

Top ten careers in genomics

1 | DNA Sequencing

If you come across some DNA, how would you identify who (or what) it belonged to?

The first step in identifying the source of DNA is to find out the exact order of the nucleotides, which is a process known as “DNA sequencing”.



1 | DNA Sequencing

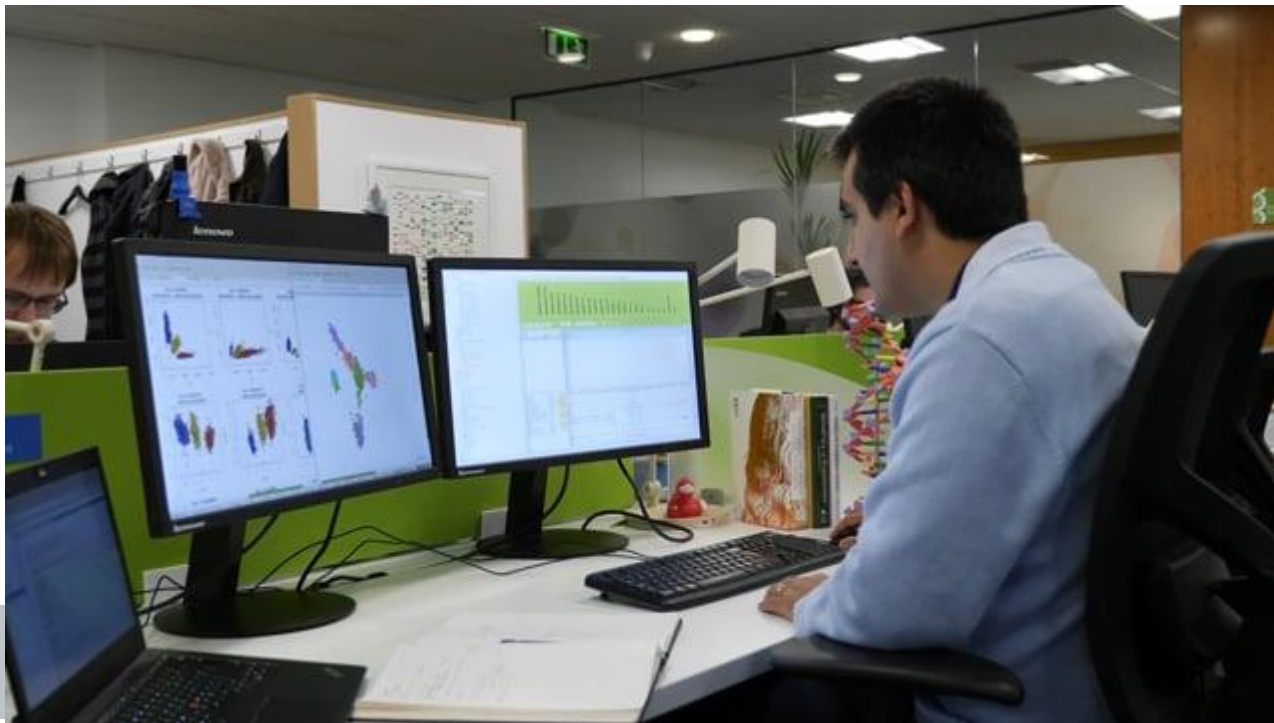
DNA sequencing technology has developed tremendously in the past decade. Scientists are now able to sequence thousands of nucleotides in a few hours, whereas it took days to do the same amount of work just 10 years ago.

While automation has helped with this process, laboratory technicians are still needed to process these samples, such as extracting and purifying the DNA, and preparing them for sequencing.

Occupation: Laboratory Technician

2 | Data Processing

Once the DNA is sequenced, the data generated is usually saved as a large file containing the specific order of the nucleotides. Depending on the length of the DNA, this could be a jumble of hundreds to millions of A, T, G, and Cs. T



2 | Data Processing

To make sense of this data, bioinformaticians use computer programs (and often code their own to fit their needs) that can identify and analyze these sequences of DNA, and generate databases to maintain this large amount of data.

