 'relative' dating method, in contrast to methods that allow 'absolute' dating of features, like radiocarbon dating or dendrochronology, which can give more precise results. It must therefore be used with caution. Just because a pottery sherd is found in a stratigraphic layer belonging to this or that period doesn't mean that the pottery was actually made in that period. Similarly, two pottery sherds can be found side by side during an excavation but not date from the same period. It's like our crockery; we can still today keep plates in our cupboards made over a century ago! It is therefore the collection and detailed study of all the elements found on site and the integration of the data obtained that allows the most precise dating possible of an archaeological site.

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UK

The Dover Bronze Age boat lay 6 metres down in the stratigraphic sequence, below medieval and Roman remains

FR

The ditch of enclosure 1 at Fresnes-Lès-Montauban was filled with 5 different layers of stratigraphy

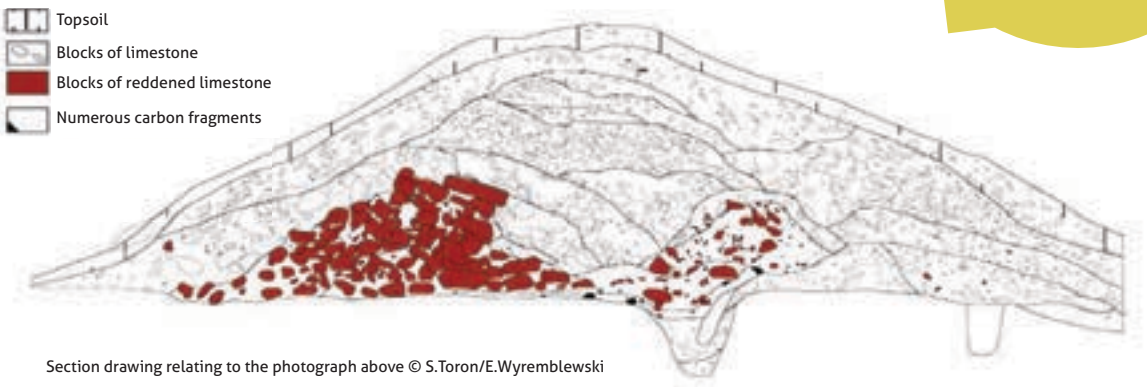
Key points!

- Stratigraphy is the formation of layers in the ground as a result of man's activities and natural events.
- The traces that the archaeologist finds can have several origins, like a construction layer, occupation or the fill of a pit.
- Using the stratigraphy on a site enables a method of dating known as 'relative' dating.

Archaeological site at Chevincourt (Oise). Detail of the fortification © E. Wyremblewski

BE

What remains of a wooden building tends to be the post holes. The plan of these in the ground allows us to reconstruct its shape



Section drawing relating to the photograph above © S.Toron/E.Wyremblewski

Reconstruction drawing of the fortification at the Chevincourt site (Oise) © B. Lambot 2011

Activity suggestion no 6

History is a load of rubbish!

Objective :

- to find out about stratigraphy.

Equipment needed:

- USB pen in the kit;
- computer;
- digital projector.

Digital support?

- yes.

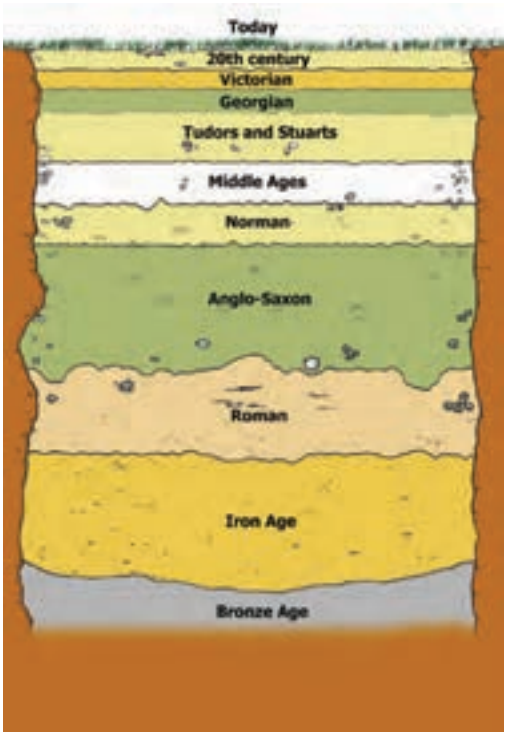
Activity (as a class):

Talk with pupils about the kinds of remains archaeologists find. A lot of it is old rubbish! But it is valuable rubbish because it is evidence for people's everyday activities in the past.

Talk about how archaeologists find this evidence in layers which have built up over time. These pictures will help pupils to understand how. You can make photocopies or use the image files on the digital pen.

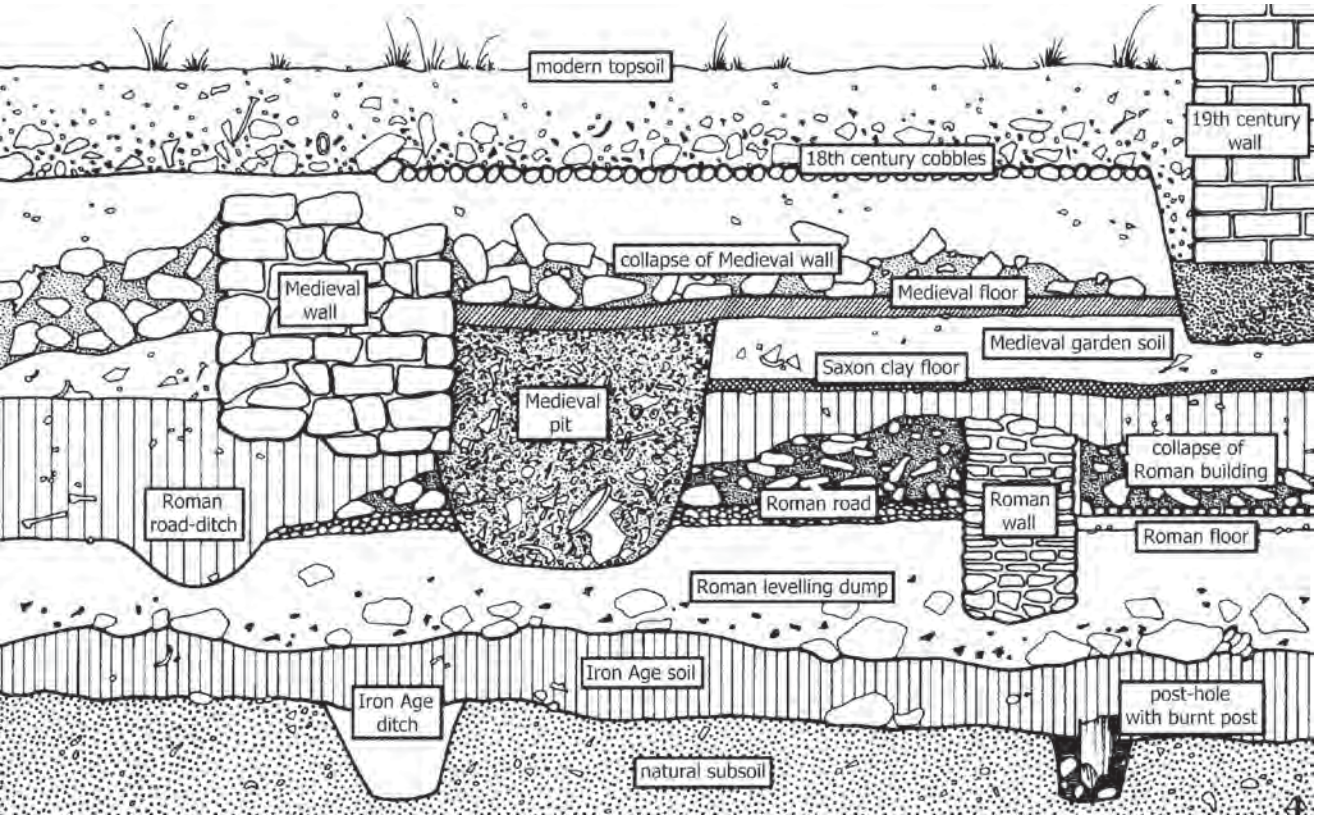
Rubbish bin stratigraphy © Canterbury Archaeological Trust

Picture 1. On which day was the last layer of rubbish put into this bin? On which day was the first layer of rubbish put in? Which day do you think has the oldest rubbish?



Simplified site stratigraphy © Canterbury Archaeological Trust

Picture 2. This is a simple drawing of the layers on an archaeological dig. It is like a huge rubbish bin. Here there may be 100s or 1000s of years represented between the top and the bottom. Which layer is the most recent? Which layer is the oldest?



Realistic site stratigraphy © Canterbury Archaeological Trust

Picture 3. This is more like a real archaeological site. Which layer is the most recent? Which layer is the oldest? Find the rubbish pit dug by somebody in medieval times. See how the pit has cut down through the layers underneath. Which layers has it cut through? The pit is full of bits of building and objects from these times.

Data recording

The process of excavation is based on the 'plan' and the 'section' of a site. The plan corresponds to the horizontal dimension of human activity. The section relates to the vertical dimension of human activity with strata being laid down over time. The section allows the establishment of a relative chronology.

