# DNA ELECTROPHORESIS & SEQUENCER

DNA, deoxyribonucleic acid, is a molecule that contains genetic instructions for the development, functioning, growth, and reproduction of all living organisms.

DNA is made up of four nucleotide bases: adenine (A), cytosine (C), guanine (G), and thymine (T). The order of these bases provides a message for the amino acids and therefore the protein made.

A “typical” gene or sequence of DNA that codes for a protein is about 10,000 to 15,000 nucleotides in length for humans (includes non-coding regions).

The length of genes in non-human eukaryotes like invertebrates, plants, and fungi can range from a few thousand base pairs to tens of thousands.

When scientists want to “read” DNA they need to first isolate DNA using various chemicals, enzymes and protocols in the lab and then make many copies of it in a PCR machine.

After making copies of DNA in a PCR machine, scientists will load DNA into an agarose gel and run electricity through it to separate DNA fragments by size.

Scientists then physically cut the DNA fragments seen as “lines” on the gel and the gel itself. Using chemicals and protocols, they remove the DNA from the gel and put it back into solution form.

The DNA in solution form can now be loaded into a DNA sequencer so that the bases themselves can be “read.” They show up on a display as colors and peaks which scientists can then read and write down the nucleotides/bases for a complete code.

Scientists can use these sequences from common genes to consider how related organisms are to each other. If two organisms share a lot of bases in common in this gene, they will be closely related to each other.

Scientists are interested in homologous genes – that is genes that came from a common ancestor.