Primers Encyclopedia Article

Primers

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Primers

A primer is an engineered piece of **deoxyribonucleic acid**. This short segment of **DNA**, typically 18 to 24 **bases**, is deliberately made to be complementary to a target stretch of DNA that lies immediately beside another stretch of DNA that is destined to be copied. The principle use of primers is used in the copying of DNA via the **polymerase chain reaction** (PCR).

The use of primers is vital to the performance of the **polymerase** chain reaction. The PCR technique itself has revolutionized molecular biology and areas such as forensic pathology, making the detection of even a single molecule of DNA achievable.

Primers are used following the selective cutting of the DNA. The two strands of nucleotides that comprise DNA can be selectively cut open using one of a variety of a class of **enzymes** called **restriction enzymes**. Each enzyme recognizes a **nucleotide** sequence at which to cut the DNA. Some restriction enzymes produce a staggered cut, in which a region of each single strand of DNA is exposed. The primer segments of DNA are complimentary to each of the two exposed single stranded regions. Because they are complimentary, the primer sequences are able to bind to the exposed single stranded regions of the restriction enzyme-treated DNA.

The restriction enzyme cutting of DNA can be performed at an elevated temperature, which discourages the DNA from annealing back together (rejoining). Once the temperature is reduced, annealing can occur. Then, the primer sequences, which are present in a large concentration, anneal to their target DNA strand. The primers provide an initiation site for the elongation of a complimentary DNA strand. Repeated cycles amplifies the quantity of the target region of DNA and forms the basis of PCR.