

## MEDICAL PHILATELY

## Kary Mullis-inventor of PCR

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Kary Mullis Stamp Ghana, 2\*\*\*

Development of the **polymerase chain reaction (PCR)** has been a major breakthrough in the analysis of genetic information. Such analysis earlier required quite a large amount of DNA sample. In 1985, **Kary Mullis (1944-)** is credited for inventing the process known as PCR, in which a small amount of DNA can be copied in large quantities over a short period of time.

Mullis claims that concept came to him in a flash of inspiration and that he invented PCR by accident. Idea occurred to him while he was driving home to California redwood for the weekend in April 1983 and later worked out the process at Cetus Laboratory with some colleagues where he was working. Mullis described the detailed technique for the first time in December 1985 issue of *Science* and received a patent for it in 1987.

The process has multiple applications in medicine, genetics, and forensic medicine. PCR, because of its ability to extract DNA from fossils, has become the basis of a scientific discipline *paleobiology*.

Forensic scientists use it to identify crime suspects or victims from traces of blood, and other biological material left at a crime scene via DNA comparison. In Medicine PCR makes it possible



Kary Mullis Stamp Palau, 2000

to identify the causative agent of a bacterial or viral infection directly from a very small sample of material. PCR is also used to screen for genetic disorders. It is an important tool in gene sequencing.

Union Cabinet has cleared a **DNA profiling bill** (July 2019), for establishing a regulatory board to control the use of DNA technology.

**Kary Banks Mullis (b-1944)** was born in Lenoir, North Carolina. After graduating from the Georgia Institute of Technology (1966), he earned a Ph.D. in biochemistry from the University of California, Berkeley, in 1972. Mullis pursued postdoctoral research in pediatric cardiology at the University of Kansas Medical School before turning his attention to pharmaceutical chemistry.

Mullis joined the Cetus Corporation at Emeryville, California (1979) as a DNA chemist. During the time he carried out research on the synthesis of oligonucleotides synthesis for use as probes and primers.

Mullis work was based on the work of 1968 Nobel Prize winner **Hargobind Khorana (1922- 2011)** and

associates **Nirenberg** and **Holley**, for their part in the genetic code. discovery. Khorana was the first scientist to chemically synthesize oligonucleotides.

PCR uses three ingredients. 1-Sample of double stranded DNA segment to be copied (the template DNA), 2-oligonucleotide "primers" (short segments of single-stranded DNA, each of which is complementary to the template DNA nucleotides). 3-Key enzyme- thermo-resistant DNA polymerase (Taq) is then added. When these ingredients are heated, the template DNA separates into 2 strands. The mixture is then cooled, allowing the primers to attach themselves to the complementary sites on the template strands. Enzyme Taq DNA polymerase is able to begin copying the template strands by adding nucleotides onto the ends of the primers, producing two molecules of double-stranded DNA. Repeating this cycle increases the amount of DNA exponentially. Few cycles, yields large number of copies of original DNA. Repeated thermal cycling led to the automation with thermocycling machine (1984) of the initially slow and laborious PCR technique

In 1993, Nobel Prize in chemistry was awarded jointly to **Kary Banks Mullis (1944-)** for his invention of the PCR and **Michael Smith (1932-)** for developing procedure of *site-directed mutagenesis*.

Kary Mullis received many other rewards and in 1998, was inducted into the US National Inventors Hall of Fame for his invention of PCR.

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