Biological anthropology? Making Integrative Anthropology Matter[i]

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"Biological anthropology, so what?" was the title of the talk I gave at the 2015 SACC "Five-Fields Update" session at the American Anthropological Association meetings in Denver, CO. I used that title because I am firmly committed to the notion that much, if not most, of what we do as anthropologists should have some connection to the larger world outside of the discipline. In that vein, I like to remind our colleagues that most people in the United States who get even one small introduction to anthropology do so in community colleges. The broader discipline has ethical and moral obligations to support the anthropologists in these institutions as best we can and to specifically assist those instructors who are teaching way too many classes for far too little money. In order to assist in this endeavor, this essay provides a small sample of current issues and contexts in biological anthropology that have implications for both broader anthropological conversations and the daily lives of our students and ourselves. I offer two brief narratives: 1) an illustration of how biological anthropology (or better put: an anthropology that likes to focus on biological themes) can, and is, enriched by thinking about human evolution in the context of an integrative approach and with contemporary evolutionary theory, and 2) a discussion of how thinking with biological anthropology can assist us in tackling and dismantling pervasive myths and (unfortunately) popular egregious views about race and racism.

I should note that, although this is a view from biological anthropology, it is my growing position that the subfield boundaries in anthropology are becoming archaic and maybe even inhibitory to the practice and development of a truly integrated anthropology. Anthropological information and insight and its translation to the broader world is increasingly difficult to divide into nice clean categories labeled "cultural," "biological," archeological," "linguistic," and "applied"—and that is a good thing.

Human Evolution in 2016

The fossil record today is messy and amazing, more so than ever before (see Wood and Boyle 2016). New species, controversies over what to call "human," challenges to long held assumptions about the processes and patterns that characterize humans and human-like relatives, are all current topics of debate. In 2016, the increasing density and quality of fossil and archeological discoveries is reshaping the

way we envision human evolution. Thirty years ago, there were a few genera that were of specific interest in the human story (namely *Australopithecus* and *Homo*), and within those genera were only a handful of species that:

1) did things that we found particularly interesting (like being obligate bipeds, moving around and out of Africa, making stone tools, etc.), and

2) were likely to be on our direct ancestral lineage.

Today, there are twice as many genera in the hominin story (at least), stone tools emerge well before the genus *Homo* (as much as 3.3 million years ago with certain *Australopithecines*), and dispersal around and out of Africa looks to have happened multiple times over the last 2 million years by different groups of humans or at least very human-like beings. Many of the groups of the genus *Homo* (and there is debate as to exactly how to categorize them as species, subspecies, or other allied clusters) co-existed in time if not in space and did many of the things we used to associate only with "us" (*Homo sapiens sapiens*), who show up on the scene about 200,000 years ago. As recently as 30-50,000 years ago, at least three or four measurably different types of humans roamed Africa and Eurasia, from the tip of South Africa to the Indonesian archipelago. They used fire, hunted with complex tools, created and wore jewelry, and likely participated in some forms of symbolic expression and communication. But today there is only one member of this diverse lineage standing: us.

This leaves *Homo sapiens sapiens* as the last remnant of a multi-million year radiation and evolutionary experiment that resulted in a particularly strange and interesting ex-ape (the very apt term provided by Jonathan Marks in his 2015 book, *Tales of the Ex-Apes: How We Think about Human Evolution*). But why? Why us?

