



# General Anthropology

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## Forensic Anthropology

### Catching Bad Guys (and Gals) Using Pollen from Archaeology to CSI

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In forensic anthropology there is a tradition of using the skills learned in physical anthropology to assist crime scene investigators and medical examiners in determining the cause and time of death, and often the identity of victims. More recently, there is a growing trend to use skills and techniques learned in archaeology as forensic tools when excavating and reconstructing catastrophic events, or examining graves of victims killed by some murderer (Connor 2007; Hunter & Cox 2005). Both of these

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## Africa Now

### How Did Modern Humans Originate

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#### Abstract

People alive today and their immediate ancestors—modern humans—had multiple ancestors in the Middle Pleistocene. They did not originate as a new clade—the *unique* descendants of a recent, small African population. Therefore, the **anatomical, behavioral, and genetic** aspects of their modernity are not tied together in their origin. Instead, these key components of modernity have different origins and evolutionary pathways that can be understood as distinct, although interrelated, processes. Each process characterizes all living and recent human populations, and their interrelationship derives from a shared unifying factor: changes in human demographic history originating as the consequence of increased adult survivorship. Longer lifespans helped make humans modern.

#### What modernity is not

The term “modern humans” has never been well defined (Wolpoff and Caspari 1997a; 1997b). In recent years, largely due to widely held interpretations of mtDNA variation originating in the late 1980s (Stoneking and Cann 1989), the term has had a phylogenetic meaning—that is, modern humans were believed to be a new species, a discrete entity with a fixed time of origin. Thus, “modern humans” were thought by many to be *Homo sapiens*, a new, recently

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## Student Interest

### Motivating New Students

By *Serena Nanda*  
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Michael Connelly, a best-selling mystery author recently wrote, “Growing up... I bought countless novels based on the cover or the title, not knowing what was inside.”

Many introductory cultural anthropology students have little knowledge about or interest in our field. In my experience, the Day One strategy I describe below, which focuses on book titles and covers, motivates students to read further and more closely. This works particularly well with crime novels, which I have used in interdisciplinary courses and in our John Jay course, *Crime and Culture*. Murder mysteries can be an engaging way of exploring our own and other cultures (see appendix for some of my favorites). Compelling, culturally informed narratives, character development, behavioral details, contemporary social issues, including globalization, criminal investigations, and an anthropologist as investigator, afford students accessible entry into many concepts central to cultural anthropology. Relatively short novels work best; and since in-class discussion is vital, I suggest a class size not beyond 40 students. Using several culturally specific crime novels permits further reflections on anthropological concepts from a cross-cultural perspective.

#### Off ToA Flying Start

Michael Connelly notes above, titles and cover images attract readers to a book, “not knowing what is inside.” In the strategy below, I focus on the titles and covers

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Texas: the coprolite evidence; *American Antiquity* 39: 407-420.

2009 Palynology. In *Wiley Encyclopedia of Forensic Science*, A. Jamieson, A Moenssens, eds. Pp. 1954-1968. Portsmouth: John Wiley & Sons, Ltd.

Bryant, Vaughn, and Gretchen Jones

2006 Forensic palynology: Current status of a rarely used technique in the United States of America. *Forensic Science International* 163: 183-197.

Melissa Connor

2007 *Forensic Methods: Excavation for the Archaeologist and Investigator*. Lanham: Altamira Press.

John Hunter and Margaret Cox

2005 *Forensic Archaeology: Advances in Theory and Practice*. London: Routledge Press.

Milne, Lynne, Vaughn Bryant, and Dallas Mildenhall

2005 Forensic palynology. In *Forensic Botany. Principles and Applications to Criminal Casework*. H. Coyle, ed. Pp. 217-252. Boca Raton: CRC Press.

David Stoney, Andy Bowen, Vaughn Bryant, Emily Caven, Matthew Cimino, and Paul Stoney

2009 Particle Combination Analysis for Predictive Source Attribution: Tracing a Shipment of Contraband Ivory. *Journal of American Society of Trace Evidence Examiners* 2(1):13-72.

R. Szibor, C. Schubert, R. Schöning, D. Krause, and U. Wendt

1998 Pollen analysis reveals murder season. *Nature* 395(6701): 449-450. □

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evolved species that dispersed to replace earlier populations that lived outside of Africa without mixing with them. As part of this scenario, the new species brought a new and improved anatomy, behavioral system, and an array of new genes that allowed them to outcompete archaic human species around the world.

