(Wo)man the hunter: The archaeological evidence

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Land Acknowledgment
The University of Delaware occupies lands vital to the web of life for the Lenni Lenape and Nanticoke, who share their ancestry, history, and future in this region.

The University of Notre Dame is on the traditional territory of the Haudenosauneega, Miami, Peoria, all of the Bodéwadmik Potawatomi peoples, and particularly the Pokégnek Bodéwadmik/Pokagon Potawatomi.

Running Head: Archaeological support for female hunters

Abstract: The Paleo-fantasy of a deep history to a sexual division of labor, often described as “Man the Hunter and Woman the Gatherer,” continues to dominate the literature. We see it used as the default hypothesis in anatomical and physiological reconstructions of the past as well as studies of modern people evoking evolutionary explanations. However, the idea of a strict sexual labor division in the Paleolithic is an assumption with little supporting evidence, which reflects a failure to question how modern gender roles color our reconstructions of the past. Here we present examples to support women’s roles as hunters in the past as well as challenge oft-cited interpretations of the material culture. Such evidence includes stone tool function, diet, art, anatomy and paleopathology, and burials. By pulling together the current state of the archaeological evidence along with the modern human physiology presented in the accompanying paper (Ocobock and Lacy, this issue), we argue that not only are women well-suited to endurance activities like hunting, but there is little evidence to support that they were not hunting in the Paleolithic. Going forward, paleoanthropology should embrace the idea that all sexes contributed equally to life in the past, including via hunting activities.

INTRODUCTION

Strong archaeological evidence for the sexual division of labor is associated with the advent of agriculture and the Neolithic (e.g., Masclans et al., 2021), suggesting human societies were more egalitarian in the earlier Paleolithic. This contrasts with the popular image of the Paleolithic, such as the portrayal in Mel Brooks’s movie History of the World, Part I of a caveman hitting a woman over the head and dragging her back into the cave as property. Or when overtly sexist
men are described as “Neanderthals” in the contemporary media. Yet it is this inaccurate popular image that is implicitly and explicitly presented in the figures of anthropology and archaeology textbooks when Pleistocene men are depicted as the protagonists of the images, and hunting—specifically male-only hunting—is celebrated as the behavior that differentiates humans from the other primates (Gifford-Gonzalez, 1993). Recent surveys found that Paleolithic textbooks and museum images have become more biased toward centering men over time, not less (Khorasani and Lee, 2020; Solometo and Moss, 2013). These images of “Man the [hero] Hunter” and “Woman the [background] Gatherer” become the public face of paleoanthropology, and the assumptive hypothesis from neighboring disciplines is frequently that the sexual division of labor in the Pleistocene must have been extreme (e.g., Arner et al., 2021).

The persistence of the “Prehistoric Man the Hunter” hypothesis is also a misapplication of modern forager studies to the past: modern foragers are not living fossils. Their social structures have evolved over time and been influenced by agricultural/pastoral neighbors as well as interpreted through the eyes of patriarchal and colonial governmental administrators and outside researchers (Wilmsen and Denbow, 1990). Especially during the heyday of forager ethnographies in the last century, researchers were predominately male and did not necessarily have or desire access to female spaces or recognize their bias away from women’s work (Owen, 2005). This view of the past is also a product of long-held assumptions that men are physically superior to women in most ways, never rendered infirm by their reproduction, and therefore natural hunters. This myth is interrogated and dispelled in the sister article to this one, where women’s endurance capacities are explored (Ocobock and Lacy, this issue).
When applying research from recent human biology to ask questions about the past, there are major gaps in what is available to cite. As Ocobock and Lacy (this issue) describe, the human physiology literature, especially in sports science, routinely leaves women out of research questions and participant pools. These papers also frequently conflate the terms “sex” and “gender” and describe both concepts as “binaries,” which they are not (DuBois and Shattuck-Heidorn, 2021). This results in a dearth of data on women for those reconstructing aspects of past physiology, though as we point out, paleoanthropologists and human biologists have not been demanding the data either. They simply use male physiology as the default for all humans (e.g., Bramble and Lieberman, 2004).

These deficits set up the issues covered in this article: despite a vocal, 50-plus year history of feminist archaeology and even recent popular cultural attention (e.g., Rebecca Wragg Sykes’s 2020 book *Kindred*), evidence of women and children and their activities in the deep past are still frequently ignored or forgotten in paleoanthropology and prehistoric archaeology literature. There is no responsible excuse for this. Here, we will describe some of the ways this ignorance manifests in the literature as it relates to hunting, and in contrast present the plethora of biological and archaeological evidence that challenge the persistent assumption that Paleolithic foragers practiced a widespread deep sexual division of labor where women were excluded from hunting: the “Man the Hunter, Woman the Gatherer” hypothesis. The ideas used to support the hypothesis of male-only hunting range from the ways stone tools are described to interpretations made of early art and the questions asked about sexual differences in hominin anatomy. Moving forward, we hope the assumption can be—without evidence to the contrary—that sexual labor divisions were limited and that sexed and gendered roles are generally the exception, not the
rule, in the Paleolithic past. Women could and did hunt once hunting was part of the hominin repertoire, just as men did.