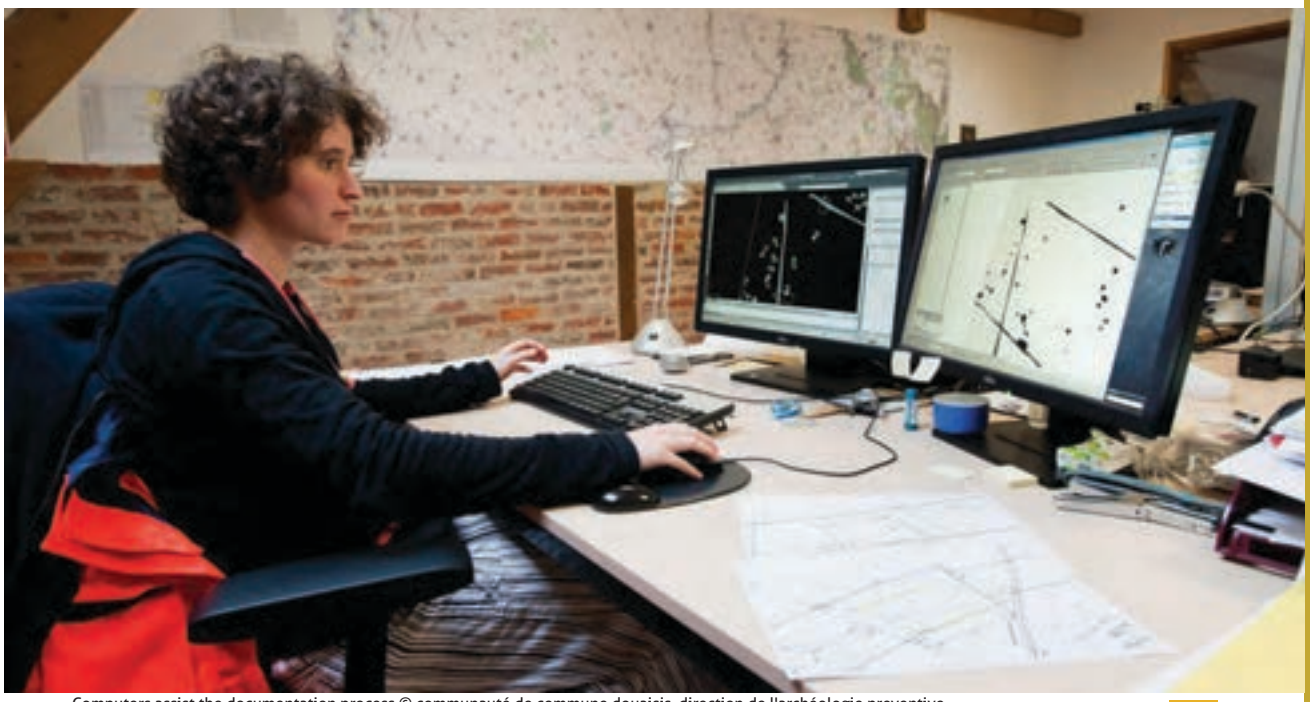
Depending on the site, an archaeologist will emphasise the vertical view in order to get to grips with the stratigraphy, while on another site, the horizontal view may be essential in looking for the spatial relationships between objects and structures. Both dimensions have to be considered.

The objective of the *topographic survey* is to draw up an accurate plan of the site and to map discoveries. The work is carried out in three dimensions, recording horizontal X and Y co-ordinates along with elevation above sea level. The archaeologists or surveyors use measuring instruments such as site levels, theodolites etc. Computerisation is standard and the surveys are recorded precisely and quickly by increasingly improved instruments in addition to the use of a Global Positioning System (GPS).

Measuring on site (Kent, England)
© Canterbury Archaeological Trust

Registering and recording an oven on site © CG62

Recording the levels on the site of Fresnes-lès-Montauban, using a theodolite © Inrap

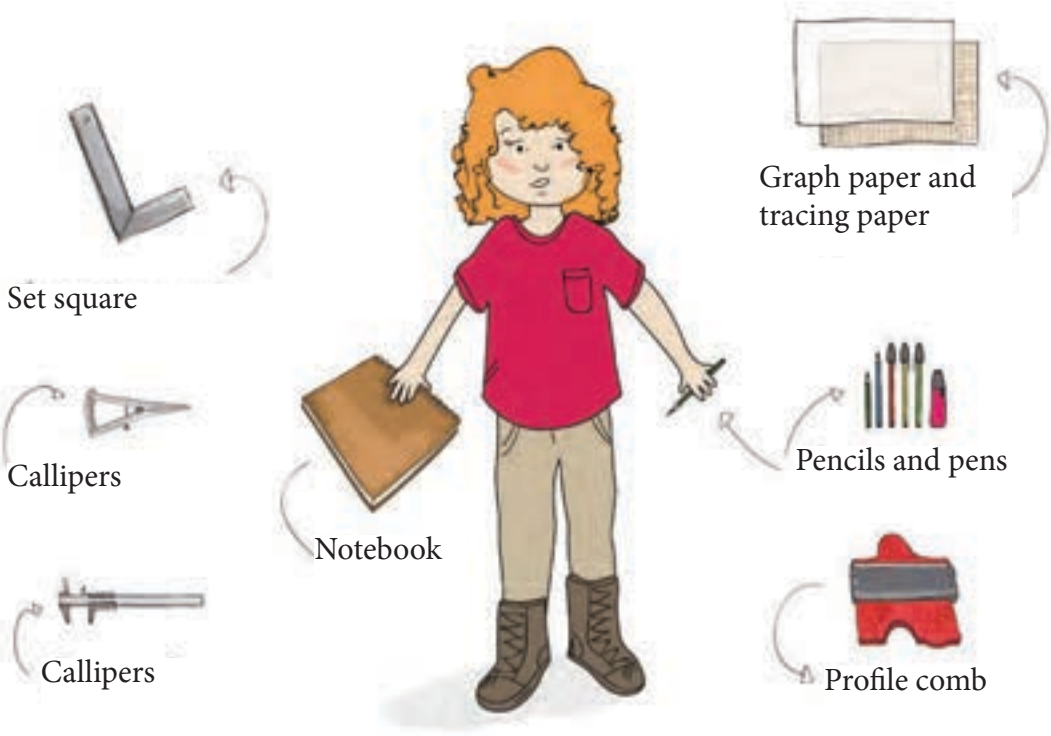


Computers assist the documentation process © communauté de commune douaisis, direction de l'archéologie preventive

Archaeological drawing is an essential stage of excavation or post-excavation work. When illustrating an artefact, the drawing should both represent the object itself and highlight any technological information about it.

Tools used include graph paper, tracing paper, measuring instruments (rulers, tape measures, callipers etc.), pencils, a set square and a profile comb for drawing finds. The process involves making a series of measurements and using a continuous line to trace the outline of the object. In order to give an impression of volume, stippled shading allows variation in light and shade to be expressed. The closer the dots are, the darker the shade. The illustrator follows some strict conventions, for example the blade of a sword or an axe is always facing downward, while a spearhead is always drawn with its point upward.

Photography is commonplace in archaeology these days. It should enhance objects, stratigraphy, structures etc. A photograph is an archaeological record along with the drawing. All archaeological photographs must be catalogued and must include a scale and (on site) an arrow indicating North.



Key points!

- A plan drawing shows a horizontal view of the human activity at a point in time, while a section drawing shows a vertical view, which may be of a succession of activities over a long period of time.
- Topographical survey can develop a precise plan of the site and location of its discoveries.
- Illustration enables us to show the artefacts found and highlight any technological information about them.
- Photography is also a technical process and completes the principal set of data recording.

Topographical survey at the paleolithic site at Étricourt (Seine-Nord Europe canal) © Inrap

Surveying with theodolite (Kent, England) © Canterbury Archaeological Trust

Surveying with GPS (Kent, England) © Canterbury Archaeological Trust

Recording burials dated to the Gallo-Roman period at the site of Cléry-sur-Somme (Somme, France) © Inrap

Activity suggestion no 7
How to classify objects like an archaeologist

Objective :
• to classify objects;

Equipment needed:
• replicas and original finds in the kit;

Digital support?
• no.

Activity (as a class or in groups)**:**

Take all the objects from the kit, lay them out and allow pupils time to freely explore them. Next see how many ways they can group them.

They could make a list under each of their headings.

Here are some ways. The pupils may think of more.

• By function (e.g. Pottery, building materials etc);
• by material (clay etc);
• by whether manufactured (artefacts) or natural (ecofacts);
• by date or period (start with 'old' and 'modern'; look in the kit booklet to find dates of the objects);
• by whether an original artefact or a replica.

You could expand this activity by adding some other modern or older objects to the range.

Activity suggestion no 8
How to record objects like an archaeologist

Objective :
- to make a record of an object;

Equipment needed:
- replicas and original finds in the kit;

Digital support?
- no.

Activity (as a class and in groups)**:**

Talk to pupils about the importance of close observation and making a record.
How much can they find out about a single object?

1. Is it a complete object or a fragment?
2. What material (or stuff) is it made of?
3. What colour is it?
4. What does it feel like?
5. How big is it? (use a pottery measuring chart for pottery rim sherds)
6. How do we think it was made? (By hand? On some kind of machine?)
7. Is there any decoration? (Describe any visible)
8. What could it have been used for?
9. How old do we think it is?
10. Is it a real artifact or a replica?
11. Do we think it is valuable? (discuss the value of knowledge, not only monetary value)
12. What does it tell us about the people who made and used it?

Pupils could make a written record of an object with some or all of these headings.
They could draw and label the object (size, colour, texture etc).
They could photograph the object.

SECTION 2
CHAPTER III

The science of archaeology

BE

Typical pottery of Bronze Age Flanders is characterised by its 'bucket' shape and its rough finish

Pottery studies

The fired clay that is pottery survives extremely well over time, which means that if a pottery object is broken the fragments can last through the ages. Manufactured since 14,000BC, pottery could be used for burial urns, table and kitchen ware and containers preserving and transporting food or drink. These objects are therefore very useful in that they reflect the cultural practices of a society.

Potter's clay may consist of fine-grained minerals and inclusions (e.g. quartz, calcite, mica, granite, limestone, fossils and organic materials). The plasticity of clay is normally improved by using water to remove any coarse material.

Fragments of pottery, known as 'potsherds' are an essential element of the finds from an archaeological excavation. Pottery, along with coinage, is the material most commonly used for the dating of a site. The role of the pottery specialist is to study the form, the fabric, the quality and the function of the pottery, and to consider the social status of the men and women to whom it belonged, along with its geographical origin (whether locally produced or imported). By studying the spatial distribution of pottery, the pottery specialist can provide evidence of trade between societies.

Laboratory studies of pottery aim to complement the information gained by examination by the naked eye or through a microscope. In particular they allow us to identify the origin of a vessel, to study manufacturing techniques such as the firing temperature and craftsmanship and to carry out ethnographic research of its creators and owners. Some methods, such as archaeomagnetism or thermoluminescence ('absolute' dating methods) enable the pottery to be dated quite precisely.

Ceramics on site (Kent, England) © Canterbury Archaeological Trust

Ceramic reconstructed (Kent, England) © Canterbury Archaeological Trust

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C. Orton, P. Tyers and A. Vince, *Pottery in Archaeology*, Cambridge University Press, 1993.

Reconstructing pottery © CG62

FR

At the site of Roeux, pottery experts were able to distinguish two types of ceramics: a tall, large vessel and an open, shallow type of 'plate'

UK

Several hand-made, decorated 'beakers' were identified from Thanet Earth. They were grave goods in Bronze Age burials

Key points!

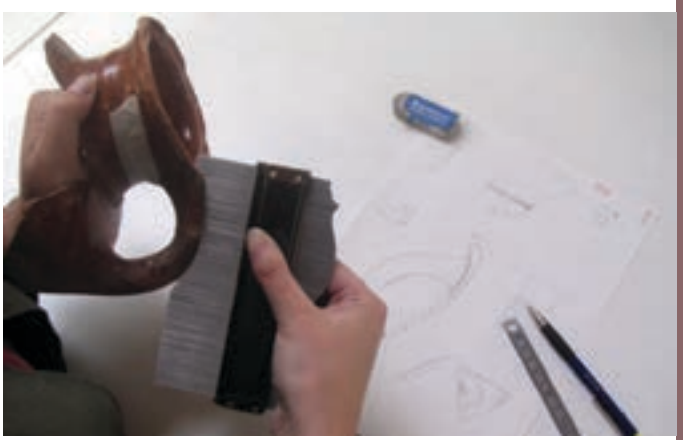
- Pottery studies involve examination of the form, quality and function of ceramics.
- It is possible through observation and analysis in the lab to find out where pottery was made and the social status of those who used it; study can also aid theories about trade between societies.