However, 21<sup>st</sup> century genomics has brought certainty to the understanding that modern humans are *not* the *unique* descendants of a new African clade, but rather are descended from both Africans and many other human populations in a multiregional pattern. There may never be consensus on the meaning of “species,” but for our purposes here that doesn’t matter; what we are concerned about is *ancestry*. No matter what species definition is used to describe the diversity of ancient humans—multiple interbreeding human species or interbreeding populations of a single species—the issue of importance to us is whether or not there is a *single recent unique ancestry* for modern populations. And, the last decade of discoveries in paleogenetics shows that modern humans do not have a *single unique ancestry* in a recent African (or any other) population.

The recent finding that significant interbreeding occurred between Neanderthals and modern populations refutes the longstanding model that proposes all living humans trace their ancestry exclusively back to a small African population that expanded and completely replaced archaic human species, without any interbreeding (d’Errico and Stringer, 2011:1060).

Therefore, modernity does *not* have a phylogenetic basis, and this means the anatomy, behavior, and genetics of living humans and their immediate ancestors, the components of modernity, did *not* necessarily appear together.

### What modernity is

If modern humans are not a new species (i.e., have a single unique ancestry), what does it mean to be modern? The bottom line is that modernity describes all living human populations and their recent ancestors (Wolpoff 1986). Because living populations

do not uniquely descend from any single recent source (Alves et al. 2012), modernity cannot be a single thing, or a single event. Instead, there are anatomical, behavioral, and genetic aspects of modernity with different meanings that can be understood by viewing them as different processes evolving at different times in differing patterns. “Different,” however, is not “independent.” Paleogenetics and a better understanding of the origin of modern genetic diversity demonstrate how the concepts of genetic, anatomical, and behavioral modernity are intricately related; they address three different aspects of humanity related through demography and united in the precept that all recent and living humans are modern.

This recognition creates a complex understanding of modernity because its many aspects arose as different gradual processes. We see modernity as an ongoing process of change, an evolutionary *pattern* of changes that differs from archaic patterns in both tempo and mode. The modern pattern is one of increasingly rapid biological, genetic, and social changes within our wide spread, interconnected human species, resulting in what might be considered three of the most unique aspects of the human species: (1) its rapid, accelerating genetic evolution; (2) the mixed ancestry of human populations and the absence of human races despite widespread geographic variation because of the existence of widespread, exogamous, genetic ties between groups; and (3) the consequences in increased longevity in multigenerational relationships, grandparents, and the wider kinship/social systems they support.

Here, we argue that because of its evolutionary pattern, modernity can be best understood in terms of processes of biological, social, and genetic changes. We describe the processes that comprise three aspects of modernity: anatomical, behavioral and genetic, interrelated through the demographic consequences of significant longevity. An expanded version of this paper is published as Caspari and Wolpoff (2013).

### Anatomical modernity

Anatomical modernity has always been difficult to define. Even Schwartz and Tattersall note (2010:94): “Our species *Homo sapiens* has never received a satisfactory morphological definition”. We contend

this is because modernity is a process, rather than an entity of recent African origin. The earliest fossils recognized as “modern” from regions away from Africa are neither particularly African nor particularly modern, in the sense of similar to people living today (Wolpoff et al. 2001). Early anatomical modernity varies by region, a result of global trends coupled with regional variations. Genetic evidence demonstrates that Africa plays a very important role in this process as the center of the human range with the highest Pleistocene population densities, but the process of modernity involved the mixture of African populations with those from other regions. Because of directional selection at the peripheries, regional variants were also a major component of early anatomical modernity, although only some regionally predominant features persist today because of the significant demographic changes of the last 10,000 years that guarantee modernity did not simply disperse with African populations. For instance, from Europe to East Asia, regions furthest from Africa, modern human populations are on average more gracile, with crania smaller and more rounded than their Late Pleistocene predecessors. One might assume this gracility to be a consequence of genetic influences from Africa, spread by dispersing Africans. But it is not evident that dispersing Africans themselves were especially small or gracile.

Anatomical variation today continues to be heavily influenced by these recent changes and there were many different population expansions and partial replacements responsible for modern human anatomical diversity (for instance as in the European Neolithic, a microcosm of the recent past as it was in many areas (Chikhi et al. 2002; Fu et al. 2012)).