**BACKGROUND: EARLIER FEMINIST ARCHAEOLOGY**

The term “Man the Hunter” and its modern connotations were coined at a conference and then promoted in an edited volume of the same name in 1968 by Lee and Devore that focused on the role hunting played in driving human evolution, both by adding a nutrient-dense food to the diet and by giving males an opportunity to show off for potential female mates. The idea has had real staying power. In more recent literature, the terms “Man the Hunter” and its foil “Woman the Gatherer” have obvious sexist overtones—even if the book *Woman the Gatherer*, edited by Dahlberg (1981), was a feminist response to the book *Man the Hunter*—so the field shifted toward a broader discussion of the “sexual division of labor.” However, attempts to document anatomical and behavioral evidence of sex-role differences in Plio-Pleistocene hominins frequently rely on the same analysis of searching for evidence of male hunting and female domestic activities. Instead of letting the evidence lead the interpretation, the assumption of male-only hunting drives any discussion of sex differences (e.g., Gurven and Hill, 2009). Hence, the term “sexual division of labor” becomes shorthand for “different gendered roles,” and when discussing Paleolithic foragers, it usually means male-only hunting and female domesticity and plant gathering.

Feminist archaeologists have pushed back on this at various points, and these critiques have primarily taken two paths. One is that “feminine” activities like childrearing, cooking, clothing manufacture, etc., are just as important to defining what it means to be human as hunting is and
are equally a part of hominin evolutionary success (e.g., Adovasio, Soffer and Page, 2007; Gero, 1991; Zihlmann, 1997). The other approach lambasts the idea that activities could be feminine and masculine in the past at all—at least in the way we see these terms—and without clear evidence to the contrary, no reconstructed behavior should be gendered (e.g., Hrdy, 1981; Khorasani and Lee, 2020). Though there are contemporaneous publications taking these two approaches, and some authors suggest both (e.g., Conkey, 1991; De Beaune, 2019; Knapp, 1998), the former approach could be described as second-wave feminism increasing awareness of women’s contributions and the latter a third or fourth wave feminist paradigm challenging whether gender roles are inherent at all. The problem with the first approach is that it still assumes a gendered division of labor while celebrating women’s roles (Khorasani and Lee, 2020). Childbirth and lactation notwithstanding, we favor an approach more toward the latter and suggest authors should approach potentially gendered behavior with a differential discussion as opposed to assuming its presence.

Unfortunately, many of the criticisms leveled against archaeology by feminist archaeologists of the twentieth century (e.g., Gero, 1991; Hrdy, 1981; Zihlmann, 1997)—such as its failure to see women archaeologically or to include children and women in reconstructions of the past—have yet to be corrected in paleoanthropology (French, 2019). This lack of action in paleoanthropology justifies continuing feminist critiques in the twenty-first century, as well as the fact that some of these feminist critiques are rooted in capitalism and whiteness (e.g., see Sterling [2015] for a Black feminist critique of Paleolithic interpretations). Though there are new data sources from the rapidly expanding field of ancient genetics that can give indications about genetic sex, it has yet to upset the conclusions that can be drawn from other evidentiary sources: that there is little evidence of a sexual division of labor, especially male-dominated hunting,
throughout most of the Pleistocene. Some evidence appears at the end in the Upper Paleolithic (Kuhn and Stiner, 2006), which we include, though its interpretation should continue to be limited to what the data can support.

SEX AND GENDER ISSUES IN PALEOANTHROPOLOGY

Tools

The study of lithic tools is the cornerstone of Paleolithic archaeology, so the gendered bias in the interpretations and language used here influence neighboring subdisciplines. For example, flintknapping is frequently assumed to be an exclusively masculine activity, and is described as such (Murdock and Provost, 1973). However, surveys of recent foragers that claim flintknapping is a near-universal male activity frequently use dated ethnographic data (e.g., Murdock and Provost, 1973), ignore mentions of women’s use of stone tools in those ethnographies (e.g., Gould, 1977), and exclude recent studies of women’s flintknapping, such as Arthur (2010). Further, Gero (1991) could find no published work by female authors on experimental archaeological flintknapping, even though she knew women who could flintknaps. The field has not come far in 30-plus years, and there are still few female authors of flintknapping papers (but see Ruck’s [2014] thesis and Feuerriegel’s [2016] dissertation). Gero (1991) suggested a modern sociological bias toward associating men with flintknapping was driving these assumptions in past literature, and in revisiting the topic, she found little has changed (Gero, 2020).

We also see this gendered bias in how tool types are defined and which tool types are preferentially studied. Lithics assumed to be hunting tools are frequently preferred by researchers over lithics thought to be used for processing (Finlay, 2012; Gero, 1991). The images of tools
placed into textbooks and journal covers show a strong preference for points and hand axes over scrapers and awls.\textsuperscript{4} Gero’s (1991) explanation for this is researcher bias: projectile and field dressing/butchery tools are viewed as masculine and used by men to hunt. Processing tools are viewed as women’s tools and therefore less interesting—but this reveals a conflicting idea. If men manufacture all the stone tools, are they making the processing ones for women, or does producing processing tools not count as flintknapping? The former seems unlikely as most ethnographic examples show foraging individuals make and retouch the tools they use (e.g., Arthur, 2010), and therefore this reveals some of the fallacies in these researchers’ thinking (O’Brien, 1990). The production of processing tools is also often described as less technologically complicated (Arthur, 2010), suggesting again that if the flintknapping of processing tools is granted to women, it is only because the less-intelligent sex produced less-complicated tools. These grouped binaries of hunting/complex/male versus processing/simple/female are pervasive. Even though hunting large mammals for food and hides is only half of the process—there is no dinner without butchering and cooking or leather without tanning—many researchers are fixated on the first half of this workflow. And they conjure this half as the masculine half. Paleolithic women were likely making the tools they use (O’Brien, 1990), and even if that was only processing tools (which is unlikely), they were still flintknappers.