Pottery examination © CG62

Bronze Age Tatihou pottery during restoration © Inrap

Bronze Age Tatihou pottery after restoration © Inrap

Pottery from Fresnes-Lès-Montauban dating from the Bronze Age to Gallo-Roman periods © Inrap



Measuring pottery
© Communauté d'agglomération du Douaisis - Direction de l'archéologie préventive

Activity suggestion no 9

How to examine pottery like an archaeologist

Objective :

• close observation, asking questions, estimating, making interpretations, looking at materials and their uses, making a record;

Equipment needed:

• pottery in the kit;
• pottery measuring chart in the kit;

Digital support?

• no.

Activity (as groups or individuals)**:**

Examine some pottery. How much can pupils find out?

1. Is it a complete vessel or a fragment?
2. What material (or stuff) is it made of?
3. What colour is it?
4. What does it feel like?
5. How big is it? (use a pottery measuring chart if you have a pottery rim sherd)
6. How do we think it was made? (By hand? On a machine?)
7. Is there any decoration? (Describe any you can see)
8. What could it have been used for?
9. How old do we think it is?
10. Do we think it is valuable?

Pupils could draw and label their pottery (size, colour, texture etc).

Here is my drawing of the pottery.

The drawing is smaller than / about the same size as / bigger than the real thing.
(circle one of these)

If they have a fragment, they could also try drawing what they think the complete pot looked like.

Now I have finished my examination, this is what I have learnt.

Activity suggestion no 10
Restoring pottery

Objective:
- to find out about the pottery specialist's work and try reconstructing some pottery.

Equipment needed:
- the glue supplied in the kit;
- 2 cheap ceramic vessels of different design per group.

Digital support?
- yes.

DVD: Archaeology Experts, *The Pottery Specialist*.

Activity (in groups)**:**

1. divide class into groups of maximum 5 in each group;
2. obtain and break the 2 ceramic vessels for each group;
3. once the pots have been broken, mix the sherds and leave them on the table. Swap the groups around so that the pupils do not recognise their pots;
4. explain how pottery specialists group sherds by colour, thickness, shape and pattern;
5. leave the pupils to work. Their aim is to try and reconstruct the vessels.

As it takes time to stick sherds together, this activity may be spread over several days – a little at a time!

Reconstructing pottery © Denis Gliksman, Inrap

Lithics

The expert who studies stone artefacts is called a 'lithics' specialist. Since the 20th century, researchers have tried to establish a methodology for studying stone objects in order to learn about ancient communities. Flint knapping, often associated with Prehistory, is not in fact specific to any one period. This craft existed in every historical period up until the 19th century.

A stone object cannot be separated from its geological and archaeological context. Stone is a natural material. Flint is the best known material, but other rocks were used. The stone worker used all the materials at his disposal.

To 'knap' is a general term used by archaeologists to describe the process of intentionally fracturing rocks. The recognition of techniques by the specialist is based on long experience of studying archaeological examples but also on experimentation. Experimental archaeology holds an important place in the study of lithics: for example, you can knap stone using different techniques and compare the marks on these pieces with those on archaeological remains.

A stone artefact, such as a tool or a weapon, can perhaps be made in two ways: either by direct shaping of the raw material, because its form lends itself to its production, or, when the desired artefact cannot be obtained immediately, the raw material must be prepared by knapping. Here the goal is to produce flakes, which can be worked further or used as they are. The material which you strike is called the core. Shaping is a technique that does not require flakes, because the material lends itself to the manufacture of the piece itself. The craftsman can work by knapping a nodule or a large blade of flint. Percussion is a technique that be used either for flaking, shaping or retouching. It can be direct or indirect. When it is direct, it is done by striking with a hard percussive device (such as a pebble or nodule), but it also can be done with perishable materials such as wood or bone. To apply the force exactly where it is wanted, the craftsman can knap by means of indirect percussion.

Once the material recovered from an excavation is catalogued, a lithics specialist must make a technical study of each object, e.g. what was the primary material used (flint, obsidian, etc) or what techniques were used for making the object (such as flaking or percussion). There are often many traces on these objects that can be thousands of years old, undetectable to the novice, but full of information for the specialist.

Microwear analysis, for example, is a discipline that aims to determine the function of objects by studying the traces produced during their use. It is based on an examination of wear marks at a microscopic scale. Each material 'records' traces that can be identified thanks to a collection of comparative material established during experimental archaeology.

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FR

At Roeux 820 flint objects were discovered during the excavation

BE

Bronze Age arrow heads are shaped like two wings, one either side of a 'stem'

UK

A prehistoric flint arrow head and flint scraper were found while surveying the Thanet Earth site

Key points!

- The expert who studies remains of flints is called a lithics specialist.
- 'Knapping' is the term an archaeologist uses to describe the action of deliberately fracturing a rock.
- The craft of flint knapping was practised from the earliest times up to the 19th century.
- Experimental archaeology plays an important role in the study of lithics.

Flint tools from The Meads, Sittingbourne (Kent, England) © Canterbury Archaeological Trust

Activity suggestion no 11
Evidence for tool use

Objective:
- to see how traces can be left on a common tool showing how it was used

Equipment needed (per pair of pupils)**:**
- 2 erasers supplied in the kit;
- 1 magnifying glass supplied in the kit;
- 1 rough surface (e.g. the school wall);
- 1 sheet of paper;
- 1 soft pencil.

Digital support?
- yes.

DVD: Archaeology Experts, *The Microwear Analyst*.

Activity (in pairs)**:**
Microwear analysis is the study of the traces left on tools used by man, whether they were made of stone, bone, wood or metal.

1. Make some pencil marks on the sheet of paper.

2. Rub one of the erasers on the pencil marks.

3. Rub the other eraser on the chosen rough surface.

4. Compare the two erasers using the magnifying glass: which is the more worn? Does either have any marks on it? Are the marks the same? Are there any particles from the rubbed surfaces?

The exercise is an illustration of the science of microwear analysis which allows archaeologists to recognise the traces and marks of wear left on a tool from actions such as cutting or scraping.

Examining a flint with the aid of a computer © Inrap

Archaeometallurgy

Archaeometallurgy is the scientific study of how metals were made and used by ancient societies. In the 1930s, new analytical methods were developed by physicists which were then applied to ancient metals. Observations with the naked eye and under the microscope, together with analysis of the composition of a metal alloy, can reveal how the metal was made. Knowing this helps us appreciate the skills of the craftsman at that time.

Preparing and examining a sample

For an initial examination, a binocular microscope is used together with the naked eye. The analyst will examine the surface of the metal for any severely corroded areas and any traces of how the object was made and used.

To analyse the microstructure of a metal, a fragment is cut from the artefact using a watchmaker's saw (Fig. 1). A 2mm² fragment is enough (Fig. 2). The sample is then coated in synthetic resin to make it easier to handle (Fig. 3).

The surface of the sample is then carefully polished. This is a delicate stage, the aim being to achieve a 'mirror' surface. With the help of a polishing machine (Fig 4), the sample is polished in several stages by increasingly fine discs. Between each polish, the surface is examined under a microscope (Fig 5).

To see even more detail, the metal is then treated with a solution of iron chloride, ethanol and hydrochloric acid (Fig. 6). The aim is to oxidize the surface, so that certain characteristics of the metal's microstructure emerge and can be observed more effectively (Fig 7).

An optical microscope is used to see the various treatments the metal has gone through during its manufacture and use. The metal actually memorises certain information.

A scanning electronic microscope is used to see the composition of a metal alloy. This is capable of huge magnification, with an image obtained point by point, between six and ten nanometres. It can be coupled with an X-ray analysis system.

