# ENDONUCLEASE *VS* EXONUCLEASE

(Similarities and Differences between Endonuclease and Exonuclease Enzyme)


Nucleases are a class of enzyme which hydrolyzes the nucleic acids such as DNA and RNA. They hydrolyze the phosphodiester backbone which connects individual nucleotides in a polynucleotide. There are two broad categories of nucleases depending upon their site and mode of action on the nucleic acid. They are Endonucleases and Exonucleases.

**Endonucleases**: Endonucleases cleaves the phosphodiester bond in the polynucleotide from the interior (endo). They hydrolyze the phosphodiester bonds present within a polynucleotide chain. Some endonucleases are non-specific and they can cut the phosphodiester bond between any nucleotides. A special class of endonucleases, called restriction endonucleases (restriction enzymes), is very specific in their action and they cut at a specific sequence in the polynucleotide chain called the Restriction Site. Restriction endonuclease has immense application in recombinant DNA technology.

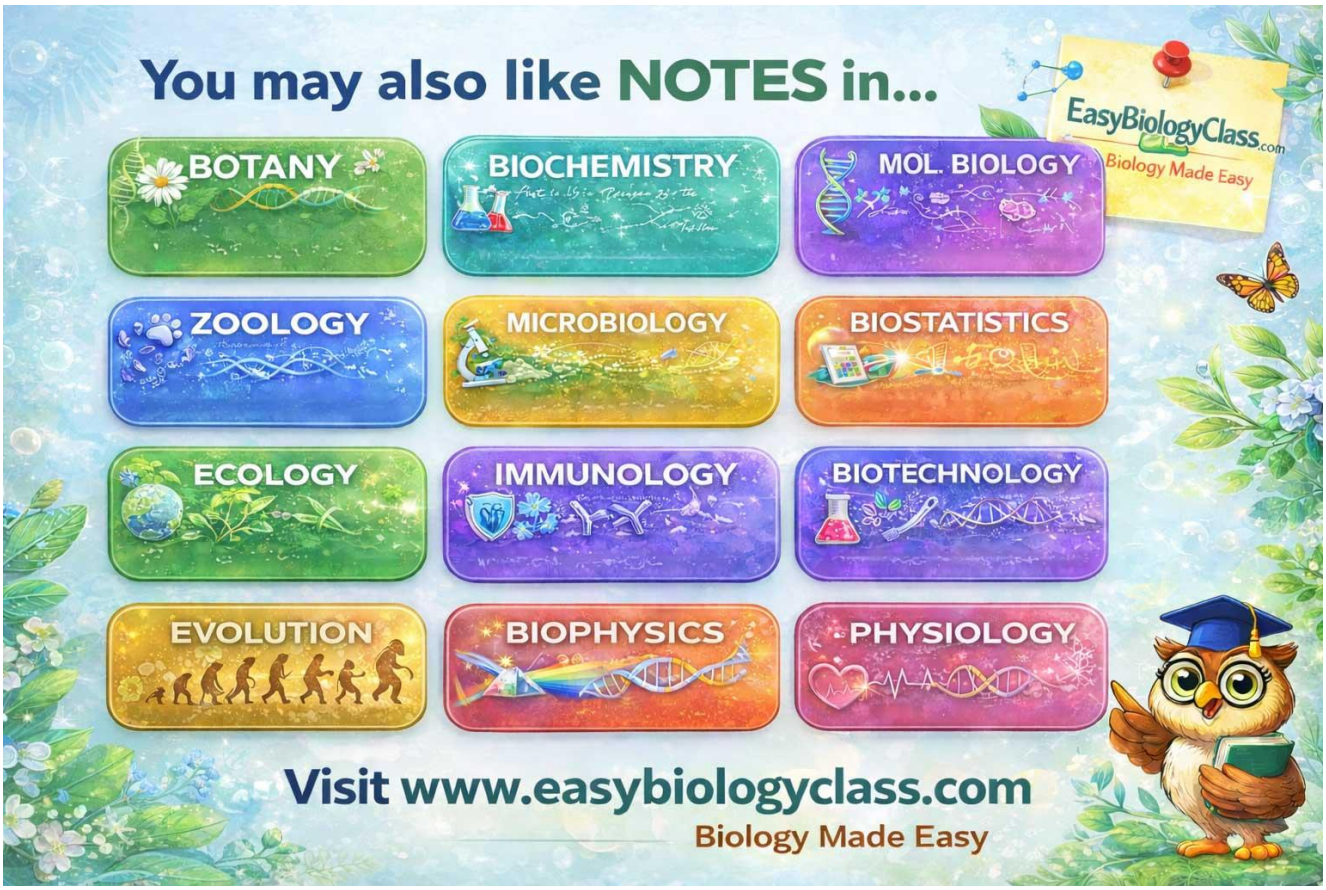
**Exonucleases**: They are nuclease enzyme which cleaves the nucleotides from the ends. They hydrolyze the phosphodiester bonds present either at 3' or 5' end of the polynucleotide chain.

The present post discusses the similarities and differences between endonucleases and exonucleases with a comparison table.

**Similarities between Endonuclease and Exonuclease**

- Both endonuclease and exonuclease are nuclease enzymes which hydrolyze polynucleotide chains.

- Both act on nucleic acids.
- Both can hydrolyze DNA and RNA.
- Both can cleave the phosphodiester back bone in the polynucleotide chain.




**Difference between Endonuclease and Exonuclease**

| Sl. No. | Endonuclease | Exonuclease |
|---|---|---|
| **1** | Endonucleases cleaves the phosphodiester bond present internal in the polynucleotide chain. | Exonuclease cleaves the phosphodiester bond from ends. |
| **2** | Do not require a free 3' or 5' end for their action. | Require a free 3' or 5' end for their action. |
| **3** | Endonuclease after its hydrolytic reaction releases oligonucleotide chains. | Exonuclease after its hydrolytic reaction releases individual nucleotides (monomers). |

| | | |
|---|---|---|
| **4** | Endonucleases are usually sequence specific. | Exonucleases are usually non-specific. |
| **5** | Examples: Deoxyribonuclease I, S1 Nuclease, Restriction endonucleases (EcoRI, BamHI) | Example: Snake venom, Exonuclease I, Exonuclease II |