The association of hunting tools, and flintknapping in general, with masculinity also genders descriptions of Paleolithic site layouts. De Beaune (2019) cites multiple articles that claimed flintknapping areas were “male activity zones,” such as at the Magdalenian site of Verberie (Audouze, 2010) and the Epipaleolithic site of Ohalo II (Weiss et al., 2008). Food-preparation areas were also described as likely female areas at Ohalo II since “plant-food preparation is
reported to be an almost exclusively female task” (Weiss et al., 2008, 2412). There is no way to
determine the sex or gender of individuals working at the grindstone versus inside the circle of
stone debitage from flintknapping 23,000 years in the past.

Of course, we have no actual evidence of different tool types being associated with one
sex/gender in the Paleolithic. We have not found evidence of who the flintknappers or end-users
of the tools were. The first example of using genetics to identify a maker or user of a deer-tooth
pendant in the Upper Paleolithic found the owner to be female (Essel et al., 2023); perhaps we
will see more research in this direction in the future. Also, there are no sex differences in tool
types being placed into burials in the Paleolithic (De Beaune, 2019; Riel-Salvatore and Gravel-
Miguel, 2013), unlike in the Neolithic (Harto Villén, 2021; Masclans et al., 2021). In fact,
paramasticatory anterior dental wear in Neanderthals, which is assumed to be associated with
leather processing, is equally present in all sexes (Fox and Frayer, 1997). Leather processing is
everyone’s work in the Middle Paleolithic, if the behavioral reconstruction for this dental-wear
pattern is accurate. This unsupported gendering of lithic tools has widespread impacts. Whole
cultural time periods are named and defined based on lithic assemblages (e.g., Mousterian or
Solutrean), and if lithics are seen as the domain of men, then we are organizing most of human
history through a masculine lens.

Beyond lithics and spears, many different food-procurement technologies proliferate in the
Middle Stone Age and Upper Paleolithic. These include the bow and arrow, hunting nets, and
fishing hooks (McBrearty and Brooks, 2000). These new technologies decreased the strength
needed for hunting and, in some cases, the direct attention needed of the hunter, as well as
increased potential prey types, such as fish and birds. Given the various excuses provided for
why women would not hunt—childcare, lactation, less upper-body strength—these hunting innovations would have only made it easier for women with young offspring to participate in hunting.

**Diet**

The association of hunting with masculinity also drives a fixation with eating meat. Taphonomic biases contribute to the idea of a meat-heavy diet in Pleistocene hominins since site assemblages are full of animal remains, but the compression of time means that trying to calculate the proportion of the diet that these animals made up is near impossible without other lines of evidence. The lack of preservation of plant remains suggests that gathering tasks and their sites and products are often archaeologically invisible. The field is moving toward recognizing this in dietary reconstructions (e.g., Barr et al., 2022; Hardy et al., 2022; Henry, Brooks and Piperno, 2014), though the public has not—for instance, see the evolutionary evocations used to justify the paleo diet, keto diet, and the carnivore diet.5

There is a geographical bias toward Paleolithic sites north of 40º latitude for historical and recent geo-political as well as taphonomic reasons. Recent foragers living beyond 40º latitude have a considerably smaller proportion of their diet from carbohydrates (less than 20%) relative to equatorial and subtropical foragers (Ströhle and Hahn, 2011), and this latitudinal gradient in the bioavailability of foodstuffs was also present in the past (Hardy, 2010). Low-carbohydrate diets need to be higher in fat, as there is a ceiling on protein consumption (see below) (Speth, 1991). Reconstructing all hominin diets based on sites from the north will not accurately reflect what is
available to those living closer to the equator, which tends to be a much more plant/carbohydrate-based diet.

This masculinity-meat fixation in the literature also relates to gender roles in foragers, as cultures where both genders contribute large proportions of calories to their families tend to be more egalitarian (Friedl, 1978). The Inuit are frequently used as analogies to Neanderthals because of their diets high in meat and are often cited as examples of strongly patriarchal societies where men control hunting. However, this description comes from outsiders and does not reflect how all Inuit cultures view women's participation in subsistence at all times (Bodenhorn, 1990; Owen, 2005). The Inuit are outliers in this sexually skewed procurement strategy as well as latitudinal outliers. Temperate Neanderthals had very different bioavailability of edible foods from the Inuit (Hardy, 2010), so analogies between Neanderthal and Inuit diet, and therefore social structure, are weak.

