Ready, aim, throw! Lobbing rocks key to meat-eating

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A game of catch could show how our distant ancestors survived on the African savannah. The ability to hurl stones hard may have been one of the most important steps in our evolution, because it allowed us to take down big game before the invention of tools or spears.

Throws three times as fast as a chimpanzee *(Ima Elsa/Getty)*

The storage of energy in shoulder muscles is crucial to our throwing skills, according to an analysis of modern athletes by Neil Roach of George Washington University in Washington DC, and colleagues.

Other primates can throw, but not as well as humans. "Chimpanzees are incredibly strong and athletic, yet adult male chimps can only throw about 20 miles per hour – one-third the speed of a 12-year-old little league pitcher," Roach says.

The team studied 20 young men who were good at throwing, using a 3D camera system to build a biomechanical model of movement during the act. Roach realised that the shoulder muscles store energy and make the throw more powerful, and suggests that such storage first appeared around million years ago in *Homo erectus*.

Fastest motion

Human shoulders are subtly different from those of our ape-like ancestors. In particular, our shoulder sockets face out to the side, rather than facing forwards.

Anthropologists have long assumed that *H. erectus* ate a much more meat-based diet than earlier hominins like *Australopithecus*, which were largely dependent on grass and other plants. *H. erectus* also looked quite different, with a flimsier skeleton, long limbs and big brains. "This change happened fairly rapidly," says Rhodes, and eating more meat may have been partly responsible.

Hominins also evolved weaker bites around the time of *H. erectus*, according to a study of fossil skulls by Carolyn Eng and colleagues at Harvard University. The hominins may have figured out how to process food, beating it to soften it or even cooking it, allowing them to extract more energy from it for less effort (*American Journal of Physical Anthropology*, DOI: 10.1002/ajpa.22296).

"Cooked meat frees up time normally spent chewing and digesting and also increases access to the nutrients," says Rhodes. "This also would be a major behavioural adaptation. By reducing chewing and digestion time, that frees time and energy for other activities such as socialisation or tool making."

Much later, perhaps as recently as 70,000 years ago, hunting took another big step forward when humans learned to make true projectile weapons, probably spears.

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