Chicken genomes and human history: What can the DNA of our animal associates can reveal about our past?

What can the genomes of chickens tell us about our history? More than you'd think. Studies of human DNA are often used to reconstruct our species's migration out of Africa and across the globe, but now an analysis of domesticated chickens in Polynesia has challenged the idea that Polynesian seafarers made it to the Americas long before Europeans did so.

Roff Smith, writing for National Geographic, summarizes the evidence of Polynesian influence:

> Among the intriguing indications that contact might have been made between Polynesians and the native peoples of South America was the supposed pre-Columbian presence of non-native chickens, allegedly introduced to the continent by seafarers from South Pacific islands. More evidence comes from the ubiquity of the sweet potato, a South American native, in the South Pacific—it was already widespread throughout the islands by the time James Cook sailed into the region in 1770.

A study compared ancient (through archaeology) and modern chicken genomes in Micronesia and Polynesia to those in ancient and modern South American chickens and found the two chicken populations were genetically distinct. The chickens in South American seem to no longer belong on the evidence list for early Polynesian arrival.

Chickens are not the only close animal associate that ingenious researchers can use as a proxy when trying to tease out our own history. In this specific case, Smith notes, the total absence of Pacific rats in South America is also compelling evidence against early Polynesian contact. No genetic work needed here: "The Pacific rat is known to have traveled everywhere with their Polynesian hosts, and wherever they landed they invariably established thriving local rat populations that live on to this day." Their ecologically conspicuous absence is evidence enough.

Though fascinating in its own right, this study highlights the potential of our ecological associates (e.g. chickens, rats) and their own genetic histories for helping us piece together our species history.

The living, breathing artifacts of our history are all around us. If you live anywhere in the United States, you are almost certainly familiar with a ruddy little bird call the house sparrow. This species came here on ships with Europeans, and it came to Europe from the Middle East. Starlings are another avian gift from European settlers.

The people behind the chicken study are not the only ones to recognize this: A study published last week (March 13) linked the domestication of livestock in Africa with the development of Africans' ability to digest lactose. Domestication would mean reliable access to milk as a food resource, and would confer a major

advantage to humans able to digest milk even in adulthood. (Most mammals lose the ability to digest milk out of infancy.) Our own Tabitha M. Powledge wrote extensively on the topic for this week's newsletter.

The lesson: our ability to trace patterns of ancestry and population movement through human genetics may be more sophisticated than ever, but it only reaches its fullest potential as a tool when used in tandem with cultural, historical, and ecological studies.

What other stories of human history might be contained in the genes of chickens and cow, sparrows and starlings, rats and mice?

Sources:

- "Chicken DNA Challenges Theory That Polynesians Beat Europeans to Americas," Roff Smith | National Geographic
- "Milk genes: Why only some of us can drink milk," Tabitha M. Powledge | Genetic Literacy Project
- "Africans' Ability To Digest Milk Co-Evolved With Livestock Domestication," Helen Thompson | Smithsonian