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91606



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Level 3 Biology 2022

91606 Demonstrate understanding of trends in human evolution

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of trends in human evolution.	Demonstrate in-depth understanding of trends in human evolution.	Demonstrate comprehensive understanding of trends in human evolution.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–16 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (///). This area may be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

QUESTION ONE: *HOMO BODOENSIS*

Source: www.dailymail.co.uk/sciencetech/article-10140669/Meet-Homo-bodoensis-Newly-identified-ancient-human-species-lived-Africa-500-000-years-ago.html

Source: <https://atlasvirtual.com.br/homobodoensis.htm>

Researchers suggest that a skull found in Bodo D'ar, Ethiopia, East Africa in the 1970s belongs to neither *Homo heidelbergensis* or *Homo rhodesiensis*, but instead, is a new species entirely. Both mitochondrial DNA (mtDNA) and nuclear DNA (nDNA) have yet to be sequenced.

Homo bodoensis has been suggested as a direct ancestor of our species *Homo sapiens*. The *Homo bodoensis* species hasn't been identified from new fossils, but on the re-examination of old ones. *Homo bodoensis* is currently estimated to have lived between 770 000 and 126 000 years ago, with the specimen shown dated to around 500 000 to 600 000 years ago.

The fossil of the skull has an enlarged cranium compared to *Homo erectus*, but smaller than *Homo sapiens*, which suggests it is an intermediate species between them. *Homo bodoensis* is not thought to be an ancestor of the Neanderthals or the Denisovans, as the cranium does not share similar features. The endocranial capacity is estimated to be approximately 1250 cm³.

A number of other remains previously thought to be *Homo heidelbergensis* have also been reclassified as *Homo bodoensis*. Based on these remains, there are suggestions that *Homo bodoensis* may have reached south-east Europe, but died out there about 200 000 years ago.

Discuss how new knowledge can lead to changes in human evolution theories.

In your answer:

- describe what is meant by the terms hominin and endocranial capacity
- explain how new DNA evidence (from mitochondria (mtDNA) and nuclear (nDNA)) can be used to approximate times of species divergence, and how this DNA evidence might support the Out of Africa Theory of modern human origins
- discuss how changes to the cranium and hand bones would benefit the lifestyle of *Homo bodoensis* compared with earlier hominins.

QUESTION TWO: NEANDERTHALS



<https://www.smithsonianmag.com/science-nature/rethinking-neanderthals-83341003/>

Neanderthals evolved in Europe and Asia while modern humans were evolving in Africa. Judging from fossil evidence from northern Spain and England, Neanderthals were already well established in Europe by 400 000 years ago.

Neanderthals ranged widely – from Portugal and Wales in the west across to the Altai Mountains of Siberia in the east. The range changed a lot, due to the effects of the ice age, when at times, there were land bridges and at other times, ice or water. Around 300 000 years ago Neanderthals developed a stone tool technology known as the Levallois technique. This involved making pre-shaped stone cores that could be worked into a finished tool at a later time. It meant Neanderthals were free to travel away from sources of raw material and yet be able to make tools when needed.

The bone damage found on Neanderthals suggests they were assisted in their recovery after injury.

Ancient DNA began to be recovered from Neanderthal fossils in 1997, and this has led to the reconstruction of several complete genomes. These indicate that Neanderthals living from Spain to Siberia were relatively low in both population and diversity during their last 20 000 years. The genome of one female individual from the Altai Mountains also shows signs of long-term inbreeding in her population.

It seems that regular, and sometimes extreme, climatic fluctuations continually fragmented Neanderthal groups during the last 100 000 years, preventing them from building up large populations and continuous distributions across their range.

**Extra space if required.
Write the question number(s) if applicable.**

QUESTION
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