This site-sampling and taphonomic-preservation bias results in dietary reconstructions that are often not grounded in basic nutrition and physiology. These reconstructions can report protein consumption levels that are beyond what a human body can metabolize (Hardy et al., 2022). Trophic-level reconstructions using carbon and nitrogen isotopes in Neanderthal bone and tooth collagen have been used to argue Neanderthals were apex predators (Richards and Trinkaus, 2009). But there are two problems: these samples come from mostly northern Neanderthals, and, more importantly, how could Neanderthals be eating proportionately more meat than local carnivores like cave lions and hyenas (Bocherens, 2009)? Once protein consumption exceeds 35% of caloric intake, recent humans cannot clear the urea byproduct of protein metabolism.
quickly enough, and kidney and liver damage can happen within days (Speth, 1991), which is of
even greater concern for pregnant women (Hockett, 2012). Neanderthal lower thorax shape
suggests they could have had larger livers, and, therefore, the upper limit on their protein
consumption could be slightly higher than recent humans (Churchill, 2006; Ocobock, Lacy, and
Niclou, 2021). However, they are not practicing a nearly carnivorous terrestrial diet (Bocherens,
2009; Hardy et al., 2022; contra Jaouen et al., 2022; Richards and Trinkaus, 2009).

Part of the persistence of this physiologically impossible idea—humans as top-level terrestrial
carnivores—is the masculinization of hunting and meat-eating and the fetishization of these
behaviors as driving human evolution. Other explanations for the isotopic evidence, such as
smaller consumption of meat in a dried/cured form (Speth, 2017) or mushroom consumption
(O’Regan, Lamb and Wilkinson, 2016), may explain Neanderthal trophic-level values better but
are less masculine-sounding. In addition, the isotopic signature in bone for the consumption of
other protein sources like insects are currently unknown (Pianezze et al., 2021). Henry and
colleagues (2014) argue that Neanderthals were sophisticated gatherers of plant foods for
nutrition and medicine and that this suggests specialized gathering roles—but they are careful to
say that these are not necessarily women’s roles.

The belief that ancient people ate a nearly carnivorous diet and the association of hunting with
masculine behavior reinforce one another in constructing a view of the past that focuses on men
and fetishizes hunting and meat-eating as a defining feature of human evolution. Meat
procurement and consumption is often described as a foundational Homo behavior, even if there
is no evidence of an increase in carnivory with the origins of our genus (Barr et al., 2022). The
persistence of this just-so story likely reflects the association of meat-eating and masculinity in contemporary Western culture, something well explored in the gender studies literature (e.g., Adams, 2015; Stanley, Day and Brown, 2023). Neither belief—that ancient humans ate a carnivorous diet or hunting was a male-only behavior—are well supported.

Artistic Subjects

Much of Paleolithic art with human subjects is described in sexualized terms. Despite the colonialist, racist, and sexist origins of the term “Venus” for Upper Paleolithic female figurines, it persists and projects a sexualized and religious purpose for the figures by their association with the goddess of love. They have been described as pornographic and assume a male artist producing art for a lusty male audience because of the figurines’ nudity and prominent secondary sexual characteristics (Guthrie, 2005). But considering our limited understanding of clothing manufacture in the Paleolithic, we should not assume nudity was sexualized. No authors are arguing that the few masculine figures are also pornographic (Nowell and Chang, 2014), but the interpretation of these images continues to be skewed toward an assumption of sexuality and the male gaze through a Western and colonial definition of pornography (e.g., Guthrie, 2005).

Beyond the mobile feminine figurines, there are few depictions of humans in Paleolithic parietal art and even fewer of humans doing a recognizable activity, gendered or otherwise (hunting, cooking, childcaring, etc.) (Conkey, 1991). Guthrie (2005) suggests images of males carrying spears and animals attacking humans should be considered hunting scenes, but we disagree, as this is too broad, and his definition of a hunting scene explicitly requires that women and children not be present (276). Examples of images of humans in the act of hunting would be the
Auroch hunt engraving from La Vache (not recognizably gendered human forms) (Guthrie, 2005); a *Bos* hunting scene from Bhimbetka, India—if it is truly Paleolithic (Blinkhorn et al., 2012); and the not recognizably gendered animal-headed hunters of Leang Bulu’ Sipong 4, Indonesia (Aubert et al., 2019). There are many more images of animals with likely hunting injuries, but no humans are present in the scene. There are also scenes of individuals being maimed by an animal, such as the birdman of Lascaux being attacked by a speared bull or the image of a humanoid running from a charging bovid at Roc de Ser (Guthrie, 2005). Guthrie describes these scenes as “testosterone events” (151); however, it is hard to understand why human victims of animal aggression are “testosterone themes” and not images of emasculation. None of the definitive images of hunting in the Paleolithic show forms that a modern viewer can interpret as gendered; they are often stick figures. We cannot say how the artists and their target audience would have viewed the images, but other forms of art from the period demonstrate that the artists know how to portray both anatomically accurate and highly stylized images of feminine and masculine body shapes. Of the few images we have of active hunting in the Paleolithic, there is little sexing/gendering of the participants that we can recognize.

**The Artists Themselves**

Because so much of the Paleolithic oeuvre has been interpreted either sexually or as related to hunting themes, and there is the pervasive Western trope of the brilliant master artist being male, it is unsurprising that much of the literature, and especially the artistic reconstructions, assume the Paleolithic artist is male. For instance, Guthrie (2005, 25–26) logicizes that since only men hunt, all spear straighteners were made by men. And as most spear straighteners are decorated, it must have been common for many men in a group to be artistic. This questionable deduction is
directly challenged by Fritz and colleagues [2016] and us. The sex/gender of Paleolithic artists is not a case of lack of evidence, though, and what evidence there is does not support the idea of art as the domain of men.

