

## A Note on Forms of Genetics

Storm Russell\*

Department of Plant Biology, University of Georgia, Athens, Georgia

### Opinion Article

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**\*For Correspondence:**

Storm Russell, Department of Plant  
Biology, University of Georgia,  
Athens, Georgia

**E-mail:** russell@gmail.com

### DESCRIPTION

Genetics is a branch of biology that studies genes, genetic diversity, and heredity in living things. Gregor Mendel, a Moravian scientist and Augustinian priest working in Brno in the 19<sup>th</sup> century, was the first to investigate genetics scientifically, despite the fact that heredity had been observed for millennia. Mendel looked on "trait inheritance," or even how characteristics are passed down from parents to offspring over time. He discovered that organisms (pea plants) inherit features in separate "inheritance units." This word, which is still in use today, is an unclear definition of what has been known as a gene.

In the 20<sup>th</sup> century, trait inheritance and molecular inheritance mechanisms of genes are still essential aspects of genetics, but modern genetics has evolved beyond inheritance to include the study of gene function and behavior. The structure and function of genes, as well as their variation and distribution, are investigated in the context of the cell, the organism (e.g. dominance), and a population. Molecular genetics, epigenetic, and population genetics are only a few of the subfields of genetics. The organisms researched in this broad field come from all areas of life (*archaea*, bacteria, and eukaryote).

Nature against environment refers to just how genetic processes interact with an organism's surroundings and experiences to determine development and behavior. A living cell's or organisms intracellular or extracellular environment can turn gene transcription on or off. Two genetically identical wheat seeds, one in a temperate region and the other in an arid climate, are a famous example (lacking sufficient waterfall or rain). While the average height of the two corn stalks may be genetically equivalent, due to a lack of water and nutrients in its surroundings, the one in the arid climate only grows to half the height of the one in the temperate zone.

Although genes were known to exist on chromosomes, scientists didn't know which of the two is responsible for inheritance because chromosomes are made up of both protein and DNA. Frederick Griffith discovered the phenomena of transformation in 1928 (see Griffith's experiment): dead bacteria may "convert" other still-living bacteria by transferring genetic material. The Avery–MacLeod–McCarty experiment conducted sixteen years later in 1944, identified DNA as the molecule responsible for transformation.

Hämmerling established the nucleus as the storage of genetic information in eukaryotes in 1943 in his work on the single celled alga, *Acetabularia*. In 1952, the Hershey–Chase experiment established that DNA (rather than protein) is the genetic material of viruses that infect bacteria, adding to the growing body of evidence that DNA is the molecule that controls heredity.

In 1953, James Watson and Francis Crick used the X-ray crystallography work of Rosalind Franklin and Maurice Wilkins to establish the structure of DNA, which suggested that DNA has a helical structure (shaped like a corkscrew). Their double-helix model consisted of two strands of DNA with nucleotides pointing inward, each of which matched a complementary nucleotide on the other strand to form rungs on a ladder.

This structure indicated that genetic information is encoded in the nucleotide sequence on each strand of DNA. The structure also provided a basic replication method: if the strands are separated, new partner strands may be created for each strand using the old strand's sequence. This feature is responsible for DNA's semi-conservative nature, which occurs when one strand of new DNA is derived from an original parent strand.

Although the structure of DNA revealed how heredity works, it remained unknown how DNA affects cellular response. Scientists spent several years having trouble figuring out how DNA regulates protein synthesis.