

# CHAPTER 5

## Gender Size Differences

*“Some questions, including those pertaining to...sexual dimorphism...appear to be resistant to solution—or are at least ongoing subjects of polarized debate”*

[Kimbel and Delezenne, 2009, p. 39]

**Introduction.** A difference in body size between males and females is referred to as sexual (or gender) size dimorphism. In most animals males are larger than females and their physical weapons such as antlers, horns or canine teeth are inevitably larger. Males have been naturally selected in these ways because they fight with each other over access to females. Those who are bigger, stronger and better equipped for combat are more likely to win these battles, giving them an advantage in the competition for mates and increasing the frequency of their genes in the next generation.

Females don't fight to get pregnant because males willing to perform this service are not a scarce quantity. They are not naturally selected for combat because there is no reproductive benefit in it for them. Females of many species are not sexually receptive when they are pregnant or lactating, which is most of the time. Thus receptive females *are* a scarce quantity, males fight over them, and the victors gain the most mating opportunities. This is the prevailing explanation of gender size differences.

In the field of human evolution, sexual size dimorphism looms large. The major evidence consists of fossilized bones and teeth, and the predominant goal of analysis of these precious relics is to learn something about the *behavior* of our ancient ancestors. “Sexual dimorphism is the primary morphological evidence for social behavior in early hominins” [Plavcan, et al., 2005, p. 318]. It is one of the few potential means of inferring behavior in hominin groups [Harman, 2006]. Gender size differences provide “a window onto behavior in earlier hominids and added perspective on the evolution of human social behavior and mating systems” [Larson, 2003, p. 9104].

Were hominin males fighting with each other for mating opportunities? The message in the bones makes it seem likely. *Australopithicus afarensis* and later fossil hominins had greater sexual dimorphism than exists among modern humans [Johanson and White, 1979; Harman, 2006]. In this chapter, the evidence and its interpretation will be summarized. The result proves to fit

seamlessly with the proposal that hominins underwent an evolutionary adaptation to the bipedal use of hand-held weapons in which males did most of the fighting.

**Sexual selection and sexual size dimorphism.** Darwin [1871] placed male against male competition for females in a special subcategory of natural selection which he called “sexual selection” (that is also based on reproductive success). Darwin proposed two forms, one for each gender. Males battled among themselves for direct access to females or for possession of resources like food that females need. Females were the choosy sex, selecting males to breed with based on their evaluation of personal attributes such as physical signs of health and vigor. Darwin stated that the greater size and strength of modern human males compared to females, together with their broader shoulders, more developed muscles, greater courage and pugnacity were due to the success of the strongest and boldest men in the general struggle for life and in their contest for mates. Success would have ensured their leaving more progeny than the males they defeated.

Darwin’s view remains in the forefront of current thinking. Fighting typically has been far more important to male than female reproductive success (Chapter 3). Because males can father more offspring than a female can produce, they will compete for access to more potential mothers. Large size and better weaponry therefore will be favored by natural selection [Gaulin and Sailor, 1984; Foley, 1987; Mitani, et al., 1996]. Selection for fighting presumably explains the marked sexual dimorphism of early hominins [Kirschmann, 1999; Plavcan, 2000; Carrier, 2004; Harman, 2006].

The role of female choice is often difficult to determine. The ability of males to defeat rivals may indicate that they are healthy and vigorous, which might entice a female to choose them for mating. However, sometimes females may have no choice. The male may be capable of injuring her if she tries to refuse his advances [Gould and Gould, 1989].

**Polygyny, monogamy, and size dimorphism.** When analysis of hominin bones suggests that the population was sexually dimorphic in size, the deduction is usually made that the males were “polygynous.” Polygyny is often defined as having more than one “wife” at a time, but since there is little likelihood that early hominin males had wives, in this context it means males mated with more than one partner.

Hominins might have lived in small groups of one male who defended a harem with children (as do gorillas), but this view is not favored because at some hominin sites there is evidence of several individuals of both genders, suggesting that early hominins lived in mixed groups of males and females, like chimpanzees [Johanson and White, 1979], and mated with multiple partners. In chimpanzees and bonobos this is displayed as “promiscuity” with both males and females having sexual relations with different partners. There is no pair-bonding and no

paternal support [Ryan and Jethá, 2010].

Polygyny, where males potentially have access to multiple mates, is linked with sexual size dimorphism and inter-male fighting for mating partners. The proposal that early hominin males added the use of hand-held weapons to their fighting behavior, that females remained adapted to the role of gestating and nurturing children, and that the two genders were sexually dimorphic in size is symbolically depicted in Figure 2.

Gender size monomorphism (males and females are the same size) is associated with monogamy. With one exception (cited below), numerous analyses of the hominin fossil record have rejected this form of social organization.

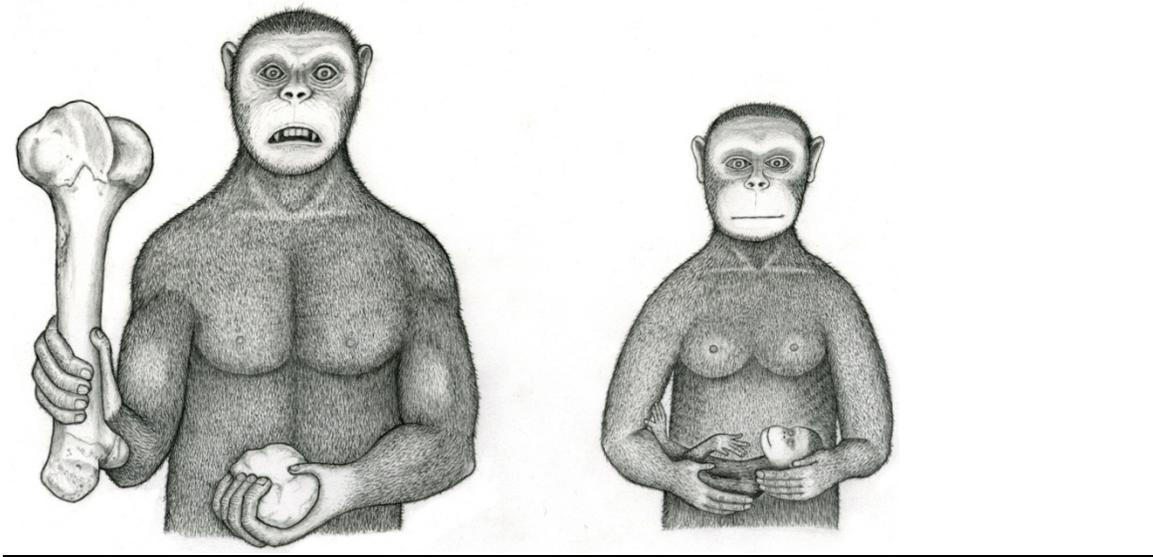


Figure 2. Artist's conception of an early hominin male and female, illustrating sexual size dimorphism, related to the male's use of hand-held weapons (a club for striking and a spheroidal rock for throwing), an addition to that gender's ancestral role of fighting. The smaller female, holding an infant, depicts her major role in producing and raising the next generation. The male is flashing his sharp canines, which in subsequent hominins became obsolete for fighting and were naturally selected for other purposes. The male and female are not married or pair-bonded (although they might be friends) because early hominin mating was presumably promiscuous, with advantages going to the best male fighters because they achieved higher dominance status.

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