Marks again steers us in the right direction when he states:

> The most significant paradox in the study of human evolution is that human evolution over the last few million years has been bio-cultural evolution, and it is thus perversely unscientific to try and imagine it as simply a succession of biological processes and effects. Without confronting the cultural aspects of human evolution, one cannot approximate the reality of human origins or human nature. (Marks 2012, 139)

What does that tell us? Many people think that biological anthropologists, or anthropologists in general, care mainly about bones and the materiality of bodies. It's not just about the bones, it's about developing a framework that encompasses the complexities of our evolutionary story. As I've noted elsewhere, when studying the evolution of humans, we need to go beyond explaining our bodily structures and our ecologies and develop an approach that can describe an evolving system that tracks and explains the move from transactional to transactional and transcendent beings (the phrasing proposed by the anthropologist Maurice Bloch; see, for example, Bloch 2008). The exciting part of human evolutionary studies at the moment is the need to develop a model of what facilitated a

community of beings in the transition from the production of simple stone tools two million years ago to increasingly complex tools and widening geographic spread one million years ago, to the use and control of fire, to complex hunting and rudimentary language, to art and complex multi-community social networks, to agriculture and towns, to the megacities, global religions, and world economies of today. It is the human ability to deploy multiple and distinctive modes of responses to evolutionary pressures and their concomitant influence on evolutionary landscapes that facilitates the emergence of the possibly dubiously named "sapiens" by approximately 200,000–100,000 years ago. The way anthropologists construct the narrative of this evolution is central to our ability to understand it and to the broader public's access to core issues of what it means to be human.

Constructing this narrative is the challenge of human evolutionary studies, much of which rests squarely on the shoulders of biological anthropologists. It turns out that there have been substantial physiological, morphological, historical, perceptual, experiential, and political changes over the last 2 million years, and the pace of such changes has been radically increasing in the last 10-20,000 years. To engage with these kinds of issues, we all have to be open to an integrated anthropology.

Our current understanding of human evolution demonstrates that a substantial chunk of our explanation for why we are here is related to our amazing capacity for cooperation—for getting stuff done together. Humans collaborate, coordinate, and communicate better than anything else on the planet, and we do so in amazing ways.

Most researchers agree that the human niche, our way of making it in the world, consists of extreme cooperation in complex social relationships, in childrearing, in foraging, in information sharing, and in the development of a symbolic, extended, and shared memory wherein people, places, items, and relationships became imbued with meaning beyond their immediate sensory and temporal contexts. We also have deep evidence for compassion; there's substantial fossil and archeological data for compassion early on in our history (covered well by Penny Spikins in her 2015 book, *How Compassion Made us Human: An Archaeology of Stone Age Sentiment*). A primary characteristic of this human niche is an obligate interdependence where being in a community with one another is fundamental to successfully becoming, and being, human.

Humans face (and faced in the past) environmental challenges as communities, not individuals. We create, we think, we develop. All of this is something that should be taught in our classrooms. This is what human evolution is about; it is not solely about how long our femurs got or how big our brains became. Those are interesting components, but those are also small parts of the overall story. We need to point out that human evolution is all about understanding us in relation with everything else. We cannot be so self-centered to think that anthropology is actually about studying humans separate from the world. We are and always have been part of the world. Today we are in the Anthropocene, in large part because for hundreds of thousands of

years, humans have been shaping and managing the world we are part of. Recently, we've been doing it with incredible speed, influence, and zeal—with many negative repercussions. We are living in a hybrid earth, a new landscape, and we have to take responsibility for this process. A robust narrative of human evolution is key to doing that.

Contemporary Evolutionary Theory

As Jonathan Marks (2012, 2015) points out, it is perversely unscientific to try to imagine human evolution just as a bunch of bones and stones. Biological anthropology is about engaging all of the material evidence with the ways in which we understand the bodies, the minds, the perceptions, the histories, and how all of this changes over time. Luckily, current innovation and dynamism in evolutionary theory lends itself well to thinking, and theorizing, along these lines.

