RAFF unedited

How did you come to study both anthropology and genetics?

As a kid I was fascinated by archaeology, and never really grew out of it! But I was also exposed to a lot of biology as I was growing up as my mother was in graduate school studying neuroscience. I had the wonderful privilege of being around science professors and research labs for most of my life, and really fell in love with science and biology in particular. After the movie Jurassic Park came out, I realized that my love of biology and archaeology could be combined by studying ancient DNA (though not, of course, from dinosaurs). In graduate school I decided to pursue a double degree (a double major) in genetics and biological anthropology to develop as broad a knowledge base as possible for working in this field.

And, I have to ask, which came first, those interests or mixed martial arts? Perhaps related, why do you call your blog "Violent Metaphors"?

Definitely my interest in science came before MMA, although I have been studying martial arts in some way or another since I was six years old. I started training in Tae Kwon Do with my sister and father, and eventually my interests broadened to encompass Hapkido, Kali, Silat, Muay Thai Kickboxing, Brazilian Jiujitsu, and western boxing. My sister was a very high-level professional fighter in MMA (she was one of the first women in the UFC), and when I started my first postdoc after graduating, I decided to take advantage of her team connections and spend a few years on intensive training in MMA and related arts. I was privileged to be trained by some incredible coaches at Gym Jones, at the Bernales institute, with the Muay Thai legend Sakasem Kanthawong, and I also got to train with some of the best MMA fighters and coaches in the world on my sister's team in Albuquerque. Later when I moved to Chicago for my second postdoc I worked with coach Wayne Gregory and made it to the semi-finals of the Golden Gloves. I did not compete long enough to really develop to my full potential as a fighter (I was juggling training with doing research, and eventually had to back away from competing), but I really cherished the experience and the lessons I learned from training for fights. Today I'm slowly easing back into martial arts after a hiatus spent focused on writing my book, going up for tenure at KU, and having a baby. I'm really happy to be training Brazilian Jiujitsu with the wonderful people at Rivers BJJ here in Lawrence.

Violent metaphors was originally going to be a blog that combined all my interests, including combat sports, but it evolved into a science blog and also one to which my husband now contributes his writing on understanding and debunking conspiracy theories. I've sadly neglected it in recent years, but I keep meaning to write more for it….when I have more time! It's not dead, just dormant.

I think several facets of your field are unfamiliar to many of us, from the size and duration of the Bering land bridge to genetics to the timelines involved. All three are mind boggling. You discuss it in Origin, but could you briefly describe the processes of sampling and identifying DNA?

The process of sampling and identifying DNA begins with conversations between us and descendant communities. We talk about what kinds of research questions they might be interested in, whether the research questions that we have are acceptable to them, and how they would like us to do this research. For example, are there certain skeletal elements that they would prefer us to sample, are there certain protocols they would like us to follow in respectfully handling the remains, how often would they like to be updated on the project, what involvement would they like to have in interpreting the results, would they like to co-author any research papers, who should have access to the resulting genetic information? It's only after we figure all this out—a process that can take years of discussion—that we begin the DNA work itself.

These days I don't get to do much laboratory work myself, the chapter in my book notwithstanding. So it's one of my students or one of the research staff who does all the actual DNA recovery in our lab. They bring the sample of bone or tooth into the isolation lab in Fraser Hall, which is directed by Foundation Distinguished Professor and Chair of Anthropology Dennis O'Rourke, who kindly shares it with me and my students. In order to work in this lab, you have to be specially trained in anti-contamination techniques, and you have to wear a full Tyvek body suit, hairnet, gloves, masks, and spray yourself with bleach before moving into the clean areas of the lab. It's all to prevent modern DNA from contaminating the ancient DNA extractions, which is a major concern to us. DNA extraction is a process that takes several days, and it's really tedious work to recover these tiny, damaged DNA fragments. The researcher then builds DNA libraries and assesses how much of the total DNA extracted from the sample actually belongs to the ancestor. The amount that's preserved, if any, determines what we can do with the

genome—whether we sequence the whole genome, whether we try to look at the sequence of preselected DNA bases across the whole genome using probes, or whether we can't do much with the sample because there's not much DNA present. Unfortunately, that's true most of the time, because ancient DNA is so fragile and scarce. But when we do have enough ancient DNA present to get genomic information, we can compare it to other individuals across the world and model population histories using the tools of population genetics.