fig.1 © E. Wyremblewski

fig.2 © A. Lehoërff

fig.3 © A. Lehoërff

fig.4 © E. Wyremblewski

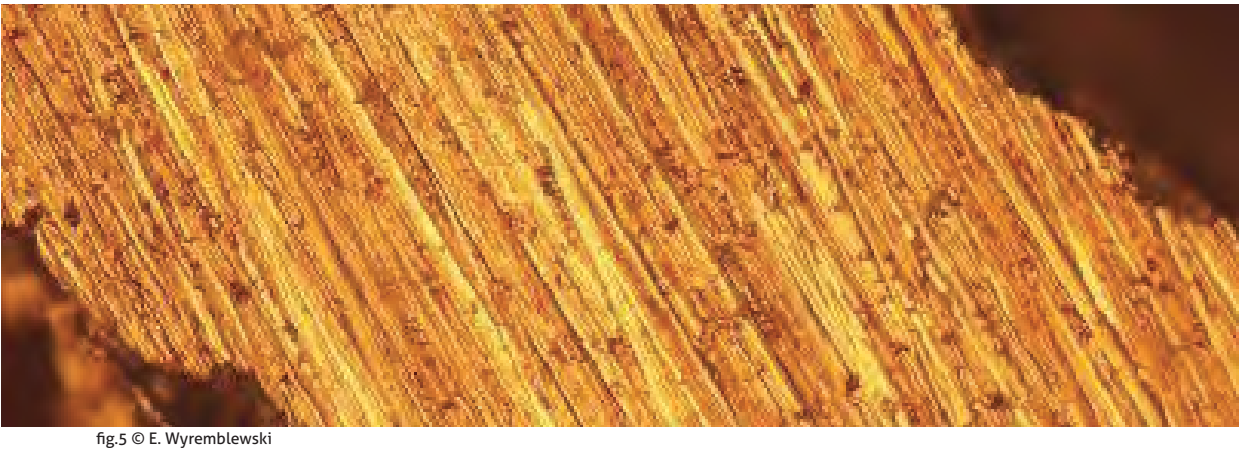


fig.5 © E. Wyremblewski

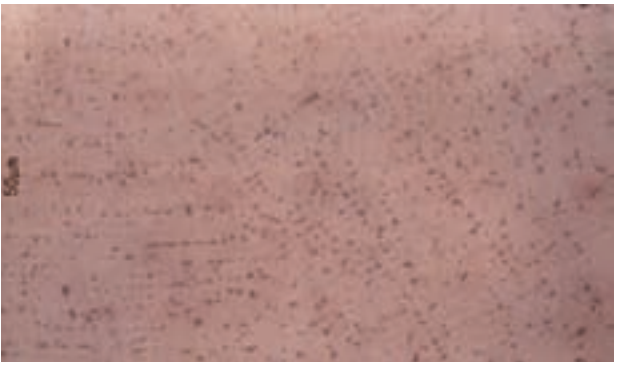


fig.6 Sample before effect of chemical treatment © A. Lehoërff

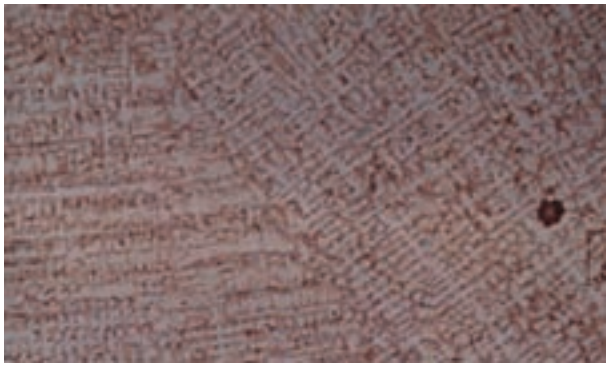


fig.7 Sample after chemical treatment © A. Lehoërff

FR

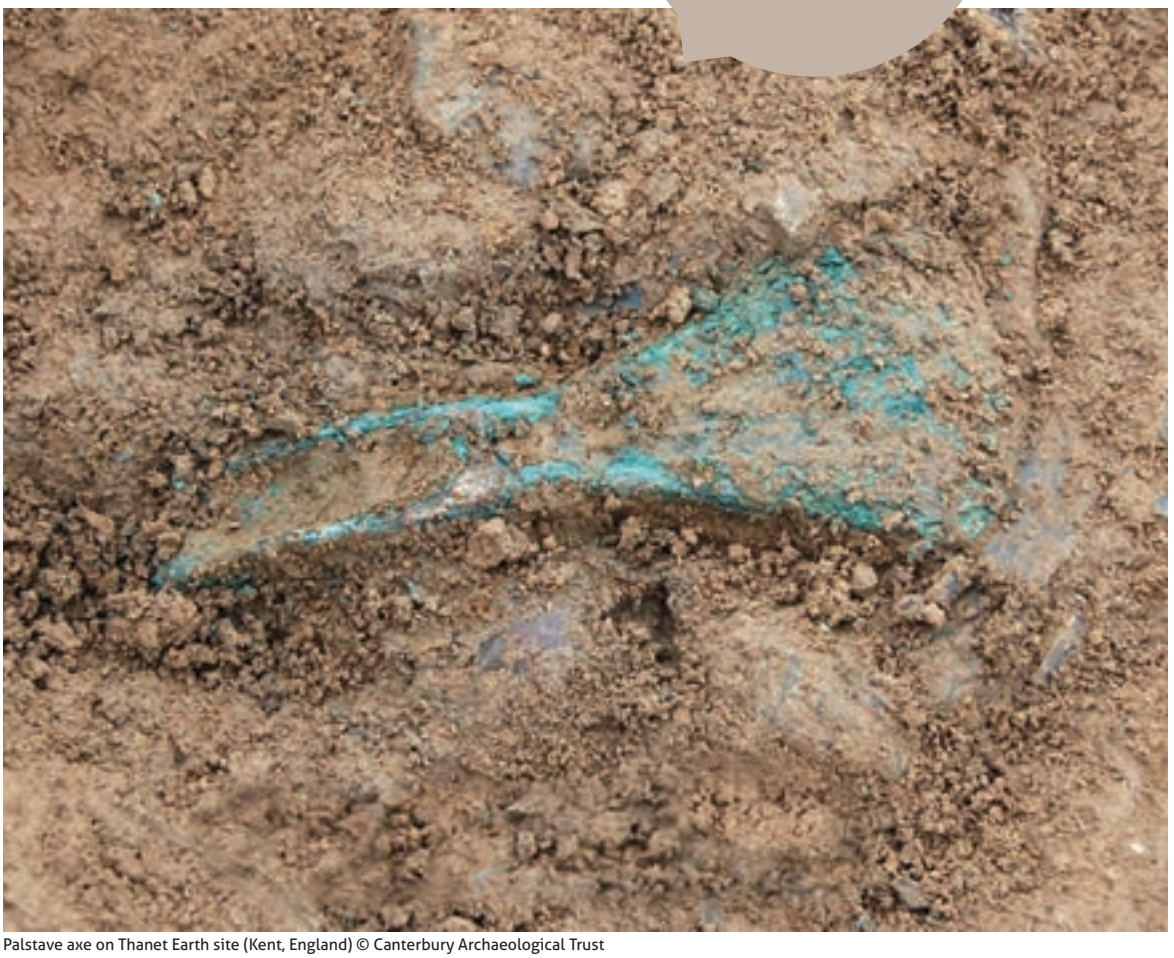
A copper alloy axe head was discovered at the Roeux site

BE

A copper alloy axe was also found at Lochristi. It may have been made in Britain and then imported into Flanders

UK

A copper alloy axe head was found at Thanet Earth. Axes were used in the making of the Dover Bronze Age boat



Palstave axe on Thanet Earth site (Kent, England) © Canterbury Archaeological Trust

Axe from Roeux (France) © Inrap

Key points!

- Archaeometallurgy is the scientific study of how metals were made and used by ancient societies.
- Examination and analysis require many processes (sampling, polishing and chemical treatment) and highly sophisticated equipment (binocular microscopes, X-ray machine, etc).

Activity suggestion no 12

What did the invention of bronze mean for people's lives?

Objective:
- to explore replica bronze objects;
- to learn about the kind of people who made and used these things, thousands of years ago.

Equipment needed:
- replica bronze axe;
- replica bronze pin;

Digital support?
- no.

Activity (as a class or in groups)**:**

In the kit are two bronze replicas of real Bronze Age objects. Explore the replica axe and replica pin to learn about the kind of people who made and used these things, thousands of years ago.

Examine *each replica bronze* object with pupils. Encourage them to think about:
- what it was used for;
- what it is made of;
- how it was made;
- what kind of person would have made it;
- what kind of person would have used it;
- what we would use today;

In the kit booklet, you will find information about the manufacture and use of the original objects, from which the replicas have been made:
- a Bronze Age axe found in Picardie (France);
- a Bronze Age pin found at Merendree, Eastern Flanders (Belgium).

Similar types of axe have been found in Belgium and England and similar types of pin have been found in France and England, indicating cultural links between these three countries in the Bronze Age.

Hopefully, you will be able to dispel the myth that prehistoric peoples were 'primitive'!

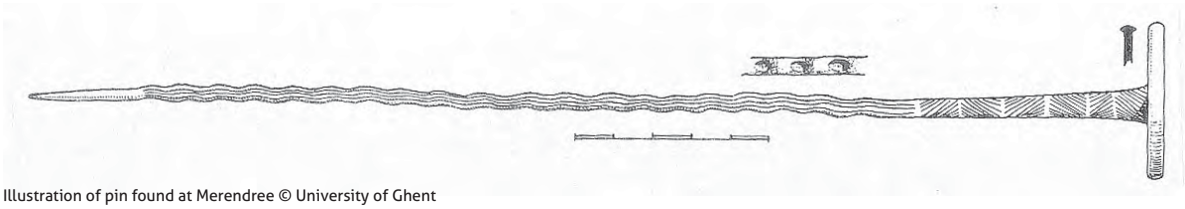


Illustration of pin found at Merendree © University of Ghent

Replica of the axe © F. Gendre / BOAT 1550 BC

Archaeozoology

An archaeozoologist uses the *animal remains* discovered on an archaeological site to try and reconstruct the role of animals in the ancient environment and their relationship with man.

There are several areas of study: identification of the species, how animals were used and analysis of the consequences of human intervention on an animal population.

On archaeological sites, we may find the bones of vertebrates and the shells of invertebrates. Other animal material (fur, feathers, leather or internal organs) can also be studied when it has been preserved in exceptional conditions like very cold, wet or dry environments. DNA analysis may also be undertaken.

Much of the material is found using site tools and the naked eye. But a shovel and pickaxe are no good for finding fish-bones! Small animal remains will usually only be found when soils are sieved.

Certain species have precise ecological requirements and therefore may indicate what the landscape was like and what activities were happening around the site. They also help us understand the function of a site: mouse remains can, for example, reveal the proximity of a human settlement

In archaeozoology, we also study the *traces left on bones*. These may be:
- Cuts made by weapons and tools.
- Marks made during craft work, for example in making weapons, tools or ornaments.
- Traces made by rodents or carnivores.

The animal bones are examined looking for known characteristics of a family or a species. The first stage is to identify and sort the categories of bone: those of the head, ribs, vertebrae etc

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BE

In the sandy soils of Flanders, bones from the Bronze Age are badly preserved

FR

At Roeux, the archaeologists recovered 1177 bones, mostly cattle, which was 6kg of material!

UK

Bronze Age rubbish near the Dover boat had bones of sheep, pig, cattle and red deer, some with butchering marks.

Ox skull on site (Kent, England) © Canterbury Archaeological Trust

Determining the *age* is essential for understanding animal management in the past. It is important to know, for example, if the hunter refrained from killing certain age groups or which type of stock rearing was practised. Age is determined by examining the teeth and to what extent the skeleton has formed.

The sex is also useful when looking at animal management. This can be determined by comparing particular bone structure and measurements with known reference collections.

Being able to distinguish between *wild and domestic forms* of the same species allows us to see certain changes that have come about through domestication of animals.

One of the main changes is a reduction in height, in particular for cattle, pigs and sheep, starting in the Neolithic period.

The first signs of the domestication of the wolf can be traced back to at least the Mesolithic Age. Now, the domestic dog is man's best friend.

Animal jaw bones on site (Kent, England) © Canterbury Archaeological Trust

Cattle horn cores (Kent, England) © Canterbury Archaeological Trust

Key points!

- An archaeozoologist uses the animal remains discovered on an archaeological site to try and reconstruct the place of animals in the ancient environment and their relationship with man.
- By assessing the provenance of the animal remains and analysing them, an archaeozoologist can give us information about the landscape, domestication of animals, animal management and other activities in the past .

Fish bones and fish scales (Kent, England) © Canterbury Archaeological Trust

Chewed animal bones from cess pit (Kent, England) © Canterbury Archaeological Trust

Cat bones showing marks of skinning (Kent, England)
© Canterbury Archaeological Trust

Porpoise jaw (Kent, England)
© Canterbury Archaeological Trust

Activity suggestion no 13
Examining animal remains

Objectives:
- using evidence;
- asking questions;
- classifying information;
- looking at materials and their uses;
- recording.

Equipment needed:
- animal bone in the kit;
- Canterbury Archaeological Trust website photos.

Digital support?
- yes.

Activity (as a class, in groups or individual)**:**
Archaeologists divide objects into different groups. They *classify* them.
Things made by people are often called *artefacts.*
Remains of plants and animals are often called *ecofacts* or *environmental finds.*

Pig skull (Kent, England) © Canterbury Archaeological Trust

1. Talk with children about *artefacts* and *ecofacts.*
How do they differ?

2. Find an *animal bone* in the kit.
Can we find out what type of animal it is from?

3. Discuss some of the things animal remains can tell us about.
- What types of animal were around in the past
- How people farmed the land
- What pets they had
- Foods people ate
- Clothing (for example rare survivals of leather shoes or woollen cloth).