The Extended Evolutionary Synthesis (or EES, see Laland et al. 2014 and 2015) sets the stage for contemporary investigations into human evolution. Kevin Laland and colleagues summarize the heart of this perspective as follows:

> Organisms are constructed in development, not simply "programmed" to develop by genes. Living things do not evolve to fit into pre-existing environments, but co-construct and coevolve with their environments, in the process changing the structure of ecosystems. (Laland et al. 2014, 162)

Our contemporary understanding of how evolution works is more or less like this: mutation introduces genetic variation which, in interaction with epigenetic and developmental processes, produces biological variation in organisms, which may be passed from generation to generation. The variation can move around within a species by individuals moving in and out of populations (gene flow), and sometimes chance events alter the distribution of variation in a population (genetic drift). Natural selection shapes biological variation in response to specific constraints and pressures in the environment (*sensu lato*), but dynamic organism-environment interaction can result in niche construction which changes the patterns, foci, and intensity of natural selection and creates ecological inheritance. But there is more to evolutionary processes than just the biology.

Natural selection does not mean what most people think it means. Rather than being a lethal competition for survival where the bigger, badder, and "fittest" battle it out on the playing field of life, natural selection is, in fact, a filtering process that shapes variation in response to specific constraints and pressures in the environment. Imagine a giant strainer with openings of a certain size (that change depending on the conditions of the environment), and then imagine that organisms come in different sizes and shapes (variation). Now these organisms have to pass through the strainer in order to get to the next generation (to reproduce and leave offspring); those who fit through the strainer's openings reproduce more, on average, than those who don't. Some of the successful variants fit through better than

others due to their particular size and shape and end up leaving more offspring (who inherit that specific size and shape). This process, the filtering of variation from generation to generation based on pressures in the environment, is what natural selection is. So in evolution, the type and pattern of variation and how that variation is inherited matter a great deal.

In our contemporary understanding of evolution, we recognize that multiple systems of inheritance (genetic, epigenetic, behavioral, and symbolic) can all provide patterns of variation that influence evolutionary processes. Genetic inheritance is the passing of DNA (where the genes are) from one generation to the next. Epigenetic inheritance are aspects of systems in the body associated with development that can transfer from one generation to the next without having a specific root in the DNA. For example, certain stressors on a mother during pregnancy can affect the development of the fetus, who can in turn pass those altered characteristics on to its offspring. Behavioral inheritance is the passing of behavioral actions and knowledge from one generation to the next and is common in many animals, such as mother chimpanzees helping their offspring learn how to crack nuts with rocks or fish for termites with sticks. Finally, symbolic inheritance is unique to humans and is the passing down of ideas, symbols, and perceptions that influence the ways in which we live and use our bodies and which can potentially affect the transmission of biological information from one generation to the next. So when thinking about human evolution, we have to recognize that evolutionarily relevant variation can come in the forms of genes, epigenetic systems, behavior, and even symbolic thought.

Niche construction is a key process in the EES. It is the process of responding to the challenges and conflicts of the environment by re-shaping those very pressures. A niche is the sum total of an organism's ways of being in the word: its ecology, behavior, and all the other aspects (and organisms) that make up its surroundings. In short, the niche is a combination of the ecology in which an organism lives and the way it makes a living.

Many organisms "do" niche construction. Beavers build dams changing the compositions of fish and crayfish, water temperature, and water flow around their houses and thus altering the kinds of pressures they face in the world. Even earthworms niche construct. When arriving in a new place they work their way through the soil, ingesting it, changing its chemical structure, and loosening it, making a better environment for the subsequent generations of worms living in that same place. However, humans are a class all our own when it comes to niche construction: towns, cities, domestic animals, agriculture—the list goes on and on.

Niche construction, the process by which organisms simultaneously shape and are shaped by their ecologies, plays a key role in human evolutionary processes via our ability to substantially modify our surroundings through behavioral means. Niche construction creates feedback within the evolutionary dynamic, with organisms engaged in niche construction modifying the evolutionary pressures acting on them, on their descendants, and on unrelated

populations sharing the same landscape. Understandings of niche construction reflect a synthesis of ecological, biological, and social processes rather than treating them as discreet influences or processes.

