

Our inheritance

A fascinating history of heredity research reveals the field's highs and lows

By Axel Meyer

With hundreds of ancient human genome sequences at our fingertips and millions of contemporary samples provided by customers of consumer genetics companies, now—more than ever before—we

are able to discover, decipher, and interpret mixing, migration events, and genetic variants in human populations. Into this zeitgeist enters Carl Zimmer's most enjoyable new book, *She Has Her Mother's Laugh*, with a sweeping overview of the history of our understanding of heredity.

From Mendel's peas and Soviet-era Lysenkoism to chimeras, CRISPR, and the microbiome, the book traces the scientific discovery of genes, chromosomes, and epigenetics, as well as recent advances in gene therapy and paleogenomics. It is ambitious in scope, but Zimmer is one of the best science journalists of our times, with a long history of setting the bar for beautiful, clear, and scholarly writing. He is true to form in this book.

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Zimmer begins with a personal tale of a visit to a genetic counselor that preceded the birth of his first child. This experience reveals how little he actually knew about heredity at the time. Later, he seems to “hear heredity”—his daughter's laugh is so similar to his wife's—but why? And what makes his second daughter so different from the first?



She Has Her Mother's Laugh
The Powers,
Perversions, and
Potential of Heredity
Carl Zimmer
Dutton, 2018. 672 pp.

Interesting historical tidbits are peppered throughout the book. The term “hereditas,” Zimmer reveals, for example—employed by the Romans—referred not to biological inheritance but to a legal concept concerning who would inherit a relative's assets. Genealogies, we learn, evolved in their depiction of biological connections from vertical lines to treelike structures, which, to the French, resembled the forked *pé de grue* (“crane's foot,” later rendered into “pedigree” in English).

In the 14th through the 16th centuries, Europeans began to conceive of the link between generations as being related to the blood, although other cultures maintained very different ideas. Native populations on the Malaysian island of Langkawi, for example, continued to believe that kinship was achieved by sharing foods.

Evolutionary biology is Zimmer's specialty: He coauthored one of the best textbooks in

In his daughter's laugh—so similar to her mother's—Zimmer wondered if he was “hearing heredity.”

the field, and it shows (*I*). But evolution and heredity are not the same, both constituting huge fields that only partially overlap.

Charles Darwin famously misunderstood inheritance, proposing that tiny particles shed from an organism's many cells migrated to the gonads, where they were transferred to offspring. His cousin Francis Galton did further disservice to the field of heredity, having conceived of the notion of “eugenics”: a program whereby strategically arranged marriages would result in “better” humans from generation to generation. Ironically, Nazi bombs destroyed the Galton laboratory during World War II. However, the lab's research continued, becoming part of University College London's Department of Genetics, Evolution, and Environment in 2013.

“Individual ‘Z,’” as Zimmer refers to himself after having his own genome sequenced, consults experts in New Haven and New York to help him interpret the results. His Y-chromosome haplotypes, he learns, are shared with Napoleon's (a lock of hair was saved after the general's death, allowing French researchers to extract some genetic information in 2011). Luckily for Zimmer, his results were otherwise rather boring.

The book reminds one how little information is typically transmitted between generations in many families. Often, we don't know where our ancestors were born, what diseases plagued them, or how long they lived. Genome sequencing stands to shed light on some of these genealogical questions. Now we can say, for example, that we are 43% Ashkenazi Jewish or put a name to a mysterious malady that plagued our mother's sister.

When one writes about genetics and heredity in humans, one runs the danger of ignoring societal short fuses. Zimmer does not shy away from controversies, but he does, artfully, ship around some of the shallows. He points out, for example, how historically transient, arbitrary, and scientifically wrong it is to classify humans based on skin colors. “[S]kin color,” he writes, “is not a timeless hallmark of human races. It has changed in different places and at different times.”

She Has Her Mother's Laugh is more than a historical account of the field of genetics. It's a treasure trove of curious facts, contextual tidbits, and up-to-date reports on the trials and tribulations of heredity told in a most entertaining way.

REFERENCE

1. C. Zimmer, D. J. Emlen, *Evolution: Making Sense of Life* (Roberts and Company, Greenwood Village, CO, 2012).