The evidence we do have of the artists predominately comes from handprints. Analysis of the ratios of the second to fourth digit reflects testosterone exposure *in utero*, and despite plenty of overlap, do show sex-specific patterns, with males having on average longer fourth fingers (Manning et al., 1998). Study of the 2:4 digit ratios of these handprints suggests 75% of those studied are female (Snow, 2013), and the overall small size of the hands again supports female (or in some cases, juvenile) artists (Fernández-Navarro, Camarós, and Garate, 2022). This is important work, if accurate, as it puts pigment directly into the hands of women. If they are generating this handprint form of cave art, why not other forms of art?

Another compelling hypothesis looks at the proportions of Gravettian feminine figurines (formerly Venus figurines). The lack of facial features and nearly nonexistent feet have been frequently commented on, but McDermott (1996) suggests that this may not be an attempt to make the figure anonymous or generic by leaving the face blank and exaggerating the breasts and hips by diminishing the feet. It may be an artist’s attempt at self-portraiture in a time before mirrors. Their own face is rarely seen, and the parallax from viewing one’s own body means breasts are exaggerated and feet distant. McDermott (1996) included some compelling self-portrait photographs of pregnant women and compared them to Gravettian figurines from the same perspective. This hypothesis argues that these figurines are not pornography for men but art made by women potentially for their own consumption. The bored Upper Paleolithic deer-tooth
A pendant from Denisova Cave may also be an example of a carving done by a woman, but the current evidence is that it is merely a pendant with XX sex chromosome aDNA on it (Essel et al., 2023).

Considering that many of the parietal artists were likely female and the few images of hunting are sex ambiguous, we should consider a few possibilities. One, the few hunting groups shown are mixed sex or the sex of the participants is unimportant to document. Two, the lack of hunting images could be because the artists had little experience with hunting. Or three, there was some taboo on showing images of hunting. There are no images of human-on-human conflict, for instance, so perhaps images of violence were largely considered inappropriate. We cannot rule out the first or third possibility, which are not mutually exclusive, but we can reasonably assume the second possibility is unlikely. Perhaps if the artists are female and if women do not hunt, they would not know what to portray (Guthrie, 2005). But it is unlikely that anyone living in a small-group foraging society had not seen some aspect of hunting many times in their life, even if they did not regularly participate (Fritz, Tosello and Conkey, 2016). It seems more likely that there is some prohibition on showing hunting in the act, which could relate to the larger ritual context of the art production.

**Anatomy and Paleopathology**

Some of the most direct evidence against a sexual division of labor that excluded women from hunting comes from the skeletal remains of Paleolithic peoples themselves. Though Australopithecines show evidence of sexual body size dimorphism comparable to chimpanzees, sexual body-size dimorphism diminishes through the Pleistocene (Arsuaga et al., 1997). This is
either a relaxing of the selection for larger bodies and canines in males from reduced male-male competition or active selection for proportionally smaller males and/or larger females. Neutral evolution has not been proposed as an explanation at the species level. By the Middle to Late Pleistocene, postcranial sexual size and robusticity dimorphism are the same in *Homo heidelbergensis* and Neanderthals as both are in modern humans (Arsuaga et al., 1997; Trinkaus, 1980). Ruff (1987) argues for sex differences in lower-limb cross-sectional geometry in Neanderthals and Upper Paleolithic moderns and that this could be a sign of a sexual division of labor—that is, different activities produce different strain on the lower limbs. However, there are alternative explanations, such as small sample size, the scale of the effect of bi-iliac breadth on these values (Pearson et al., 2014), or the heritability of the trait (Hansen et al., 2009). A new analysis suggests sex and femoral robusticity are not correlated in Neanderthals, but they are in modern *H. sapiens* (Kubicka et al., 2022). Pleistocene hominin lower-limb cross-sectional geometry likely reflects regular long-distance ranging (Trinkaus and Ruff, 2012), but how any sex differences reflect hunting strategies like persistence hunting is unclear (Bramble and Lieberman, 2004), especially since female physiology is better adapted to endurance activities (see Ocobock and Lacy, this issue). As Sparacello and colleagues (2017) note, some of the alleged sex differences in things like humeral asymmetry are actually body-size differences, not sex difference. Humeral asymmetry increases with larger body size in Neanderthals and Upper Paleolithic moderns (Sparacello et al., 2017), so authors should be careful to not conflate size differences with sex differences.

Though the hypothesis was retracted due to the frequent mischaracterizations of it (Trinkaus, 2012), the image of the Neanderthal as rodeo-rider has captured many people’s imaginations
(Berger and Trinkaus, 1995). Berger and Trinkaus (1995) argued that Neanderthals have trauma patterns similar to rodeo-riders—predominately head, trunk, and arm injuries—because both groups spend time in close contact with agitated large mammals. What is important about their survey is that there are no sex differences in the patterns of trauma location on the body, and recent work reaffirms this (Lacy and Trinkaus, n.d.). Every known fairly complete Neanderthal over the age of 25 has at least one healed broken bone (Trinkaus, 2012). If there is no sexed pattern to these traumas, we could infer everyone is doing similar trauma-inducing activities over the life course, one of which could be ambush hunting. However, Neanderthal overall trauma patterns do not appear to be unusually high when compared to other forager and nomadic peoples (Estabrook, 2009). This, along with young mortality profiles, is evidence of the risks of everyday life in the Middle Paleolithic for all individuals (Trinkaus, 2011)—though variable risk mediation at different points in the life course, such as avoiding ambush hunting during late pregnancy, are not ruled out by cumulative evidence like bony traumas.

