

# Generations

## *Reproduction, Heredity, and Epigenetics*

All the world is a stage,” Shakespeare wrote, and in some sense, scientifically, he was right. Your body is acting out a script that defines your existence, one which is encoded in each of your 37 trillion cells. That script is made up of short chunks of DNA called genes, which tell your cells how to grow and function.

While each person has a unique combination of genes, all humans have the same set of genes, and this unites us as a species. You can't change that, but your script can be adapted in different ways: picture a big-budget Hollywood production of *A Midsummer Night's Dream* as opposed to one acted at a community theater. The sets, costumes, and effects would be very different, but the story and the words would be the same.

If, on the stage of your body, your genes are the script and your cells are the cast, epigenetics is the director that determines the way the script is enacted. Everything in

your life – your environment, upbringing, diet, age, emotional states, and relationships– can determine whether individual genes are expressed or silenced. Epigenetics accounts for variation among genetically identical twins. Epigenetic changes can determine whether you get diseases like cancer or Alzheimer's. And these epigenetic changes can be inherited.

Although the scientific study of epigenetics only dates to the middle of the twentieth century, scientists have puzzled over related questions of heredity and development for hundreds of years. Does it matter whether you inherit a trait from your mother or father? How do your earliest stages of development influence the rest of your life? Which characteristics are inborn, and which are learned?

These are questions being asked by epigenetics researchers today, and they are the questions we consider in a historical sense in this exhibition.



Jean Baptiste Lamarck was one of the first evolutionary thinkers. He described how he thought the giraffe evolved its long neck in his *Philosophie Zoologique* (1809), suggesting that the habit of stretching to reach high branches caused each successive generation to grow longer and longer necks and front legs. Lamarck was arguing for the inheritance of acquired characteristics - an idea that was certainly not new in his time. As this exhibition shows, the belief that people could pass on experiences, thoughts, and even sin to their children remained common through the nineteenth century.