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Evaluating the Finds of a Recent Discovery of Humanoid Bones Suggesting the Coexistence of and Mating between *Homo sapiens* and *Homo neanderthalensis*

by Sara Heppner

(Honors Biology 102)

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

Abstract

Past research has suggested that Neanderthals went extinct approximately 30,000 years ago. However, in a recent discovery, paleontologists found two parietal skulls of unidentified humanoids, a humanoid-type bone, a wooden section of a tool, a skull and leg bones belonging to an Irish elk (*Megaloceras*), and a bivalve shell. The finding was made in a cave near Vallon-Pont, d'Arc, France that is located on a river valley and is subject to flooding. A stream runs directly through the cave. In an attempt to identify the species belonging to the bones and the ages of the shell, tool, and elk, the items were dated using carbon-14. The carbon dating showed that of the six samples found only one, which was identified as a human tibia, was far younger than the other samples aging in at a little over 14,000 years. The other specimens were comparable in age at about 18,000 years. Based on anatomical analysis, one skull was determined to belong to the species *H. neanderthalensis*, while the other was classified as an early *H. sapiens*. Findings indicate *H. sapiens* and *H. neanderthalensis* coexisted 12,000 years beyond that previously recorded.

Introduction

The cranial space for *H. sapiens* is 1400 cc which is about the size of that for *H. neanderthalensis* (Balter 2002). However, in considering size readjustments to compensate for Neanderthals' more robust bodies, their brains are slightly smaller than ours. Thus, researchers have distinguished Neanderthals as a separate species (Balter 2002). Previous evidence suggests that Neanderthals coexisted with *H. sapiens* for millennia while the Neanderthals neared extinction about 30,000 years ago (Balter 2002). Through evolutionary advancements, cranial shapes have modified over the years to allow large brains to fit into a smaller space. An identifiable feature of the *H. neanderthalensis*' skull is the cranium shape that is relatively long and low as compared to the skulls of *H. sapiens* (Leakey and Lewin 2002).

Neuroscientists have spent decades scanning the frontal lobe of the brain and have associated the area with function of modern human behavior, such as creative thinking, artistic expression, planning, and language (Balter 2002). The temporal lobe is linked to hearing and memory thus explaining the need for cranial expansion. Expansion of these areas would lengthen the anterior segment of the cranial base and push the face into a vertical position, instead of a protruding position like that of a Neanderthal. The skull of Neanderthals also tends to be thicker than that of *H. sapiens* and a distinguishable characteristic of the Neanderthal is the

defined brow ridge (Lewin 1987). Studies of brain deformations in living infants show that brain shape changes the shape of the cranium. This means that the skull does not reform to match the brain size, but, as the human species becomes more knowledgeable, skulls adapt to growing brains verifying that natural selection acts directly on the brain and skull shape follows.

Researchers argue that the first modern humans did not appear until about 50,000 years ago in Africa (Balter 2002). Then, starting about 40,000 years ago during the Upper Paleolithic period, *H. sapiens* dispersed northward in Europe. This was a time when many archaeological findings showed intricate creativity, expressed through individualized embellishments, ritualistic burials, and cave paintings, such as the 32,000-year-old artworks at the Grotte Chauvet in France (Balter 1999). This discovery, of course, can draw a connection that Neanderthals were widely dispersed across Europe and were considered to be cave dwellers. In fact, in that very cave, researchers have found traces and paintings of bears, which makes it feasible that the artists entered the cave while the animals were hibernating. This can explain why a number of bear skulls were found piled together in one chamber. The bears may have had special significance to the human occupants, for instance sacrificial ritual purposes. Still, researchers cannot be sure if humans placed the skulls deliberately (Balter 1999).

The goal of this research is to determine the ages of the six materials found in a French cave near Vallon-Pont, d'Arc through which a stream flows. The ages of the two skulls, humanoid-type bone, wooden tool, Irish elk (*Megaloceras*) skeleton, and a bivalve shell were determined through carbon-14 dating. In accomplishing objectives, the relationships of the six items were explored. The hominid remains were identified to species with attempts made to incorporate vital statistics.

Methods

Carbon-14 was used to estimate the ages of the six cave artifacts found. The differences in the ages of the six cave artifacts were tested using a pair-wise independent-variable t test where significance was determined at $p \leq 0.05$. The anatomical features of one of the two skulls and a hominid bone were compared to remains of known hominids as to identify species. Sexually dimorphic features, number of teeth, and the condition of the skulls were used to learn gender, age at death, and a possible cause of death.

Results

Table 1 summarizes the archeological ages of the six cave artifacts as well as statistical testing. Only the tibia, from the right leg of a *H. sapiens* showed a notable difference in age.

The smaller skull was believed to be that of a younger female *H. sapiens* according to the small discrete mastoid process of the temporal bone which is located behind the ear at the base of the skull. The skull of the assumed *H. sapiens* also possessed no brow ridges further suggesting that it was a more modern and evolved species, and along with this, its distinction as a female was supplemented by the distinct supraorbital process along the lateral side of the eye socket. In addition, this female humanoid skull had a rounded frontal bone, unlike males who have a forehead that is more flat and squared off (Rhine 2002). Since the *H. sapiens* skull did not have a full set of 32 teeth, her age was estimated at roughly 21 years or older.

