**DNA AFTER MIESCHER**

After Miescher's initial description in his 1871 paper ([Miescher, 1871](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib35)), other scientists also started investigations into nuclein. Mostly chemists, often through personal contacts with Miescher or Hoppe-Seyler, were intrigued by its potential as a novel kind of cellular substance—among them [Kossel, 1879](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib23), [Kossel, 1891](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib24), [Jules Piccard (1874)](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib84), and [Jakob Worm-Müller (1874)](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib99). Most notably, Albrecht Kossel—another scientist in Hoppe-Seyler's laboratory and later winner of the Nobel Prize in Medicine—discovered that nuclein was comprised of four bases and sugar molecules. Gradually, also histologists became interested. The botanist Eduard Zacharias showed that nuclein was an integral part of chromosomes and thus in 1881, according to His ([His, 1897](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib16) ), was the first to combine the histological concept of chromatin with the chemical substance nuclein.

However, for long after Miescher's death, nuclein still received comparatively little attention. The vast majority of scientists remained convinced that the more complex proteins must be the carriers of genetic information. Proteins are comprised of 20 different amino acids, while DNA is made up of only four different nucleotides—too few, it was believed, to store the enormous amount of genetic information. Widespread interest in DNA was not rekindled until the mid-1940s and early 1950s, when Oswald T. Avery, Colin MacLeod, and Maclyn McCarthy on the one hand and Al Hershey and Marta Chase on the other demonstrated in classical experiments that DNA is the carrier of genetic information ([Avery et al., 1944](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib2), [Hershey and Chase, 1952](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib14)).

In 1953, [Watson and Crick (1953)](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib98) deciphered the structure of DNA and thus provided the first insight into how it works. A decade later, Robert W. Holley, Har Gobind Khorana, Marshall W. Nirenberg, and colleagues finally cracked the genetic code ([Singer, 1968](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib88)). At this point, it had become clear how the information for creating the variety of organisms could be encoded in a single molecule composed of only four different building blocks. This information served as the point of departure for the development of a completely new biological discipline: molecular genetics (for further information on the history of DNA and genetics ( [Mayr, 1982](https://www.sciencedirect.com/science/article/pii/S0012160604008231%22%20%5Cl%20%22bib26) and [Olby, 1994](https://www.sciencedirect.com/science/article/pii/S0012160604008231#bib82)).