Cultural practices provide a particularly robust method of niche construction. Take the evolution of dairying by Neolithic groups in Europe and Africa and the rise of the "sickle-cell allele" among certain agricultural groups in West Africa. O'Brien and Laland (2012) describe chains of processes that illustrate the niche-constructing of dairy cattle development. The behaviors and nutritional and social ecologies associated with the domestication of cattle trigger milk consumption, which creates an environment that favors the spread of the genetic basis for lactase persistence, which in turn facilitates more widespread benefits from milk consumption/use. This provides the peoples engaged in these actions with social and physiological incentives for further milk-product development and use. This process can also lead to particular types of selective breeding of milk-producing animals altering their genetic profiles, development, and behavior to create high milk yield strains. This increase in "dairy" farming and dairy-product consumption acts to shape new processes within ecologies and enables the development of nutritional profiles and mortality shifts that can lead to population growth (which in turn might cause expansion or dispersal into new environments).

Humans are excellent and frequent niche-constructors. Cultural patterns and behavioral actions and perceptions can impact genetic and other biological patterns and the process of natural selection, which in turn can affect developmental outcomes, which can then feed back into the cultural patterns and behavioral actions. In human evolution, biological, cultural, and ecological systems are entangled and not separate processes—thus perception and ideas, and the actions emerging from them, can be evolutionarily relevant.

This is the state of knowledge in current biological theory, and it is central to how we understand evolutionary processes in humans and others. But many students, and even many anthropologists, remain outdated and unfamiliar with both a full understanding of what evolutionary processes are at play and how constructive, dynamic, and integrative those processes are. Integrating these approaches, diversity, and complexity in human evolution and contemporary evolutionary theory is a major contribution that biological anthropology can make to the broader field and to the way we all see ourselves, past and future.

Race and Racism

A second locale where biological anthropology is making a difference is in the arena of discourse and research on race and racism. Anthropologists have been tackling the issues and problems of race and racism for most of the last century. There are key elements we (anthropologists) know about race but that are not widely understood in the broader public (see Fuentes 2012):

1) There is only one biological race in humans today.

2) The social construct of races in humans today does not reflect any biological reality or category.

3) There is substantial variation among individuals within populations and some biological variation is divided up between different populations and also among larger population groupings—but not along "racial" lines.

4) Patterns of variation both within and between human groups have been substantially shaped by culture, language, ecology, history, and geography.

5) Race is not an accurate or productive way to describe modern human biological variation, but human variation research does have important social, biomedical, and forensic implications. Race is a cultural construct that can affect our social realities.

6) Racial inequality (racism) is a social reality and can (does) affect individuals' biology.

7) Ethnicity is a valid way to ask questions about social histories and social and symbolic identification, but it is not biology and it is not race.

This information is widely known and well supported in anthropological circles and by the American Anthropological Association, and many individual anthropologists have gone to great lengths to get this information to the public. And yet we seem to be failing in making much of a difference. Most readers will have heard about the 2014 book by the former *New York Times* science writer Nicholas Wade entitled, *A Troublesome Inheritance: Genes, Race and Human History*. Wade makes the argument that there are definable and genetically identifiable groups that represent biological races in humans today (basically White, Black, and Asian). He proposes that evolved biological differences in these races explain social differences in histories, economies, and trajectories in societies; why "Chinese society differs profoundly from European society, and both are entirely unlike a tribal African society" (Wade 2014, 123). Wade argues that racial differences and separate evolutionary histories tell us why humans are the way they are.

Wade's is a poorly written book with shoddy scholarship and extremely weak argumentation (see a set of review essays in the journal *Human Biology* 86(3), 2014). In fact, a letter to the editor of the *New York Times Book Review* criticizing the book was signed by 130 of the top geneticists in the United States with the statement, "We are in full agreement that there is no support from the field of population genetics for Wade's conjectures" (Letters: "A Troublesome Inheritance" 2014). But the book sold tens of thousands of copies and has hundreds of positive reader reviews on Amazon.com. My favorite review reads, in part: "The genetic information revealed in this book has been known for some time, but organizations like the American Anthropological Association proclaim that race is not real (biologically), and actively suppress this information from becoming public. This is a political strategy and not scientific reality." Here, anthropologists are labeled as the political bad guys. That is great. We are, for this person, the "bad guys" and we need to embody that role. Biological anthropology is particularly well poised to demonstrate what race is and what it is not, and why Wade is wholly wrong.