We've found several relatives - not just Neanderthals, but Denisovans, and even Neanderthal-Denisovan

offspring. There's also the so-called "Dragon Man" (Homo longi), and "Hobbits" (Homo floresiensis), who

some think are still living. Do you think there might be others that we've missed? Have the genes of our

aforementioned cousins shown up in any Native American populations?

I think that we're far from having a complete understanding of the genetic variation present in other kinds of humans who were present during our early evolution. We are the only hominins remaining on the planet, but for most of our evolutionary history that wasn't true. Paleogenetics is beginning to show us their genetic legacies in our own DNA. In the First Peoples, we can see genetic contributions of both Neanderthals and Densiovans that interacted with their ancestors in Asia.

What are the basic timelines of your studies - maybe Asia to the Americas; Ice ages

We know from the research of my talented colleagues that the gene pool of the immediate ancestors of the First Peoples formed sometime around 25,000-20,000 years ago with the interaction of a population of East Asians who encountered a population we call today the "Ancient Northern Siberians". Immediately following this gene flow event, the ancestors of the First Peoples became isolated. This coincides with the peak of the Last Glacial Maximum, a global climate event in which the northern hemisphere was much colder and dryer than it was today, and sea levels were a lot lower because water was bound up in massive glaciers. One place where these ancestors might have been isolated is the

southern coast of what would have been a land connection between Asia and North America—what people call the "Bering Land Bridge." But this region was twice the size of Texas, and so I tend to think of it more as a lost continent than a bridge that people raced across. If this model is correct, then people

were isolated for a few thousand years in refugia—regions that paleoenvironmental reconstructions have shown to be relatively decent places to live during the last ice age. While they were isolated, this population split into several branches. It's a complicated story, which I go through in the book, but to put it simply here: one branch eventually makes its way south of the ice sheets that covered northern North America and peopled the American continents. This may have taken place by boat along the west coast, sometime after 17,000 years ago. Or it could have been earlier, as human footprints at the White Sands Locality II site have been dated to 21-23,000 years ago. Genetic evidence and most archaeology favors a ~17,000 year migration, but we can't currently rule out an earlier one. There are some interesting genetic puzzles still to be solved—specifically, some of these other branches and how they contributed to the genetic composition of the First Peoples in different places-- that may hint at an earlier migration. We are only at the beginning of our understanding of the genetic diversity of these ancestors, and I fully expect that additional data will change our models in the coming years.

Not that long ago there was an "Indian Burial Pit" tourist trap outside of Salina. Times are slowly

changing. Origin pleasantly surprised me by starting with ethics, its respectful attention to Native Americans. Could you talk about how that came about for you? Did you face any pushback from publishers?

From the beginning of this project, I set out to write a book that told not only the story of what we think we know about the genetic histories of Native Americans, but how we came to this knowledge. It really is a fraught history, full of stories of harmful and abusive research practices which have led to a very understandable distrust of non-Native geneticists by some tribes. It's our responsibility to mend these relationships, acknowledge the harms that have been done, and consciously improve our research practices if we're going to do this work in a good way. In telling this story, I tried to point out not only the bad examples, but the examples of good, collaborative research that has been done: I think both are important to learn from. I'm very happy to count among my mentors and colleagues Native and non-Native scientists who have done this work well for a long time; I have learned so much from them, and I try to put their approaches into practice in my own work and also highlight it in my writing.

My editor Sean Desmond, my agent Will Francis, and the entire publishing team at Twelve enthusiastically supported me in this. I am very grateful that they helped me write the story that I

wanted to tell, to highlight the work and advocacy of my brilliant colleagues—some of whom are here at KU! I'm also grateful beyond expression to the Indigenous geneticists who served as sensitivity editors in the process of writing this book. I had five different people from several different tribes giving me feedback on content and language, and I can't thank them enough.

