

The Hyoid Bone and the Capacity for Speech in Hominids and Apes

News Type: Other — Wed May 14, 2008 12:13 AM EDT
science, speech, human-evolution, anatomy, apes, neanderthal, physiology, hominids, babels-dawn, hyoid-bone

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The appearance of the hyoid bone in the humanoid fossil record occurred possibly 800,000 years ago. How this affected human speech, or at least the potential for human speech, can be inferred by the differences between the hyoid bone in modern humans, Neanderthals, and the great apes.

Let us first describe the hyoid bone. The hyoid bone is horseshoe shaped bone, really more cartilage than bone, that sits atop our voiceboxes which in turn sit on top of the trachea. It is unique in that it is the only bone in our anatomy that is not directly attached to the rest of the skeleton. It is attached only by ligaments and muscles (BoneClones.com 1995-2008).

In chimps, one of our closest relatives, the hyoid (as well as the larynx) descends in the newborn. But only in newborn humans does "the hyoid descend in relation to the lower jaw and cranial base" (op cit). In other apes, it is believed that the hyoid bone does not descend (PubPages.UNH.edu undated). Neanderthals have a smaller tract with a hyoid bone that is midway in appearance between the chimp and human, and humans also have a lower larynx (op cit). The conventional view was that speech arrived as part of our cultural and physical heritage only in the past 100,000 years with the arrival of *Homo sapiens* (Bunney S. 1989). That view is now in dispute.

However, in a fascinating archaeological discovery, a fossil bone unearthed in Israel suggests that Neanderthals (who lived about 50K to 60K years ago) may have been capable of speech as well as modern humans. The delicate, partly cartilaginous hyoid bones are rather rare finds. This hyoid, excavated in 1983, was from an adult male Neanderthal.

Jeffrey Laitman of Mount Sinai School of Medicine, New York, believes that speech began developing with *Homo erectus* about 1.5 million years ago (Bunney S. 1989). Over the course of another million years, the hyoid and the rest of our vocal toolkit took on its present form. Neanderthals were always thought to be rather behind in vocal development compared to *sapiens* (Falk D. 1975), a bit like rednecks to the Brahmin-like *sapiens*.

But much to the surprise of anthropologists, this Neanderthal hyoid was just like a modern human hyoid.

In general, the progression of the pre-hominid hyoid and the modern hyoid involves losing a cup shape in the middle, according to Dutch linguist Bart de Boer. This cup indicates the presence of air sacs, used by apes (and many other

animals) to produce louder percussive and even booming noises. The howler monkeys are especially well adapted to use their resonating sacs increase the volume of their calls (Bushnan, J. S. 1854). All apes have the cup shape and that feature is lacking in the human hyoid. Modern hyoids are now known (or thought) to be common to modern sapiens, Neanderthals, and even *Homo heidelbergensis* of 800,000 years ago (Bolles, E.B. 2008).

This leads to more than speculation about the larger range of sounds possible once one is not limited to hoots and grunts. As Bolles says in his blog, Babel's Dawn:

"But what evidence is there that the loss of air sacs might be related to the rise of speech? De Boer has modeled the sounds that follow the addition of an air sac to the vocal system. Air sac result in lower frequency sounds and a smaller acoustic range than humans enjoy. Air sacs shorten the articulatory range and the mouth is less able to shape the sound that comes out from an air sac vocalization. De Boer hypothesized that when what you say becomes more important than how you sound, air sacs give way. So the disappearance of air sacs is likely a good bit of evidence that speech of some sort has appeared (Bolles E.B. 2008)."

So at this point it seems safe to conclude that the modern hyoid bone was key to expanding our vocal capabilities, aiding our progression from apes who communicated with hoots, grunts and gestures to the modern electronic sapiens who communicates with email and iPhones.

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