Most people in the United States still think it is true that humans are divided into African, European, and Asian clusters and that these units are biological races. This stems from a broad misunderstanding of human variation, abused by racists like Nicholas Wade, and embodied in the poor understandings, and misrepresentations, of ancestry testing companies like 23 and Me.

People can spit in a cup and send it off with $100, and they can be told who they are—or at least they will be sent a chart telling them that their DNA comes from a particular cluster or clusters somewhere on the planet. Biological anthropologists know that this does not equal race. You can take DNA from a cluster of people in London, UK, from Lagos, Nigeria, and from Beijing, China, and you can sequence it and can tell people from those areas apart based on small variants in noncoding regions of the DNA. You could say, "Wow, these are people from different populations" so they must represent three races (African, Asian, and European). And you'd be wrong. You can take DNA samples from three widely distant populations in Asia (the "Asian" area), from three distant populations in Europe and the Middle East (the "White" or "European" area), and you can also do it for three distant populations in sub-Saharan Africa (the "Black" or "African" area) and almost always be able to genetically differentiate these clusters as easily as you could the initial three different continent samples. In fact, odds are the three populations from sub-Saharan Africa will be even more different than any of the others, as we know that there is more genetic variation in sub-Saharan Africa than all of the genetic variation outside of Africa (see Tishkoff et al. 2009 and the AAA race project, http://www.understandingrace.org/). This alone negates Wade's entire argument—the way we use race is not caused or formed by any biological reality.

But that does not mean that race is not real; it is. Just that it is not based in biology. Race is a real political, social, economic, and embodied experience and anthropologists have the key to understanding this. Racism creates the structures of race and these structures, and the violence they enact, can have serious biological and social impacts (e.g., Benn Torres and Torres Colon 2015; Hartigan 2015; Gravlee 2009). This perspective is a key contribution that biological anthropology can assist in developing teaching and learning for the classroom (and beyond).

Final Thoughts

I paraphrase Hugh Raffles, an anthropologist at the New School, to point out the challenge to anthropology to think about and engage with evolutionary processes and complexity: in being and becoming human there is a really real to the biophysical materiality, just as there is a really real to the perceptual experiential reality. Anthropology is bright enough to know that we need to integrate these two facets to understand where we're going as communities, populations, and as a species. Ideas, concepts, and research emerging from those anthropologists interested in the biological and evolutionary aspects of the human experience are centrally relevant to this discourse.

The artist Sarah Deremer (http://www.sarahderemer.com/#hybrid-

animals) has created an image of a whale-iraffe, a hybrid animal, part whale and part giraffe. I'd like to suggest that we need to start thinking about anthropology in this manner. Anthropology needs deep training in methods and theory, we need skillsets to go out and do the kind of work we're interested in, such as that in human evolution and the understanding of race and racism. But we are running the risk of isolating ourselves from the best discussions and missing critical opportunities if we spend too much time debating whether one is an archaeologist or a biological anthropologist, a linguistic anthropologist, social-cultural anthropologist, or an applied anthropologist. Too much allegiance to archaic boundaries will move us closer and closer into irrelevance in the broader society. It will also make our work more incomplete and less interesting. Anthropology is a beautiful hybrid, we're a chimera and we should act like one. I have provided here some musings on elements of particular interest to biologically oriented anthropologists, but (hopefully) in a way that illustrates their importance to a wider array of anthropologists and especially to those teaching anthropology. If we do not entangle approaches, mix and blend our interests and abilities, we will never get to a closer and better way to understand the moving target that is the human.

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