4. Children could try drawing a bone from the kit.

5. You could do some research on the Canterbury Archaeological Trust website and find photos of animals, skulls and artefacts made from animal bones. From prehistoric times until the early 20th century people used animal bones to make a variety of everyday things. www.canterburytrust.co.uk/learning/galleries/boney_bits/.

You could make two lists with the children.

Objects made of animal bone in the past	What they are made of today
Eg. Comb	Plastic or metal

Activity suggestion no 14

What does an archaeozoologist do?

Objective :
• to find out about the work of an archaeozoologist and how it helps us find out about the past.

Equipment needed:
• DVD supplied in the kit:
Archaeology Experts: *The Archaeozoologist*;
• DVD player;
• projector and whiteboard.

Digital support?
yes.

Activity (as a class)**:**
• watching and discussing the film.

Malacology

Malacology is the study of molluscs from archaeological sites and is a sister subject of archaeozoology. All sediment contains molluscs that are either visible or invisible to the naked eye. They like certain conditions and can be terrestrial or aquatic (fresh or salt water). Their presence on an archaeological site can therefore indicate whether that place was a terrestrial and/or aquatic environment in the past.

By becoming sedentary, man has altered his immediate environment and this can have consequences for mollusc populations as they are sensitive to climate change and changes in river and sea conditions.

Through malacology we can also learn how people have utilized these creatures in the past, as food or by using their shells in craft work.

Mollusc preservation is dependent on conditions in the soils, e.g. the presence and kind of vegetation, climate, geology and so on.

There are at least 100,000 species of mollusc, which makes them the second largest branch of the animal kingdom, after the arthropods (for example, scorpions, crabs, butterflies). They include many edible species, such as snails, oysters, and squids.

Snail shells (Kent, England)
© Canterbury Archaeological Trust

FR

At Roeux 32 mollusc samples have been analysed

Key points !

- Malacology is the study of molluscs.
- The word comes from the Greek 'malakos', which means 'soft'. It's odd to talk of studying the 'soft' when for most of the time all that remains is the shells!

Most molluscs measure between 1 and 20 centimetres. However, the largest of the invertebrates is in this group; the giant squid that lives in the deep sea can reach 18 metres in length!

Molluscs have a special place in terrestrial and aquatic ecosystems; with their size and their biology they are a mine of information.

Once the samples have been taken from the site, a malacologist will determine the species present and the the quantity of each species. A table is then drawn up to show this data which is interpreted with the aim of reconstructing the ancient environment .

UK

Particular snails in sediments over the Dover Bronze Age boat showed that the river where it lay had fresh, clear water

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Osteo-archaeology

Ancient burials and cemeteries on archaeological sites have for a long time attracted interest, but it is only relatively recently that their bones have been studied. Through *the study of bones* we can learn about the evolution of man's physical development, population groups, diet, funerary practices and sometimes occupational activities people engaged in.

In England, the person who studies human remains from an excavation site is an osteo-archaeologist, who may also draw on the work of anthropologists.

Each society has cultural practices associated with death. The deceased may be interred, perhaps with a shroud, singly or as a multiple burial; or the custom may be one of cremation. There may be evidence on the remains of other practices, such as dismemberment, decoration, mutilations, breaking of the bones and removal of body parts (like the hearts of the kings of France).

Advances in science have resulted in major advances in osteo-archaeology.

For the past twenty years or so, the ability to extract *DNA* from bones has opened up new horizons and *Paleobiology* (the molecular study of human remains) can support research into genetics and diet.

Analysis is usually carried out on bone samples, human tissue having long since decomposed. But sometimes tissue is available from a preserved body, having lain in certain environmental conditions, for example waterlogged, very dry or very cold.

FR

At Fresnes-lès- Montauban, bones from an urn were identified as a male aged 18 to 35 years old

The sex of a skeleton is determined by examining the size of the bones (male bones are generally bigger) and their shape. In adults, the pelvis is the best indicator; a woman's pelvis, designed for childbirth, is wider than a man's. To determine the sex of juvenile skeletons, DNA analysis may be carried out on any bone that has preserved some organic matter.

It is difficult to determine the cause of death of an individual, unless there is a good indicator like a severe, unhealed skull fracture. But some diseases, for example osteoarthritis, tuberculosis and dental conditions are easily identified.

Family relationships may be suggested from studying anatomical features shown in skeletons, but the archaeologist must be careful here. This type of interpretation cannot be made with any precision.

Excavating a prehistoric skeleton (Kent, England)
© Canterbury Archaeological Trust

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Child burial from the Late Bronze Age, Cross-Saint-Ouen site (Oise, France) © Inrap

Mass of cremated bone being excavated, Middle Bronze Age burial , Rue (Somme, France) © Inrap

Key points!

- Osteo-archaeology is the study of human bones.
- The study of bones tells us about the evolution of man's physical development, population groups, diet, funerary practices and sometimes occupational activities.
- Advances in science, especially DNA analysis, have opened up new horizons for osteo-archaeology.

UK

One of the Bronze Age skeletons at Thanet Earth was of an active male who died at between 36 and 45 years of age

The osteo-archaeologist at work © Communauté d'agglomération du Douaisis - Direction de l'archéologie préventive

The first records made for a human skeleton will include information about the skeleton itself, its position in the ground and anything found with it. More detailed records may be made after further examination.

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SKELETON SHEET

GRID SQUARE	CONTEXT NO.

Site Code	Area

Description of skeleton

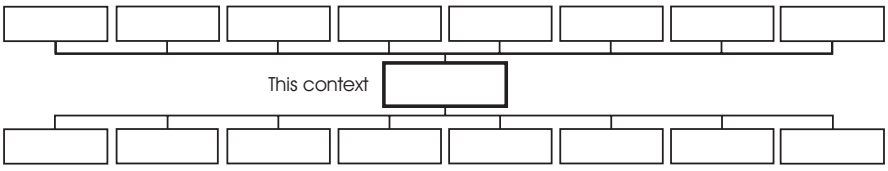
Description of material associated with the skeleton

1. Grave goods

2. Coffin furniture

Rough plan (showing grid points & reduced levels) & sections - overleaf

Grave cut no.	Fill nos.



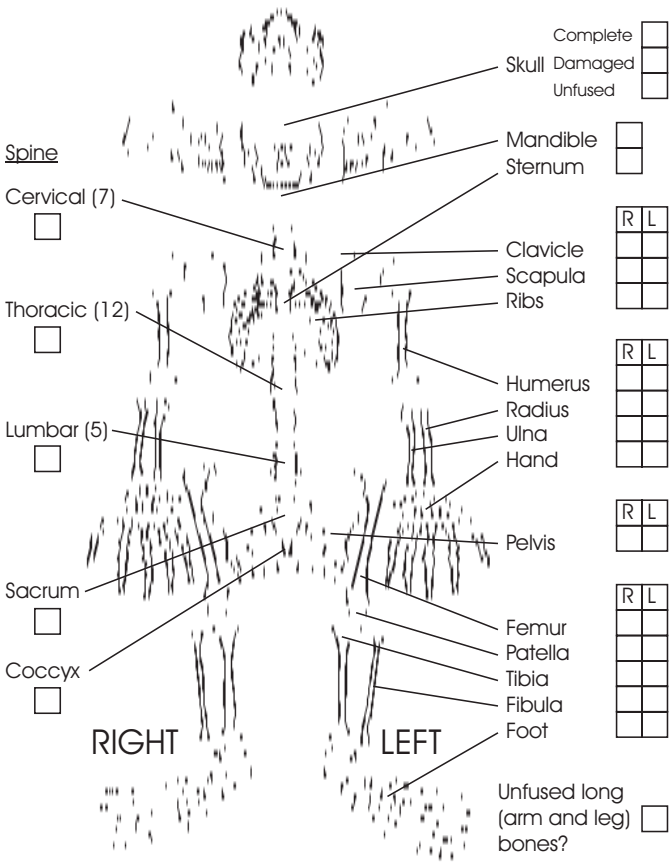
Further interpretation

Discussion

Plan No.	Section No.	Film Nos.	Sample Nos.

Excavated by Recorded by Checked by Date

Tick box if bone is present



Sketch (stick) plan
(& section if appropriate)

Showing grid points, planning discs, reduced levels and north arrow. Also show associated grave elements such as cuts, coffin furniture, grave goods

Details of skeletal remains

Articulation: Articulated ☐ Dis-articulated ☐ Disturbed ☐ Other (specify) ☐

Alignment: Orientation: Head at:

Completeness: > 95% ☐ 80-95% ☐ 60-80% ☐ 40-60% ☐ 20-40% ☐ 5-20% ☐ <5% ☐

Condition of bones: Excellent, all solid ☐ Some solid, some fragmented ☐ V. badly fragmented ☐
V. good, mainly solid ☐ Badly fragmented ☐ Stain ☐

Skull position: Skull not present ☐
Anatomically correct ☐ Facing right ☐ Facing left ☐ Other (specify) ☐ Unknown ☐

Body position: Supine ☐ Extended ☐ Crouched on right ☐ Other (specify) ☐
Prone ☐ Flexed ☐ Crouched on left ☐ Unknown ☐

Lower arm position:

	Not present	By side	On pelvis	On chest	On shoulder	Other position	Unknown
Right	☐	☐	☐	☐	☐	☐	☐
Left	☐	☐	☐	☐	☐	☐	☐

NOTES: In young persons the ends of bones may be loose and the skull and pelvis unfused. Take care to collect all fragments, especially teeth. Place each hand and foot in a separate bag and label them.

Activity suggestion no 15

What does an osteo-archaeologist do?

Objective:
• to find out about the work of an osteo-archaeologist and how it helps us find out about the past.

Equipment needed:
• DVD supplied in the kit: Archaeology Experts: *The Anthropologist* (in England this work is done by an osteo-archaeologist);
• DVD player;
• projector and whiteboard.

Digital support?
• yes.

Activity (as a class)**:**
• watching and discussing the film.

