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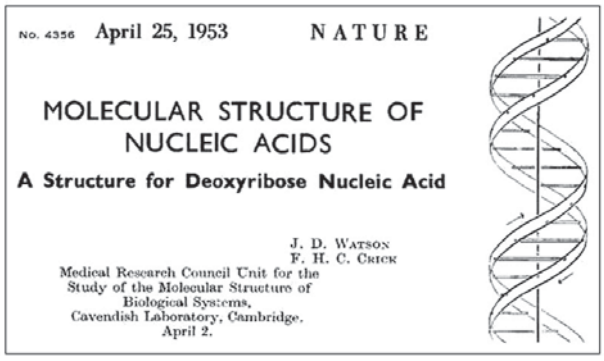
2013, THE DNA JUBILEE YEAR

It has been 60 years since the structure of DNA was unraveled – one of the most important scientific breakthroughs of the 20th century. X-ray diffraction images, generated at King's College London in the early 1950s, enabled James Watson and Francis Crick to model the molecules' double helix structure. The announcement by Watson and Crick in 1953 of the structure of DNA (1) signaled the beginning of a molecular biology revolution that is still in progress. Understanding how DNA is chemically arranged revealed the processes of self-duplication, which allows genetic information to be passed on to newly formed cells, and also demonstrated how variation can occur within species (2). This discovery revolutionized biology and has enabled great advancements in medicine, agriculture and crime investigation.

In 1972, Paul Berg produced the first recombinant DNA (3), which in turn was followed by the creation of the technology for propagating and expressing recombinant genes by Stanley Cohen and Herbert Boyer in 1973, 40 years ago (4). Recombinant DNA technology enabled the transformation of bacterial cells into living factories for targeted production of selected proteins. It was immediately recognized as the most powerful tool in genetic research, and was soon put to practical use in a wide variety of fields including medicine, pharmaceuticals, agriculture, chemistry, etc. Moreover, recombinant DNA technology allowed complex genomes to be manipulated, dissected and sequenced. Soon after the discovery of this technology, the first genetically modified mouse was created (5), followed by the first transgenic mouse in 1981 (6), and the first transgenic fruit fly in 1982 (7). The discovery of recombinant DNA technology has effectively transformed the world in which we live.

In 1983, 30 years ago, Kary Mullis discovered the polymerase chain reaction (PCR) (8, 9), without which scientific achievements in genomics, biotechnology, and much of today's understanding of molecular biology would not have been possible. PCR became the most important technique in molecular biology and biochemistry, virtually dividing biology into the epoch before PCR and that after PCR.



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MOLECULAR STRUCTURE OF NUCLEIC ACIDS

A Structure for Deoxyribose Nucleic Acid

J. D. Watson
F. H. C. Crick

Medical Research Council Unit for the Study of the Molecular Structure of Biological Systems, Cavendish Laboratory, Cambridge. April 2.

With these tools in place, and the advent of DNA sequencing (10, 11), it became possible to read the entire sequence of a gene or genome. Today, we have the final draft of the entire human genome sequence, covering most of the three thousand million base pairs that constitute the human book of life. The Human Genome project was launched in 1990, and the first chromosome, chromosome 22, was completed in 1999 (12). In 2003, 10 years ago, the Human Genome Project Consortium and Celera Genomics completed the sequencing of the human genome. We can proudly say that scientists from Serbia, led by dr Radoje Drmanac, took part in this huge and important project, and made considerable contributions to its fulfillment (13). Completion of the sequencing of the human genome has had few implications for routine health care so far (14). However, we expect to see these advances in understanding the genome translated into better methods of prevention, treatment, and curing disease.

This is a jubilee year, not only for molecular biology but also for medicine, agriculture, forensics etc, in which we celebrate the 60th anniversary of the discovery of the structure of DNA, the 40th anniversary of recombinant DNA technology, the 30th anniversary of the invention of PCR, and the 10th anniversary of the completion of the Human Genome Project. This issue is dedicated to these anniversaries.

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