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The Discovery and Classification of Remains of Hominid Found in a Cave in
Present-Day Morocco

by Hannah Kim

(Honors Biology 1152)

The Assignment: Write a paper following a professional format that describes the author's research of a fictional, but realistic, data set.

ABSTRACT

Five artifacts to include two unidentified hominid skulls were found in a dry cave within the present day Morocco. The other artifacts were the anterior two-thirds of a femur from a hyena, unidentifiable skeletal fragments, and a stone spearhead with remnants of wooden shaft. The artifacts were dated to be from the Pleistocene period, before *H. habilis* became extinct. Skull A was identified as a male *H. habilis* and Skull B was identified as female *H. erectus*. The two skulls were 1.6 million years old supporting other studies that the species co-existed.

INTRODUCTION

The climate of Africa is different according to the region where there are lowland forest, dry savannas, grassland, deserts, and woodlands. The climate in Africa 3 million to 2.4 million years ago was cooler and drier allowing vast area of grassy plains and opportunities for scavenging for herds (Isaac and McCown 1976).

The remains of the hominids that compose the lineage of mammals called the Primates include the great apes and humans. Hominids are known for their large bodies, long arms, short legs and no tail (Freeman 1999). The oldest hominid that is known is the *H. habilis* is known as the "handy man," from 3.2 million years ago, found through out Africa (Kurten 1993). *H. habilis* had a larger brain, smaller cheek teeth, smaller body size and long arms compared to australopithecines (Larsen et al 1998) and were known to have made stone tools having a advantage over earlier hominids. Using tools to obtain meat in their diet, *H. habilis* evolved mental problem-solving ability, social organization, and rudimentary speech, which stimulated intelligence resulting a growth of brain size. *H. habilis* occupied much of Africa and is believed that they did not migrate outside of East Africa unlike *H. erectus* (Leakey 2003). *H. erectus* known as the "upright man" succeeded *H. habilis* based on its larger brain size and its smaller molars (Larsen 1998). *H. habilis* and *H. erectus* coinhabited including also with later *Australopithecus* species for probably more than a million years (Kurten 1993).

The change from Australopithecines to *H. erectus* was caused by the increase of reliance on culture and climate changes (Phenice 1969). *H. erectus* emerged from East Africa in the same region as *H. habilis* but 1.2 million years after later. Evolution of cultural innovation, which is working with stones to make a desire shape created a bend in cranial. This appeared 1.5 million years ago that caused a deepening of the pharynx, allowing speech. Another morphological changed is the reduction of molar size that was linked to a change of diet and the presence of stone tools with sharp edges (Kurten 1993).

Paleontologists recently found two hominid skulls, a femur from a hyena, bone fragments, a stone head with wooden shaft in a cave within present-day Morocco. The remnants of the cave walls indicate an original size of 1 m height, 4 m length, and 3 m width. The cave's entrance was sealed

and showed no signs of having been open to recent history. The objective of this research were to estimate the ages of the five artifacts, identify the hominid species, and explain how all associate to each other. In addition, the identities of the individuals were explored as to determination of gender, age, height, approximate live weight, cause of death, the age of death, and health of the time of death.

METHODS

Uranium-235 was used to date the five artifacts. Five samples from each artifact were used in dating. Student t-tests for independent samples were applied to determine statistical differences between the skulls and also the skulls to the remaining items found in the cave with the difference of significance at $p < 0.05$. Brain capacity, emphasis on brow ridge, and flatness of the face were used to determine the identity of the skulls.

The gender of the skulls was identified through a method called sexual dimorphism that looks at the differences in sizes of frontal lobe, mastoid, and the nuchal area. These characteristics were based on *Homo sapiens*. The weight and height could not be determined because more bones are needed with the skull (Larsen 2000). The age of death was estimated with the Cranial Suture Method which measures the ten different suture parts of the skull and scores the openness of the suture with the following scores: (0) for open, (1) partially closed, (2) mostly closed, (3) closed, and the sum of the scores indicates the age of skull (Nafte 2000). The hyena femur was identified by anatomy.

RESULTS

The cave artifacts were dated to about the same statistical time period of roughly 1.7 million years (Table 1). Skull A was not statistically older than Skull B or older than other artifacts. The only significant ($p \leq 0.05$) differences in ages were found between Skull B and the wooden shaft, bone fragments, and hyena femur (Table 1). Skull A was identified as belonging to *H. habilis*, and Skull B was identified as *H. erectus*. The cranial capacity of *H. habilis* was 850cc and *H. erectus* was 1000cc. The male *H. habilis* had a large mastoid foramen, a low and flat forehead with brow ridge, a rough nuchal area with hooks, and a large frontal lobe that are features of a male. The rounded and high forehead, a smooth nuchal area without hooks, small frontal lobe, and narrow jaws, provide evidence of a female *H. erectus* (Burns 1999).

The average weight and height could not be determined from the skulls because more bones are needed to calculate the body stature and size of the individual. All the vertebrate bones, the sacrum, the leg bones, and the feet are all needed to determine the stature of the skeleton (Poirier 1981). There were no significant holes or dents in the skulls to determine trauma or disease that would have caused the death of the individuals, nor is there any flesh or organs to determine trauma that might have occurred (Nafte 2000). *H. habilis* had a composite score of 13 having the age range of 34 to 62 years old, while the female *H. erectus* had a composite score of 11 having the age range of 26 to 54 years old (Nafte 2000).

DISCUSSION

The five artifacts are dated to the Pleistocene period, when *H. erectus* evolved and co-existed with *H. habilis* (Phenice 1969, Kurten 1993). The species co-existed together for over one million years but did appear to interbreed based on unique morphological distinctions (Kurten 1993). The wooden shaft with the stone spearhead was believed most likely made by *H. erectus* as the hominid is known to have constructed weapons using wood. The hyena femur may have been left after the meat was eaten, and used for bone marrow consumption with the bone fragments (Skomal 2005). The artifacts might also been deposited by the stream that was brought into the cave in a cluster by a

result of an individual throwing bones into the stream after consumption.

Climate of the time is a possibility of why the five artifacts were found in the cave. The fragmented bones could be found in a cluster after being chewed up and broken by either *H. erectus* and *H. habilis* consumed the animal or animals. However single remains of individual skulls, hyena femur, wooded shaft, or bone fragments do not provide enough information to determine why they were are found in the cave. Further excavation should be made to find other artifacts in the cave to understand the history of the cave.

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Table 1. Summary of the ages (sample mean and standard error; all $n = 6$) of the various materials found in a cave in Morocco. Student t values from comparisons to the skulls are provided. *denotes significance ($p \leq 0.05$).

Item	Years	Comparison To Skull A +	Comparison To Skull B P
Skull A	1678133 \pm 11925		
Skull B	1643000 \pm 11115	2.155	
Wooded shaft	1715833 \pm 15547	1.924	*3.811
Bone fragments	1684333 \pm 7906	0.433	*3.030
Hyena femur	1688800 \pm 7126	0.768	*3.469