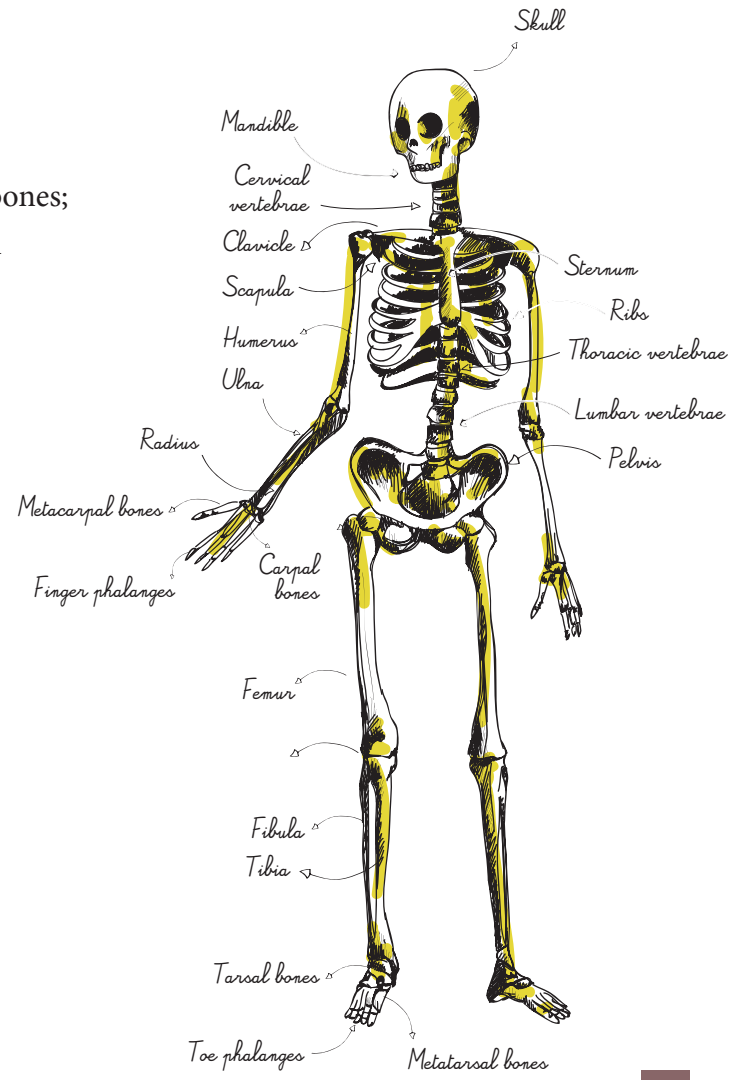
Activity suggestion no 16
The human skeleton

Objectives:
• to find out about human anatomy and recognise the bones of the human skeleton.

Equipment needed:
• laminated cards supplied in the kit (one per pupil);
• scissors;
• fasteners supplied in the kit.

Digital support?
• yes (to print extra sets of cards).

Activity (individual or in pairs)**:**
1. cut out the model's bones;
2. identify and name the various bones;
3. reconstruct the human skeleton using the fasteners.



Carpology

Carpology is the analysis of seeds and fruit lost and thrown away by people in the past during their daily activities, which have then become preserved in sediments. Carpology became a major part of archaeological studies in the 1960s.

Carpologists study this material to find out about man and his environment in the past. Their aim is to find out about:
- the history of plants as a food source;
- the development of agriculture;
- the natural environment;
- cultural practices.

Paleo-seeds (ancient seeds) are present in practically every place of human activity: storage areas, dumps, human settlements, funerary sites, and so on. Their preservation depends on the environmental conditions.

There are several ways seeds can be preserved:
- carbonisation, caused by fire, for example charring during cooking or the use of vegetation as fuel;
- mineralisation, for example when they have been in a flow of water laden with mineral salts;
- waterlogging: buried in saturated soils
- imprints: impressions (probably accidental) of seeds or ears of cereal crops found in objects of fired clay, for example a brick or pot.

Soil samples are taken from an archaeological site to find any seeds and fruits. Usually each sample is sieved through various grades of mesh using a water hose. Then when dry, any erroneous material is removed. The remaining material is then sorted using the naked eye or with a binocular microscope.

The isolated seeds and fruits are then identified, grouped together by species, counted, measured and drawn or photographed, as necessary. Identification will be made by comparison with a reference collection and published works.

FR

Analysis has enabled us to say that inhabitants at Roeux grew wheat and barley and gathered hazelnuts

UK

At the Dover Bronze Age boat site, finding seeds of weeds that grow among crops tells us that there was arable farming in the area

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- V. Matterne, *Agriculture et alimentation végétale durant l'âge du fer et l'époque gallo-romaine en France septentrionale*, Montagnac, Éditions : M. Mergoil, 2001.
- English Heritage on the web http://www.english-heritage.org.uk/publications/environmental-archaeology-2nd/environmental-archaeology-2nd.pdf.

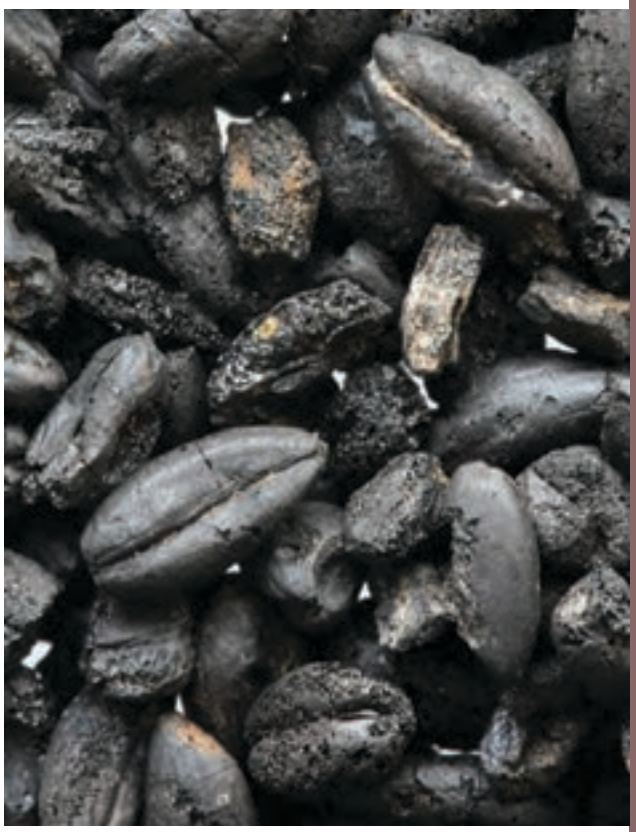
Key points!

- Carpology is the analysis of seeds and fruit preserved in archaeological sediment.
- Carpologists are interested in these paleo-seeds to find out about man and his environment in the past.
- The sieved and sorted material is identified using reference collections and published works.

Sorting and identifying species under the binocular microscope © M. Derreumaux

Sieving in the laboratory © M. Derreumaux

Carbonised emmer wheat grains (Kent, England)
© Canterbury Archaeological Trust



Detail of carbonised emmer wheat grains (Kent, England)
© Canterbury Archaeological Trust

Activity suggestion no 17

Extracting seeds from soil using flotation

Objective :
• to find out about the work of a carpologist.

Equipment needed (for each pair of pupils)**:**
• bottom half cut from a large plastic bottle;
• 20g sesame seeds;
• 20g soil.

Digital support?
• no.

Activity (in pairs or class demonstration)**:**
1. put water into the half bottle;
2. mix the seeds with the soil;
3. add the mixture to the water;
4. leave to settle for a few minutes;
5. observe what happens.

The mineral material (the soil) will fall to the bottom and the organic material (the sesame seeds) will float to the top.

Sorting a sample of seeds © G. Naessens / BOAT 1550 BC

Palynology

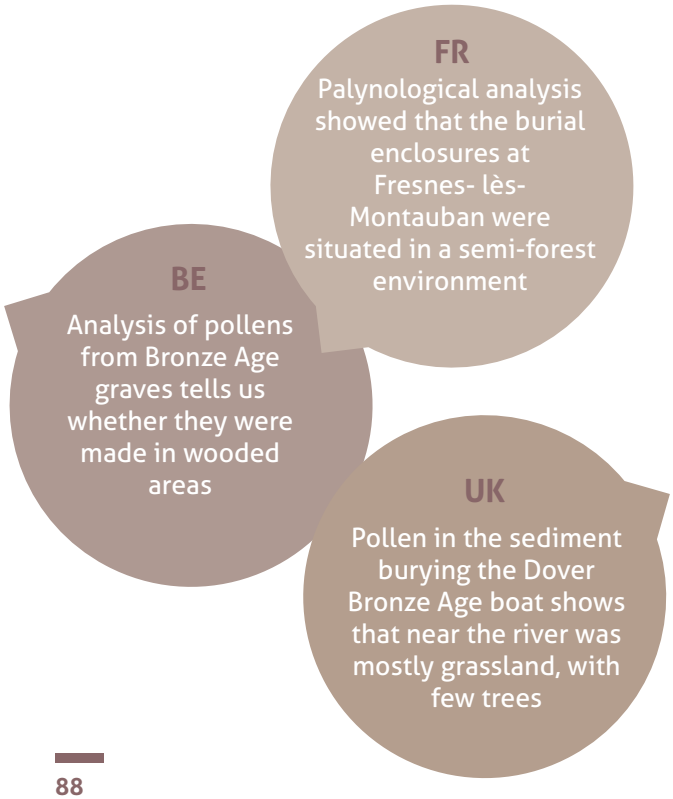
Palynology is the study of pollen grains and spores. In archaeology it is used to reconstruct a picture of the plant life of an ancient environment; an environment which may have been affected by natural influences like the climate or human activity like deforestation and cultivation.

The palynologist and archaeologist choose the area to be sampled together. The aim is to find the ideal 'trap' for the sediment and therefore for the pollen grains and spores that it may contain.

The pollen grains are placed on slides, examined under the microscope, identified and counted. The wide variety of shapes and sizes of pollen grain and features visible on their outer coat enable the plant it comes from to be classified and identified. A pollen grain's structure is unique to its plant species.

The grain's outer coat resists deterioration in certain conditions and pollen and spores can be preserved in several types of ancient sediment, sometimes for several thousand years. The best conditions for preservation are wet environments such as peat and silts.

The proportion of the various types of pollen identified in a sample is presented in the form of a spectrum. By interpreting the variations, changes in the climate can be recognised and the actions of ancient man on his environment.



