

12.2_I

Paragraph	Summary
1	the history of genetics and genomics
2	description of the Human Genome Project
3	gaps in knowledge revealed by the Human Genome Project which led to the growth of epigenetics as a field of study
4	the Human Microbiome Project and its importance
5	some of the possible future benefits from genomics

Model answer

Knowledge of the link between genomics and human health has grown rapidly over the past few decades. The Human Genome Project, which ran from 1990 until 2003, developed new technology for mapping DNA and created the first map of the human genome. This map showed that only around 2% of the human genome could be directly linked to the function of creating parts of the body. However, researchers realized that the 'junk' DNA had an important role in reproduction; this led to the study of epigenetics, or factors 'above' the gene. This research showed that, while DNA sequences themselves were fixed, other factors – including the environment – could change how the sequence produced new cells. The faster mapping of DNA achieved during the Human Genome Project was also of direct importance to medicine for at least two reasons. One was that DNA mapping could become a more routine part of treatments for patients. Researchers have now discovered that some drugs are more effective for patients with a particular DNA profile, improving doctors' ability to treat the individual patient. The second reason was that non-human life forms could begin to have their DNA mapped as well. This led to the Human Microbiome Project, which began in 2007 and which maps the DNA of the different organisms which live in and on humans. Research is showing that these organisms can influence the effectiveness of drug treatments; this knowledge can therefore help to improve treatments for patients. Understanding more about genomics has led to the knowledge that 'interactions between humans and different life forms are far more complex than previously imagined and can have a direct influence on human health' (p. 1778).¹