### **Behavioral modernity**

**B**ehavioral modernity is difficult to define for many of the same reasons: it also reflects an ongoing process rather than a discrete “modern” entity that appeared when the process began. For historical reasons, behavioral modernity has been equated with the European Upper Paleolithic, but the last decade has seen numerous archaeological contributions undermining the idea of a unique European “human revolution” (McBrearty and Brooks 2000). Instead, aspects of modernity—archaeological material

interpreted as evidence of human cognitive capacity—appears in several Middle Stone Age contexts in Africa as well as at some Neandertal sites (Zilhão 2007). We argue that the European Upper Paleolithic was nevertheless very important, differing from these earlier, more ephemeral occurrences in evidence for its persistence and increasing sophistication over time. This is tied to demographic factors.

It is our assessment that the expanding population sizes of the late Pleistocene were driven by improvements in adult survivorship, and that these underlie the archaeological manifestations of behavioral modernity. Using the ratio of older to younger adults in the death distribution, a categorical approach that measures adult survivorship rather than lifespan, Caspari and Lee (2004) demonstrated that while adult survivorship was very low for much of the Plio-Pleistocene, the older adult ratios increased dramatically in the Upper Paleolithic because many adults lived to be older. This suggests the onset of major demographic change at a time of increased archaeological complexity.

Increased adult survivorship generates population growth, the basis of the Upper Paleolithic population expansions reflected in archaeological and genetic evidence (Powell et al., 2009). Not only does increased survivorship create the potential for greater lifetime fertility for individuals who are living longer, but the investment of older individuals in their children’s families influences their inclusive fitness both by increasing the fertility of their children and the survivorship of their grandchildren. Thus, increased adult survivorship leads to population growth, and population expansions have a multiplicative factor.

These demographic changes, including the increase in adult survivorship, influence behavioral complexity. Larger populations foster innovation and behavioral diversity, and the intergroup contact associated with expanding populations underlie some of the stylistic expression associated with the Upper Paleolithic. Older adults foster behavioral complexity by promoting the intergenerational accumulation and transfer of information that allowed for intricate kinship systems and other social networks that are uniquely human (Caspari 2011). Moreover, multigenerational families have more

(and more knowledgeable) members to teach and re-teach important lessons, repetition that is important in the transmission of cultural knowledge (Strimling et al. 2009).

Thus, like anatomical modernity, behavioral modernity can be seen as an ongoing process. Our position is that the marked increase in the number of older adults reflects a shift to a modern life history pattern, one in which three-generation relationships are important, and one that results in the large-scale population expansions that underlie the pattern of genetic modernity.

### **Genetic modernity**

**T**he complex pattern of genetic variation in the human species today (Alves et al. 2012) has its beginnings in Late Pleistocene demographic changes and the intervening history of the human species, the consequences of agriculture and domestication in most places, and exponential population growth make genetic modernity largely a product of accelerating changes in the last 10,000 years (Hawks et al. 2007). Human evolution has greatly accelerated in recent history because more people mean more mutations (Tennesen et al., 2012) and more changes under positive selection, many of which are convergent adaptations (Bigham et al. 2010). Other changes are associated with the dispersal of Neolithic adaptations, population size expansions and gene flow that include increasing numbers of local population extinctions and recolonizations (Eller et al. 2004). Many recently evolved genes shared by modern populations come from these changes; Hawks has long maintained that agriculture was far more important than the genetic changes thought to come from “modern human origins.” Our point is that it is not the genes themselves that make us modern, but rather the accelerated process of genetic change, linked to demography. Its consequences lie in the mixed ancestry of human populations and the absence of human races.

### **Conclusions**

**T**he recognition that modernity describes recent and living humans and is not a product of phylogeny permits a more nuanced view of what it means to be a modern human. Modernity has anatomical, behavioral, and genetic aspects that are conse-

quences of biological, social, and genetic changes, linked by accelerating demographic transformations that have come to distinguish living and recent humans. Emerging from a changing life history pattern characterized by increased adult survivorship, modernity is an ongoing process, a pattern of human evolution that both reflects historic variation and gene flow and the dispersals of newly adaptive genes under selection. In a truly multiregional manner these continue to appear at different places and in different times and modernity has no single origin.

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### Correction

Due to a formatting error, three words were left off the end of the last paragraph of the article by Nancy Oestreich Lurie on past AAA programs that appeared in the Spring 2012 edition of GA. The sentence should read:

“The publication of Abstracts for distribution with the program did not began until 1960 but could aid analysis, especially since there seems to be increasing use of cutesy program titles of late, intended more to arouse curiosity than inform.”