We also do not see sex differences in arthritis from repetitive activities among Neanderthals (Lacy and Trinkaus, n.d.). In the Upper Paleolithic, there are some upper-limb enthesal changes (tendon insertion lesions) allegedly associated with “thrower’s elbow,” where males have twice as many on their right arms as left, and females have no significant left-right differences (Villotte and Knüsel, 2014). This pattern continues into Holocene prehistory, and though Neanderthals were not included in that study, no sex-based enthesal differences were identified in the Middle Paleolithic (Lacy and Trinkaus, n.d.). This could be explained by Neanderthals not utilizing throwing weapons, only thrusting weapons, and therefore the innovation of projectile weapons also introduces sex differences in hunting strategies. However, experimental archaeological
studies of Middle Paleolithic spears show they could be used for projectile/distance hunting (Milks, Parker and Pope, 2019), and projectile tips have been found at Middle Paleolithic sites like Abri du Maras (Hardy et al., 2013). Therefore, we should not assume Neanderthals did not have any projectile technology, and it is also possible these enthesal changes have other explanations (e.g., Kubicka and Myszka, 2020).

Projectiles like atlatls would also decrease the upper-body-strength requirements for hunting, so it is not obvious that their introduction should increase differentiated sex roles. Despite “thrower’s elbow” being more common in males across many time periods, it does not mean women never show thrower’s elbow—they do (Villotte and Knüsel, 2014). In some cases, the grave goods and paleopathology agree in demonstrating women were well-practiced projectile hunters, such as at the Peruvian Early Holocene site of Wilamaya Pratixa (Haas et al., 2020). We should also accept that despite its name, “thrower’s elbow” may not reflect participation in throwing activities (Djukic et al., 2015; Kubicka and Myszka, 2020).

A study of limb-bone strength between prehistoric and modern women revealed that average prehistoric female strength varied very little temporally but had a high degree of interindividual variation, with some individuals displaying patterns like modern sedentary females and others similar to extreme endurance athletes (Macintosh, Pinhasi and Stock, 2017). This suggests that females were generalists likely capable of taking part in the full gamut of prehistoric activities. Temple and colleagues (2023) confirmed this prehistoric pattern when they examined strength and asymmetry of postcranial elements among several Late Holocene populations in present-day Alaska. They found that in some of these Arctic populations, females and males both exhibited a
fair amount of strength and similar degrees of bilateral humeral asymmetry. The investigators interpreted this to be the result of unimanual activities, such as rowing or hunting with throwing implements. There is also evidence to suggest that females took part in more kill transportation (Temple et al., 2023), which has also been observed ethnographically with women transporting loads in excess of 100 kg (Ray, 1885). Tasks necessary for survival were not divvied up by strict sex-based division but rather were flexible, with everyone capable of carrying out and completing a wide variety of activities, in the past and today (Owen, 2005).

In contrast in the Neolithic, there are many examples of differentially sexed developmental and skeletal pathology patterns. In some ways this reflects differences in activities, e.g., women doing strenuous bi-manual upper-limb activities like working a grinding stone (Ogilvie and Hilton, 2011), but it also reflects the establishment of patriarchal social hierarchies where women’s social status decreased as their fertility increased, e.g., in increasing caries prevalence (Lukas, 2008). New data is being introduced with genetics, such as evidence for an increase in selection for women’s body fat in the last 3,000 years (Arner et al., 2021), but the source of that selection is not clear. In our evolutionary history, these examples of a sexual division of labor arrive quite late and are characteristic of the societal changes seen with the shift to agricultural subsistence.

**Burials**

Another way in which males and females remain equal in the Paleolithic is in death. There are no consistent sex differences in treatment of the dead across most of the Pleistocene, neither in burial type nor in placed funerary objects (De Beaune, 2019; Riel-Salvatore and Gravel-Miguel, 2013). Considering the deep literature exploring the association of sex and funerary objects in
more recent cultures, the lack of association in the Paleolithic is striking. The Upper Paleolithic contains many examples of group burials where males and females are buried together, as are individuals of different ages (Formicola, 2007). Gravettian red-ochre-style burials are performed on males, females, children (Zilhão, 2005), and even neonates (Einwögerer et al., 2006). This could reflect a more utilitarian approach to disposal of the dead, where everyone is equal because of limits on person power, but plenty of these burials contain intentional placement of the dead with grave goods (Harto Villén, 2021).

If anything, there is pattern toward preferential burial treatment of those with anatomical differences and anomalies, as burials are not uniformly offered to everyone (Formicola, 2007; Trinkaus, 2018). There are some regionally patterned preferential burials of males in the Upper Paleolithic, but that pattern disappears at a continental scale (Harto Villén, 2021). Many hypotheses have been put forth to explain Paleolithic burial practices, but none of them support a preference for or higher status to all adult males.