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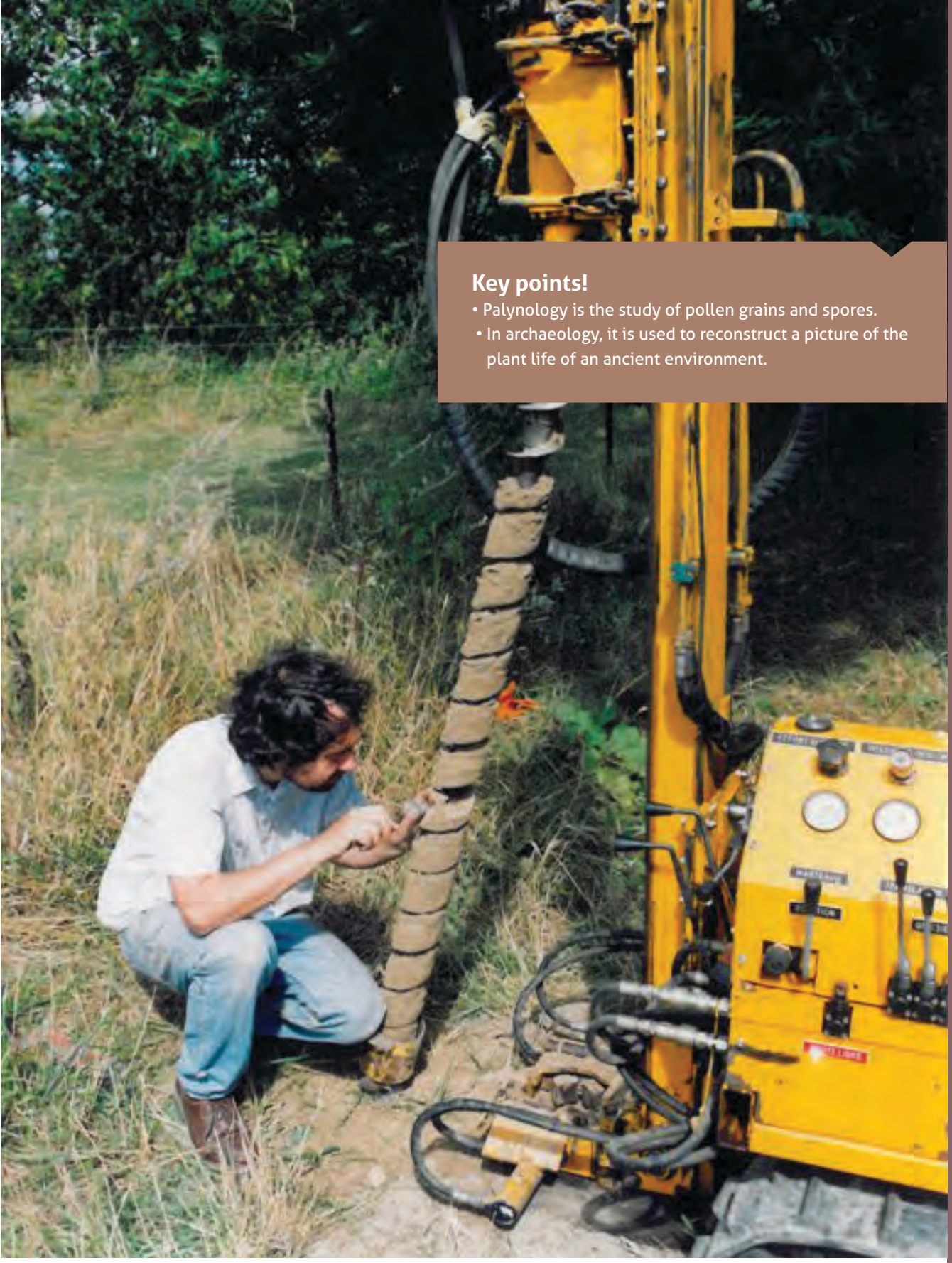

Key points!

- Palynology is the study of pollen grains and spores.
- In archaeology, it is used to reconstruct a picture of the plant life of an ancient environment.

Extracting a core soil sample for pollen and spore analysis © Inrap

Soil sciences

The specialists in this field must bear in mind that man and nature are always interacting.

The term Soil Sciences embraces several areas of study.

- geology is about oceans, volcanoes and how layers or strata have been laid down over time;
- pedology is the study of soils: how the actions of man, animals and the environment affect them;
- geomorphology is the science that studies and interprets the physical features on the Earth's surface; how its plateaux, escarpments and so on are formed.

It is considered today that soil is not a stable environment, but one that is dynamic. It is formed at the point when the atmosphere (rain), the biosphere (animals, man) and the lithosphere (Earth's crust) interact.

Soil has four vital functions :

- biological: it shelters and protects many animal and plant species;
- food: it contains certain nutrients necessary for life. It provides the plants and the animals with water and air. Man, who lives on plants and animals, is therefore utterly dependant on soil;
- filtering: being porous, soil is a filter. When water permeates soil, it leaves chemical and biological deposits;
- material: some soils can be used as a building material and constructions e.g. houses, will be supported by the ground. Soil is also a source of many useful minerals.

Archaeologists will record in detail the soils they encounter on an excavation. They are interested in colour, texture, structure and what they may contain, for example stones or roots.

Through his activities, man can alter his environment and the soil often undergoes changes.

What might these changes be?

- Subsidence that occurs during land clearance or building works;
- impoverishment of the soil's biological make-up;
- soil pollution.

All these changes can be noticed by the specialist working alongside the archaeologist on the dig or through examining sediment samples taken from the site.

To try and re-create a history of past societies, we need to trace the history of the landscape, because it is people that have worked and transformed it over time. It is important that those working in the laboratory work closely with those working in the field.

Key points!

- Soil has four vital functions: biological, food, filtering and material.
- Man and nature are always interacting: man transforms the environment in which he lives and the soil is often changed through his activities. These changes can be seen on an archaeological site.
- There are various kinds of soil sciences: geomorphology, pedology and geology.

Bibliography

- J.-P. Bravard, C. Cammans, P. Nehlig, P. Poupet, *La géologie : les sciences de la Terre appliquées à l'archéologie*, Paris : Errance, 2009.
- English Heritage on the web http://www.english-heritage.org.uk/publications/environmental-archaeology-2nd/environmental-archaeology-2nd.pdf

Activity suggestion no 18
Soil colours

Objective:
• an archaeologist can describe the archaeological layers on a site (or the colour of clays in pottery studies) using the universal Munsell Colour Chart. Pupils can try for themselves identifying colours using a chart.

Equipment needed:
• a colour chart, supplied in the kit;
• 10 sheets of card in different colours.

Digital support?
• no.

Activity (as a class and in groups)**:**

1. choose a sheet of coloured card and show it to the class;
2. ask the pupils what colour they see. Individuals have their own perception of colour and not all pupils will see the same colour;
3. do the same with the other coloured cards;
4. arrange pupils in groups, maximum 5 in each;
5. give a set of 10 colour cards and a colour chart to each group;
6. ask them to find the reference code for each coloured card.

Munsell colour chart © J. Kelley, http://SoilScience.info

Anthracology

Anthracology is the study of charcoal collected from an archaeological site or from natural sediments. The information gleaned can add to our knowledge about human settlement patterns and how people benefitted from their natural environment.

When wood is carbonised (through contact with fire) its microstructure remains largely unchanged, despite partial deformities (to a greater or lesser extent depending on the species).

Through close examination of a charcoal sample, a specialist is able to identify the species of tree the original wood came from.

It is possible to examine minute fragments, but reliable identification is only really possible for pieces larger than about 4 millimetres.

The anthracologist, just like the carpologist or the palynologist, is not able to make a complete anatomical description of the species. But he or she is still able to identify it by comparing the charcoal sample to an up-to-date reference collection of carbonised wood and related photographs.

We can probably assume that in antiquity people would have collected wood for domestic fires close to their homes; so samples collected from a settlement site can tell us about the forest cover in the immediate locale.

The increasingly systematic study of fuels used for specialist purposes (for example in pottery kilns, metal working, cremations) and of wood used in building works is further adding to our knowledge about man's exploitation of his environment in the distant past.

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UK

There was no need for anthracological analysis for the English sites chosen for this guide

Carbonised wood from a building (Kent, England) © Canterbury Archaeological Trust

Key points!

- Anthracology is the study of charcoal.
- The anatomical structure of the wood enables the species to be identified.
- Identification is made by comparing the charcoal sample to an up-to-date reference collection of carbonised wood and related photographs.

Excavating carbonised wood (Kent, England) © Canterbury Archaeological Trust

BE

Studies of carbonised wood from cremations is in its infancy in Flanders. Nevertheless it seems that oak was used

FR

At Roeux, carbon analysis has yielded evidence for oak being dominant with the presence of other species like plum and elderberry

Dendrochronology

One of the archaeologist's major preoccupations is attempting to establish a chronology for events that have taken place in the past. Archaeologists make a distinction between what they call 'relative dating' and 'absolute dating'. Relative dating is achieved by studying the build up of layers on a site (the stratigraphy) and establishing when activities took place in relation to each other.

Absolute dating is much more precise dating and can be obtained thanks to scientific techniques. One of these is dendrochronology.

Dendrochronology, or tree ring dating as it is commonly known, has resulted from a knowledge of how wood grows and is one of the best known and most precise dating methods.

In temperate Europe, *rings* are formed each year in the growing tree, from the beginning of spring until autumn. Ring width varies according to major climatic events. Winter interrupts the growth of the tree each year and the limit of its growth is marked by the formation of a ring.

The number of rings therefore corresponds to the number of *annual growth cycles* and we can count the rings to find the age of the tree. The date of its death (when it was cut down) is 'registered' in the last ring it produced, under its bark. In some cases, this can be estimated down to the year and sometimes even down to the week.

To date an archaeological sample its growth is compared to wood of a known date. It has therefore been necessary to collect the growth sequences of a large number of trees and establish reference collections. *Dendrochronological sequencing* sometimes covers several thousands of years!

In Europe, it is the oak that has the longest and the most useful sequence; scientists in Ireland, have managed to reconstruct sequences of almost 9,000 years.

Wood from an archaeological context may come from an ancient building or object, or be found simply as dead wood and it has often deteriorated to some extent. A sample for dating can be fresh, dry, waterlogged or carbonised; what is essential is that its structure has been preserved.

Once taken, the samples are treated in order to improve the anatomical reading; dry wood is polished, waterlogged wood is refreshed using a razor blade. Usually the peripheral rings have been lost and then it is impossible to establish the date when the tree was felled. In France, there are currently four specialist dendrochronology laboratories: in Marseilles (for dating underwater wrecks), Champenoux (regarding evolution of the French forests), Rennes, (species analysis) and Besancon, (for dating historical material including works of art).

In England, there are also services specialising in dendrochronology which are available to archaeologists.

BE

It is exceptional to have preserved wood in our area, so dendrochronology studies are rare

UK

A single sample of wood from the Dover boat was available for analysis giving a date of 1742-1589 BC, relating to the growth of the tree, not to when it was felled or used

FR

Preservation of wood from the Bronze Age is rare in our area, so this kind of study is rare

Bibliography

- J. Evin, A. Ferdière, G.N. Lambert, *Les méthodes de datation en laboratoire,* Paris : Édition Errance,2005.
- English Heritage on the web http://www.english-heritage.org.uk/publications/dendrochronology-guidelines/dendrochronology.pdf

Key points!

- Dendrochronology enables wood to be dated by counting and analysing the rings formed during tree growth.
- To be able to date wood, reference collections have to be established so that comparisons can be made.
- Analysis can be made using a sample that is fresh, dry, waterlogged or carbonised.

Tree rings © E.Wyremblewski

Activity suggestion no 19
Dating trees

Objectives:
• to find out about the growth of trees and how archaeologists use the information.

