Neanderthal Lacked Anatomical Competitive Edge: Skeletal Remains Tell the Story

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The Reconstruction of the Funeral of Homo neanderthalensis. Captured in the Hannover Zoo. (Via Wikipedia)

(PhysOrg.com) -- A new study of the skeletal fossils of Neanderthal and Early modern man suggest the lack of a "throwing arm" may have made the difference in human evolution. Researchers Jill A. Rhodes and Steven Churchill, evolutionary anthropologists published their findings in the January 2009 edition of the *Journal of Human Evolution*. The paper entitled, "Throwing in the Middle and Upper Paleolithic: inferences from an analysis of humeral retroversion," provides some clues to the extinction of Neanderthal.

Projectile weaponry was an important component of early man's survival toolkit. Traces of projectile weaponry have been found in Africa dating back some 80,000 years. The mass migration by early man out of Africa

into Europe some 40,000 to 50,000 years ago, show early European man developed and used bow and arrows and other projectile devices. The Rhodes/Churchill small sampling of Neanderthal's skeletal remains indicate he was outmatched by early modern man's development of a "throwing arm". This anatomical feature is measured by the degree of humeral retroversion in the dominant arm and in bilateral asymmetry.

Neanderthal's short squat body, massive limbs and lack of backward displacement at the shoulder joint may have hampered their ability to incorporate projectile weaponry. According to Jill Rhoades, an evolutionary anthropologist examinations of early modern European fossils show the backward displacement at the shoulder joint, but none of the small sampling of Neanderthal's skeletal remains carry this anatomical characteristic.

Modern athletes like baseball pitchers have this characteristic in one shoulder joint and it is referred to generally as their "throwing arm". When engaging in over head throwing activity, such as throwing a baseball or a spear, this increases the movement of the muscles and gives greater velocity and speed to the throw, according to Steven Churchill an anthropologist at Duke University. This missing technology, along with climate change and competing arrow-shooting humans significantly challenged Neanderthal and may have led to an eventual extinction.

According to the Rhodes/Churchill study, habitual behavior patterns, including those related to the production and use of technology, can be imprinted on the skeleton through both genetic and epigenetic pathways. Samples of bilateral humeri sufficient for measurement of Neanderthals are rare. The study consisted of two males and one female. The study concludes, that while the sample was small, consistently it was found that Neanderthal lacked the characteristic "throwing arm" found in early modern man.

According to archeologist Eric Boeda of Paris X, Nanterre, Neanderthal was not without his resources. Boeda's team identified bitumen, a tar-like substance on sharpened stones in Syria inhabited by Neanderthal nearly 70,000 years ago. The bitumen was used as an adhesive to attach sharpened stones to wooden handle in a procedure called hafting. This finding by the Boeda research team using gas chromatography-mass spectrometry and carbon isotopes at 40km from the source places the hafting practice back 30,000 years from the date previously set in other research.

Anthropologists agree, Neanderthal could throw spears short distances, but never graduated to the use of bow and arrows or spear-throwing technologies. Some 40,000 years ago, modern humans trekked out of Africa to Europe taking their bows and arrows with them for fishing, hunting and warfare. The bow and arrow enabled modern man to engage his environment and adapt to various environments. While it is cannot be stated with absolute certainty, Neanderthal's inability or lack of interest in developing projectile weaponry may have been an important factor in his eventual demise. Scientists are uncertain as to whether modern human used bow and arrows or projectile devices against Neanderthal, but it is a distinct possibility.

For further reading on the subject, See Journal of Human Evolution, Volume 56, January 2009, Throwing in the Middle and Upper Paleolithic: inferences from an analysis of humeral retroversion, Jill Rhodes and Steven Churchill.

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