**Paleodemography, Group Structure, and Size**

Analyzing the relatedness among individuals buried at the same site, especially when there is evidence of contemporaneous burial, as well as comparing larger genetic structuring across multiple sites, can give us some insight into how individual familial groups and their larger communities were socially structured. Ultimately, this could give us some indication of sex roles. Neandertal aDNA from El Sidrón (Fox et al., 2011), Chagyrskaya, and Okladnikov (Skov et al., 2022) suggest a practice of patrilocality, as males within groups are more closely related than females are (Figure 1). It is hard to say how widespread this pattern is, as we rarely have samples
of multiple individuals from a contemporaneous group in the Paleolithic. Analysis of recent foragers found patrilocality was a more common practice, but matrilocality is also well documented in many forager communities (Ember, 1975). It is important to consider, though, that the number of women in a group is a more important factor for population growth and stability than number of men (French, 2019). Small bands would not be eager to send off female members without receiving them in return if they were practicing patrilocality. Ember (1975) also found bilocal residence flexibility was more common for recent foragers when group sizes were small. Considering small groups in the Middle Paleolithic, the patrilocality found at a few sites may not be a defining feature.

Reconstructions of group size and larger population size in the Middle Paleolithic are generally low (Bocquet-Appel and Degioanni, 2013; Skov et al., 2022). It was so low, in fact—effective group size of 30–110 (Skov et al., 2022)—that there are multiple examples of inbreeding, both via genetics (Prüfer et al., 2014) and assessments of pathology (Trinkaus, 2018). Larger genetic surveys for Neanderthals suggest there were at least three regional endogamous groups (Fabre, Condemi, and Degioanni, 2009) with a total population size somewhere between 5,000 and 70,000 individuals (Bocquet-Appel and Degioanni, 2013). Effective population size remains small in the Upper Paleolithic, but they had assumably developed more systems for minimizing inbreeding, as there is less evidence for it than in the Middle Paleolithic (Sikora et al., 2017). Small group sizes in general do not support specialized or gendered roles (Kuhn and Stiner, 2006), as individuals need to be generalists when there are only a handful of adults in a traveling band.
IF THERE IS LITTLE EVIDENCE OF SEXUAL LABOR DIVISIONS, DID WOMEN HUNT?

Considering all this information, we return to the question: did Paleolithic women hunt? The emphasis on recent foragers to argue that hunting is a man’s game cherry-picks the data and ignores the many groups where women are known to participate in hunting (Anderson et al., 2023). For instance, Northeast Asian Ainu women hunted large game with the assistance of dogs (Watanabe, 1968), Amazonian Matses women hunt with their husbands and bring home more meat than solo male hunters (Romanoff, 1983), female Martu of Australia provide more consistent meat production than males (Bliege Bird and Bird, 2008), and North American Chipewyan women trapped game and fish (Jarvenpa and Brumbach, 1995). Sometimes these hunting styles differ based on sex, but women are not wholly avoiding hunting in most forager societies (Anderson et al., 2023; Owen, 2005). Also, the early ethnographies of foragers reflect researcher bias toward the activities of men (Owen, 2005), but these ethnographies continue to be primary sources of data on foraging societies (synthesized in Murdock and Provost, 1973). Without fully acknowledging their positionality, these anthropologists may not recognize their failure to access female spaces, activities, and stories (Owen, 2005). Anderson and colleagues (2023) recently revisited the ethnographic literature housed in the D-PLACE database and concur that 79% of recent forager cultures’ entries contain descriptions of women hunting. Also, it was mostly intentional hunting documented (87% of cultures with descriptions of female hunting), not opportunistic (Anderson et al., 2023).
Women’s experiences hunting among the Agta of the Philippines are particularly vital for consideration when presented with the arguments for why women would not hunt in the Paleolithic: that they need to breastfeed frequently and carry children, and they regularly bleed and smell via menstruation (Lee and Devore, 1968). Agta women and men spend equal amounts of time hunting (Goodman et al., 1985), female hunters with children see no negative impact on their hunting success or child mortality, and females hunt while menstruating and carrying nursing infants (Estioko-Griffin, 1985; Goodman et al., 1985). Though we are not seeing this as a widespread practice among recent foragers, it challenges the idea that female reproduction inherently renders them ill-suited for hunting. Some women foragers hunt now and in the recent past, and considering all the evidence presented above, they were almost certainly hunting in the deep past too.

There are many potential artifacts that could tell us about behaviors that are gendered in some recent foragers but that remain archaeologically invisible in the Paleolithic, such as carrying satchels, baby slings, or looms. It has even been argued that the behavior of women and children are more taphonomically invisible but that archaeologists can be challenged to recognize and represent the behaviors and contributions of women and children better (Sofaer, 2000). But there is no reason to assume if we did have sufficient evidence of these items and their associated behaviors that they would have been socially gendered in the Paleolithic or gendered in the same way as they are in more recent cultures. As a discipline, we need to tread lightly with discussing sex and gender in the Paleolithic, but unfortunately many have made bold claims based on assumptions of the universality of modern gender roles that are not supported by the evidence (for critique, see Bliege Bird and Codding, 2015). If labor allocation is rare today, it does not
mean it was unlikely in the past, and “we need to start conceiving of multiple and mutable configurations for the sexual division of labor among early hominins that may exceed the range of variability displayed by contemporary hunter-gatherers” (Lupo and Kiahtipes, 2009, 65).