Equipment needed:
• 5 cut discs of wood, each having the complete diameter of the trunk;
• a magnifying glass, in the kit;
• a sheet of paper and pencil for each pupil;
• some crayons.

Digital support?
• yes.

Activity :
1. divide the class into 5 groups;
2. give each group a disc of wood;
3. ask the pupils to draw what they see;
4. when finished, as a class identify the different parts of the disc:
    - at the centre is the heart, the first year of the tree's growth;
    - next to the heart, the innermost layer is the sapwood;
    - the circular lines are called tree rings;
    - the outer layer is the bark;
5. each group counts the rings on their disc of wood to find out the age of the tree it came from.

Equipment for sampling ancient wood for dendrochronology © Hervé Paitier, Inrap

Carbon-14

Carbon-14 (or radio carbon) dating is a scientific process that enables the age of a material containing carbon to be calculated.

In theory, all materials containing carbon and formed less than 45,000 years ago, can be dated by the Carbon-14 process. The material may be in its natural state (e.g. bones, wood fragments, ivory tusk) or it may have been used to make something (e.g. fabrics, tapestries, prehistoric paintings, the Dover Bronze Age Boat).

Every living thing produces Carbon-14 throughout his, her or its life by interacting with the atmosphere. When the organism dies, the interaction stops and the Carbon-14 starts to disintegrate. The disintegration occurs at a constant speed, at a proportional rate.

It is therefore possible to determine how much time has passed since death, by measuring the Carbon-14 that is left in an archaeological sample and applying a known formula. Starting with 100% of active Carbon-14 in a living organism, following its death no more than 50% of it will remain after 5,568 years, 25% after 11,460 years, 12.5% after 17,190 years and so on.

Like dendrochronology, Carbon-14 analysis can give the archaeologist an 'absolute' (that is, a highly accurate) date making it possible to place the analysed remains in our calendar system.

Bibliography

J. Evin, A. Ferdière, G.N. Lambert, *Les méthodes de datation en laboratoire*, Paris : Édition Errance, 2005.

FR

At Fresnes-lès-Montauban Carbon-14 analysis on the inhumations showed that the cemetery was used from the start of the Early Bronze Age until the start of the Middle Bronze Age

UK

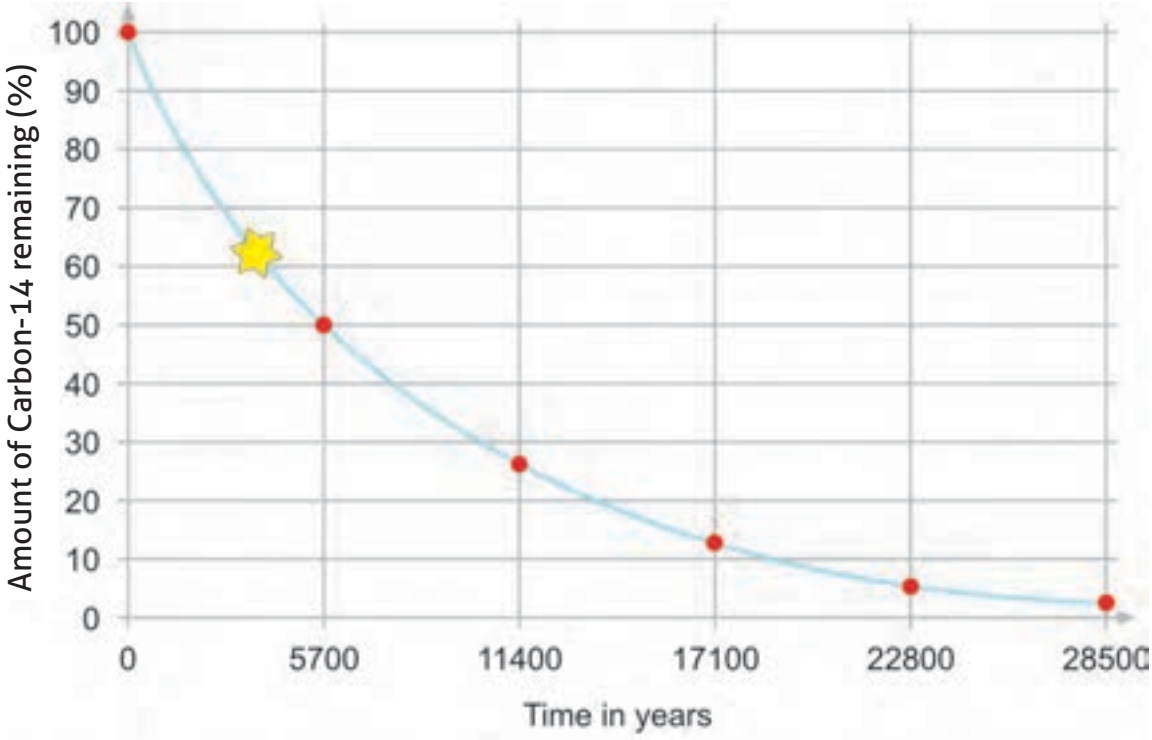
Wood, moss and shoots from the Dover Bronze Age boat have been analysed for Carbon-14 dating. The results show that the boat was built between 1575 and 1520 BC

BE

Radio carbon dating on cremated bone has brought new information about when the ritual practice of cremation began

Key points!

- Carbon-14 dating allows us to calculate the age of an organic material. C-14 gives us a highly accurate date.
- Every living thing produces Carbon-14 throughout his, her or its life. When the organism dies, the interaction stops and the Carbon-14 starts to disintegrate. The disintegration occurs at a constant speed, at a proportional rate.
- By this method, archaeologists can date many kinds of organic materials and objects made from them.



The star marks the amount of C-14 remaining in the Dover Bronze Age Boat

SECTION 2
CHAPTER IV

From excavation to exhibition – and beyond

The excavation report

Having completed an excavation, the archaeologist then moves on to the next stage – writing the site report. A certain amount of interpretation of the discoveries will have taken place while on site and now he or she will gather all the numerous written records, photographs and drawings that were made while the excavation was running in order to address this comprehensively. The site records together with specialist analyses of the finds and any samples taken in situ will all be assessed, sequenced and interpreted in order to tell the 'story' of the evolution of the site.

Particularly for a major dig, this 'post-excavation' work may take much longer than the excavation itself. There will be a great deal of data to interpret and there may be several specialists involved, some of whom may have a number of commitments running at the same time.

The final academic report, as well as being a single publication, may also contribute to a more extensive thematic work; for example several sites excavated in the same geographical area may be published together or sites dealing with the same subject matter, such as cemeteries of a particular period.

Following publication, in England all the original documentation for the site and for sample and finds analyses will be passed on to the local government authority where it will be added to the national record of archaeological data known as the Historic Environment Record. In France, all the documents will be transferred to the State archaeological service - *institut national de recherches archéologiques préventives (INRAP).*

Particularly for major projects, in addition to the academic report, the results of the excavation will usually also be published and disseminated in a number of ways for non-specialist audiences.

Writing the excavation report © Canterbury Archaeological Trust

Reaching a wide audience

Little is gained from archaeological discoveries unless they are broadcast for the benefit of others!

For the general public, many organisations have excavation tours, Open Days and volunteers may take part on site or with finds processing. Talks will be arranged for academic groups, archaeological and historical societies and special activities may be provided for national events like The Festival of Archaeology in England. Sometimes organisations will work together to put on an exhibition with an accompanying booklet or catalogue. In England, there are regional Young Archaeologist Clubs led by the Council for British Archaeology where young people get involved in activities throughout the year.

Other provision is made to support formal teaching and learning in schools and universities. Academic publications are usually produced for an excavation or series of excavations. These are aimed at other archaeologists, college and university students and those with specialist interests. A practising archaeologist may give talks to university and college departments about discoveries from a recent excavation or evidence for a particular era in a particular geographical area.

Presenting archaeology to younger people and non-specialist teachers in schools requires a particular skill set. An organisation may have a member of staff who works with these and teacher training establishments to provide services and resources to support the school curriculum. These can include specially designed excavation visits, classroom visits, website resources, resource packs and loan boxes of original and replica objects for handling activities.

Because archaeology is about looking at remains of the past, it clearly plays a key role in schools' History studies. Indeed, for the earliest periods of the past, archaeological remains may be the only evidence we have! Most subjects involve speaking and/or writing in pupils' native language and archaeology themed activities can also offer different, exciting opportunities to develop these skills. In Science studies, pupils can learn about ancient environments, how soil conditions affect preservation of buried remains and how twenty-first century scientific techniques are being applied in archaeological practice. These are a few examples of where archaeology can benefit teaching and learning. A creative teacher will find more.

The European project, 'Boat 1550 BC', was designed to engage a wide public in archaeology and a shared prehistory. Among its achievements are a travelling exhibition, a half scale replica Bronze Age Dover Boat, both enjoyed by many and handling kits, with associated teacher training, for schools to use in the participating countries of France, England and Belgium for years to come.

Archaeologist in the classroom (Kent, England) © Canterbury Archaeological Trust

School children discovering Roman artefacts (Kent, England)
© Canterbury Archaeological Trust

Archaeology Open Day (Kent, England) © Canterbury Archaeological Trust

The Boat 1550 BC exhibition

At the very heart of the 'Boat 1550 BC' project is the dissemination of knowledge. Hence, no less than two international symposia, fifteen general public lectures, teacher targetted seminars and child centred activities have been planned for the three countries during the lifetime of the project.

The 'Beyond the Horizon, Channel and North Sea Societies of 3,500 Years Ago' exhibition constitutes a high point in the project. Through seven themes exploring the construction of the Dover Boat and aspects of daily life, it invites visitors in England, France and Belgium to discover a common cultural identity shared since the Bronze Age and retraces the lives of the men and women as we might imagine them, thousands of years ago.

Collections of beautiful Bronze Age objects from all three countries were on display, together with material from recent archaeological research in France, Britain and Belgium assembled for the first time.

The accompanying exhibition catalogue amply illustrates the advances in our knowledge made possible by scientific research over the past twenty years, revealing a 'Euro-region' 3,500 years old.

The half-scale reconstruction of the Dover Bronze Age Boat
© Canterbury Archaeological Trust

Poster for the international conference 'Au-delà des frontières. Voyager, échanger, communiquer en Europe du IVe au début du Ier millénaire avant notre ère' © Cellule communication Lille 3

Poster for the international conference 'Yesterday Today: Bronze Age Connections in a Modern World' © Cellule communication Lille 3

Catalogue for the exhibition 'Beyond the Horizon, Societies of the Channel and North Sea 3,500 years ago' © Somogy éditions d'art

Launch of the Beyond the Horizon exhibition at the Heritage Center at Ename (Flanders, Belgium) © P. Van der Plaetsen / BOAT 1550 BC


Once upon a time...
Il était une fois...
Er was eens...