The skull was identified as belonging to *H. neanderthalensis* and male due to the more pronounced superior and inferior nuchal lines of occipital bone that allows for greater muscle attachment, a dominant feature in males (Rhine 2002). This skull also had orbitals that are more squared where they would be more circular as a female skull. However, unlike a female, the mastoid process was large and prominent. The skull had 32 teeth indicating an age of 21 years at time of death assuming aging similarities to *H. sapiens* (Rhine 2002).

Discussion

There is little doubt that modern humans' lifestyle quickly surpassed that of the Neanderthals (Gibbons 2001). Soon after Cro-Magnon people arrived in Europe, they made sophisticated weapons and tools out of bones, painted vivid scenes on cave walls, and carved animals out of ivory. Meanwhile, Neanderthals continued to use simpler artifacts. Considering that the two species existed together for thousands of years there is little evidence that they influenced one another. The modern human figures and Neanderthals appeared to maintain their own ways of life until the Neanderthals eventually went extinct.

The two skulls were found in the same cave and dated to the same statistical archeological age, thus supporting that *H. sapiens* and *H. neanderthalensis* coexisted. It has been questioned whether Neanderthals interbred with humans. Genetic assimilation into the population of *H. sapiens* is one explanation to the demise Neanderthal.

The wooden tool likely had a stone attached to it at one point in time. Only *H. sapiens* probably had the ability to develop a tool as sophisticated as the one found (Jordan 1999).

Irish elk were a common part of the landscape during Neanderthal times and was used as food by both hominids (Tattersal 1995). However, the conditions of the bones were not recorded. Cut marks on the bones would be evidence of butchering. The unidentified bivalve shell could have been part of some archaic type of jewelry or some sort of serving dish, or simply washed into the cave by the stream.

The tibia, due to its age, was completely unrelated to the scene. It could have been that the individual that the tibia belonged was deceased and the tibia happened to be deposited in the cave. The exact causes of death of the three hominids remained a mystery as there were no signs of fractures or trauma to the skulls and tibia. Since only skulls and a single tibia were found in the cave, it is possible that a continued cave excavation may yield more bones and artifacts.

There continues to be much controversy over where Neanderthals originated and how they coexisted with modern humans. As illustrated in Figure 1, at sites in Israel such as Amud and Tabun, remains of late archaic humans have been found, while early modern human remains were found in the Israeli caves of Qafzeh and Skhul (Wolpoff and Caspari 1997). In an attempt to support his argument that Neanderthals could interbreed with modern humans, Wolpoff and Caspari (1997) attempted to find errors in DNA analysis. However, analysis of mtDNA in living humans confirmed earlier conclusions that family trees show that all modern humans were descendents of an African group, Africa being the continent where Neanderthals were thought to have first originated. Wolpoff refuted these findings insisting that the research neglected to find the most probable tree out of a forest of possibilities. There were indeed several sparsely populated phylogenetic trees, some with African roots, some with Eurasian roots, and some with roots from all over the world implying the simultaneous evolution into modern humans in many regions. It is statistically difficult to determine geographic origins for modern humans from DNA alone (Trinkaus and Shipman 1992). Future analysis will be necessary to draw more

definite conclusions. Although, this research provides solid evidence that the two species of hominids did coexist and that Neanderthals went extinct 12,000 years later than had been previously assumed.

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Figure 1. The evolution of man and the extinction of Neanderthals reconsidered.



Lateral views of Levant crania. The specimens (top row, from left to right) are Qafzeh 3 and 5, and Tabun; (second row) Skhul 9, Amud, Skhul 4; (third row) Qafzeh 6, Skhul 5, Qafzeh 9. Of these crania only Tabun and Amud are classically considered Neandertals, but as can easily be seen, the differences in anatomy within the sample are gradual, and not large. This has always been the problem with their interpretation: where do Neandertals end and other races begin? The Mount Carmel sites are Skhul and Tabun. Their variation is an accurate reflection of the variation in the larger sample now known from the region.

(Numbers correspond to the individuals to whom the skulls

Table 1. Mean \pm standard deviation age in years for the human (*Homo sapien*) skull, Neanderthal (*Homo neanderthalensis*) skull, human (*Homo sapien*) bone, wood tool, Irish elk skeleton, and bivalve shell. All $n = 6$. The age of the human tibia was significantly different from the ages of the other cave artifacts (all t 's > 3.6 , $p < 0.05$, independent t -tests). The remaining cave artifacts did not differ significantly in age.

Cave artifact	Archeological age (years)
<i>Homo sapien</i> skull	17571 \pm 1547
<i>Homo neanderthalensis</i> skull	17378 \pm 1339
<i>Homo sapien</i> tibia	14399 \pm 1425
Wood tool	17580 \pm 1557
Skeleton of Irish elk	17875 \pm 1537
Bivalve shell	18083 \pm 1525