CONCLUSIONS

Considering that there is little evidence for a sexual division of labor until the Upper Paleolithic—and even in the Upper Paleolithic, the evidence is spotty—along with the minimization of female hunting among recent foragers in the literature, the arguments for a sexual division of labor in deep history are largely unsupported. The gender-role assumptions of researchers whose worldviews rest within recent Western patriarchy should not be accepted as the default social organization for peoples living 100,000 years ago or more. All sexes contributed equally to life in the past, and research going forward should assume this as the default. We are not arguing men did not hunt. We are challenging the assumption that women did not also participate, as there is physiological data to support that women are actually well adapted to endurance activities like persistence hunting (see Ocobock and Lacy, this issue), and the archaeological and anatomical data mostly supports a lack of sexed/gendered labor roles. By failing to challenge the idea that only one sex was a capable hunter in the past, our discipline, perhaps unintentionally, supports a narrow conception of human bodies and their capabilities today.

There is also the issue of activities gendered female in modern society being minimized in reconstructions of the past, such as cooking and communal childrearing, and an assessment of the erasure of women from hunting should not ignore this equally valid feminist critique. These
behaviors are perhaps more unique to our species than hunting and toolmaking. Going forward, if archaeological, physiological, paleogenomic, or any other work needs to examine an issue that involves sex, all sexes should be considered, not just male. When the data on women is not available from other disciplines, as demonstrated in Ocobock and Lacy (this issue), biological anthropology should be making explicit calls for it in the literature and not just accepting it as “unavailable” or not of interest.

The need for us to document this today suggests Paleo-related fields should continue to reflect on the gender and ethnic composition of its members, as Gero called for nearly 30 years ago and again more recently (Gero, 2020). These ideas should not be reserved for a “feminist” archaeological paradigm (Knapp, 1998). Though Paleolithic hunting and its accouterments take up an outsized portion of the discipline, hunting with weapons is a unique human behavior and belongs to all humans in the past, regardless of sex chromosomes.

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FOOTNOTES
1 Some may argue that the word “man” in “Man the Hunter” is being used as a gender-inclusive term like “mankind.” However, this is rarely how the word is interpreted or intended. When similar terms like “man the toolmaker” are used to describe Homo habilis, few are imagining a female hominin (Gero, 1991).

2 We use the term “forager” instead of “hunter-gatherer” to move away from the gendered associations with the term hunter-gatherer. Also, hunter-gatherer suggests that there are two parallel subsistence strategies being used, which is a misinterpretation of the subsistence behavior of these peoples and ignores activities like fishing (Ember, 2020). “Forager” acknowledges a unified behavioral and subsistence strategy.

3 “Male” and “female” are used to refer to biological patterns in anatomy and physiology related to sex chromosomes, gonadal hormones, and their impacts on skeletal shape. “Man” and “woman” refer to the social gender categories we are roughly reconstructing in the past as well as personal identity. Though skeletal remains may be described as likely female, it does not mean that individual was considered a woman within their society or personally identified as one. These binary terms do not do justice to the myriad of potential experiences these people had in the past. Please see the detailed gender studies literature on language usage as it relates to sex and gender for a deeper consideration of this issue as well as DuBois and Shattuck-Heidorn (2021) for an example of language usage best practices in human biology research.

4 Quantifying the extent of this pattern—tool types showcased and word counts of descriptions of hunting vs processing tools—in more recent publications would be a great topic for a future paper or thesis.
These meat-centered diets are also heavily marketed towards men (Adams, 2015) as both dieting and vegetarianism/veganism are constructed as feminine in contemporary society (Stanley, Day and Brown, 2023).

This also opens an unexplored question about who exactly domesticated dogs for hunting? Theories abound about women breastfeeding wolf puppies as the mechanism of the earliest domestication events (Serpell, 2021), but there has been an unchallenged assumption that dogs assisted men in hunting.

Endnotes

REFERENCES CITED


Arsuaga, J. L., J. M. Carretero, C. Lorenzo, A. Gracia, I. Martinez, J. M. Bermúdez de Castro,


Foraging in a Western Desert Aboriginal Community.” *Current Anthropology* 49 (4): 655–93. DOI:10.1086/587700.


Version of Record at: https://doi.org/10.1111/aman.13914


Essel, Elena, Elena I. Zavala, Ellen Schulz-Kornas, Maxim B. Kozlikin, Helen Fewlass,
Estabrook, Virginia Hutton. 2009. “Sampling Biases and New Ways of Addressing the
Significance of Trauma in Neandertals.” PhD dissertation, University of Michigan.
Group.” In The Agta of Northeastern Luzon: Recent Studies, edited by P. Bion Griffin
and Agnes Estioko-Griffin. Cebu City: University of San Carlos Press. 18–32.
Fabre, Virginie, Silvana Condemi, and Anna Degioanni. 2009. “Genetic Evidence of
DOI:10.1371/journal.pone.0005151.
Childhood in Upper Palaeolithic Societies: Experimental and Archaeological Approach
to Artists’ Age Estimation Through Cave Art Hand Stencils.” Journal of Archaeological
and Stone Tool Manufacture.” PhD Dissertation, Australian National University.
DOI:10.1002/9781118294291.ch7.
Formicola, Vincenzo. 2007. “From the Sunghir Children to the Romito Dwarf: Aspects of the
DOI:10.1086/517592.


Sikora, Martin, Andaine Seguin-Orlando, Vitor C. Sousa, Anders Albrechtsen, Thorfinn


Speth, John D. 2017. “Putrid Meat and Fish in the Eurasian Middle and Upper Paleolithic: Are We Missing a Key Part of Neanderthal and Modern Human Diet?” PaleoAnthropology


Press.