Describing exploration of a different era, that of Captain Cook sailing off the coast of Oregon in 1778, writer Barry Lopez flips the usual narrative of North American exploration by starting on the Pacific coast. Your work largely does the same. Can you talk about the so-called Kelp Highway?

The Kelp Highway hypothesis observes that resources and climate would have been similar all along the west coast, and therefore would have permitted very rapid travel by boat. People would not have had to make major adaptations to different environments in the same way that they would have had to do if they were traveling more slowly by land. I think the genetic evidence supports a coastal migration as well.

Have you done much field work? Where?

Far less than my archaeologist colleagues, but I've worked at archaeological sites in the Midwest, in Belize, and at the Nuvuk site near the Alaskan city on the North Slope that used to be called Barrow (today it's called Utqiaġvik). I really love fieldwork and wish I could do more of it!

What's the biggest/latest news in the peopling of the Americas that most of us aren't aware of?

I think the White Sands site—the one that's been dated to 21,000-23,000 years ago—is the most recent and exciting archaeological news. If the dating holds up to scrutiny, it will be really paradigm shifting. There are a lot of archaeologists who have reasonable doubts about the way these footprints were dated, but I find the responses of the excavators to their doubts to be very convincing. We'll have to see—it's an exciting time to be working in this field!

Any guesses of what's to come in the story/ What do you expect we"ll find next?

From a genetics standpoint I think the next major findings will be coming out from Central and South America, as I know a lot of colleagues who are working hard to document and analyze the ancient genetic variation in these regions. Here at KU, Dennis O'Rourke, I, Lauren Norman, Justin Tackney, Kristine Beaty and our students are working in the Arctic and the Plains with tribes who are interested in

learning about their genetic histories. We're very excited about what we're finding and hope that we'll be able to share our results before too long.

Where would you visit if you could, professionally?

I was all set to make a trip to White Sands last year, but unfortunately the site was closed to all but the archaeologists working on it for legal reasons. I'm hoping that I'll eventually get to go out there—I'm truly obsessed with those footprints and what they might mean for human history.

Where would you visit if you could, non-professionally?

Basically anywhere in the world—I haven't gotten to travel abroad very much and there's so much I'm curious to see! I'd especially love to visit Rome and see the ancient sites there.

Can you share some hints on what your next book is going to be about?

It will be about more ancient genomes but I'm expanding the geographic area beyond the Americas.

Can you recommend some books on anthropology, genetics, and/or Native American history?

For archaeology in the Americas, the very best book to read is by David Metlzer, called "First Peoples in the New World." His thinking and writing on the peopling of the Americas has hugely influenced me.

For more recent history and a discussion of Indigenous issues, my colleague Kent Blansett has a terrific book called "A Journey to Freedom: Richard Oakes, Alcatraz, and the Red Power Movement" which I highly recommend.

For critical perspectives on archaeology and genetics written by Indigenous scholars, see "Red Earth, White Lies: Native Americans and the Myth of Scientific Fact" by Vine Deloria Jr., and The Indigenous Paleolithic of the Western Hemisphere" by Paulette Steeves.

For archaeology and history books written for kids, see "Turtle Island: The Story of North America's First People by Eldon YellowHorn and Kathy Lowinger, "Sharuko: El Arqueólogo Peruano Julio C. Tello / Peruvian Archaeologist Julio C. Tello" (it's bilingual) by Monica Brown and Elisa Chavarri. Another great kids book which touches on contemporary Indigenous issues is "Sharice's Big Voice: A Native kid becomes a Congresswoman" by Sharice Davids (full disclosure: she's a friend of mine) and Nancy Mays.

For forthcoming books, I'm really excited about one coming out next January by Caroline Dodds Pennock called "On Savage Shores: How Indigenous Americans Discovered Europe."

What was your favorite book as a youngster?

I loved Jules Verne's and Elizabeth Peters'/Barbara Michaels' books, once I was old enough to read them! I couldn't choose just one!

What are you reading now?

Right now I'm reading "The Plot" by Jean Hanff Korelitz