Occupation: Bioinformatician/Programmer

3 | **Researcher**

If the DNA sample came from a laboratory, the data will be returned to an Independent Researcher. Independent Researchers have laboratories at research institutes, hospitals, or universities, and are in charge of scientific research projects. In the field of genomics, this can be, for example, identifying genes or changes in DNA that put you at higher risk for certain cancers or investigating the genetic influence of a disorder.

3 | Researcher

Depending on what type of institute they are at, independent researchers can wear different hats. For instance, at universities, they will be known as professors, and at hospitals, they may be doctors that treat patients, too.

Occupation: Independent Researcher



4 | Patient Counseling

If the DNA sample came from a patient, the data will go back to the doctor's office or hospital. Various genetic disorder screening methods are available based on DNA sequencing. Many of these have become routine such as fetal and newborn screening, especially based on familial history.



4 | Patient Counseling

Genetic counselors work with patients and family members identified to be at risk or carriers of a genetic disorder to help them better understand the results of their diagnosis and how to manage them. This includes helping to interpret the patient's genetic information, reviewing available options, and identifying support groups.

Occupation: Genetic Counselor

5 | Forensic Science

In some cases, DNA samples are found in crime scenes as physical evidence. Forensic science is the use of scientific methods and technology in the investigation of crimes. Forensic scientists can be found at the crime scene collecting evidence or in the laboratory processing and analyzing these samples. While 99.99% of all humans share the same DNA, we can use the other 0.01% to distinguish individuals.

5 | Forensic Science

This means the DNA sequence found in a crime scene can be matched to a suspect's DNA. When we hear in the news that DNA from a crime scene has been matched to a potential suspect, we are witnessing the hard work of a forensic scientist.

Occupation: Forensic Scientist



6 | Product Development & Support

For the analysis of DNA sequences, various applications and apparatus are needed from sample preparation to sequencing reactions. Scientists at biological science companies are responsible for creating new products, testing them to make sure they work correctly, and providing technical support to consumers.

Occupation: Product Developer, Technical Support

7 | Patent Law

The development of new products entails the need to protect the intellectual property behind them. Patents grant the inventor legal rights for sole use of their invention for a certain number of years.

Patent agents and patent attorneys help the inventors apply for and defend their patents. Patent examiners are employed by the USPTO to analyze the application and determine whether the invention is patentable.

8 | Bioethics and Science Policy

The abundant amount of genetic information helps us understand our history and health. However, without proper protection and regulations, it could be used against us. To protect us from these risks, bioethicists and policy makers work to develop and support policies and ensure regulations are in place. For instance, the Genetic Information Nondiscrimination Act, which was passed into law in 2008, prohibits discrimination based on genetic information in the workplace and by health insurance issuers.

8 | Bioethics and Science Policy

If you are interested in biology and protecting our rights, you might have a career in bioethics and policy.

Occupations:

Bioethicist

<http://www.eurogentest.org/fileadmin/templates/eugt/pdf/BackgroundDocDefinitionsLegislationV10-FinalDraft.pdf>

9 | Science Writing and Communication

Science writers help communicate new findings or topics of interest in science to the public or a targeted audience. Science writers can be employed to work on professional scientific journals, which are mostly read by scientists, or more broader publications. Scientific editors are generally employed by professional journals to review manuscripts submitted by the scientific community and determine whether they are appropriate for publication.

10 | Science Education

We may be accustomed to learning science from our teachers at school, yet science education happens in other exciting venues as well, including museums and zoos. In addition, other organizations, such as universities, companies, non-profit organizations, and government agencies are often eager to communicate scientific issues with the local community.

10 | Science Education

These diverse avenues of learning provide myriad opportunities to work as a science educator and help others learn about genomics and genetics.

