# ABSTRACT:

Inside the nucleus of every single cell reside “instructions” that provide all of the information necessary for a living organism to grow and live. These instructions tell the cell what role it will play in your body and come in the form of a molecule called deoxyribonucleic acid (more commonly knows as DNA). DNA encodes a detailed set of plans, like a blueprint, for building different parts of the cell.

All living things, bananas and people included, pass on information from one generation to the next using the same basic material, DNA. Within every living organism, most cells contain a complete set of DNA instructions. The information in DNA tells our bodies how to develop, grow, and work. It also controls many of the features that make an organism unique. These instructions are in segments of DNA called genes. Genes, along with other parts of our DNA that turn genes on and off, hold information for how our body develops and functions. They produce molecules called proteins that do most of the work in the body. Variants of genes, called alleles, are responsible for differences in hair color, eye color, and earlobe shape.

All of these instructions fit within tiny packages within our tiny cells, so that is all way too tiny for anyone to ever really see or touch, right? Well, not entirely. Because DNA is in every cell, there is a lot of it in an organism. If you took all of the DNA out of some middle-sized organism (or part of an organism, like a piece of fruit), you could see and even touch DNA. We will use common household products to break apart the cells in a banana and extract out the DNA. While you may know of the double-helix structure of DNA (it looks kind of like a ladder twisted into a spiral shape), you can't see that structure with the naked eye. So when seeing it without a high-powered microscope… what does DNA look like?

# AIM

Extraction of Genetic Material i.e. DNA(deoxyribonucleic Acid) from fruits like Banana, Strawberry etc.

# INTRODUCTION

**Deoxyribonucleic acid** is a molecule that carries the genetic instructions used in the growth, development, functioning and reproduction of all known living organisms and many viruses. DNA and ribonucleic_acid (RNA) are nucleic_acids; alongside proteins, lipids and complex carbohydrates (polysaccharides), they are one of the four major types of macromolecules that are essential for all known forms of life. Most DNA molecules consist of two biopolymer strands coiled around each other to form a double helix.

The two DNA strands are called polynucleotides since they are composed of simpler monomer units called nucleotides. Each nucleotide is composed of one of four nitrogen-containing nucleobases — cytosine (C), guanine (G), adenine (A) or thymine (T) — a sugar called deoxyribose and a phosphate_group. The nucleotides are joined to one another in a chain by covalent_bonds between the sugar of one nucleotide and the phosphate of the next, resulting in an alternating sugar phosphate_backbone. The nitrogenous bases of the two separate polynucleotide strands are bound together, according to base_pairing rules (A with T and C with G), with hydrogen_bonds to make double-stranded DNA. The total amount of related DNA base pairs on Earth is estimated at $5.0 \times 10^{37}$ and weighs 50 billion tonnes. In comparison, the total mass of the biosphere has been estimated to be as much as 4 trillion_tons of carbon (TtC).

DNA stores biological information. The DNA backbone is resistant to cleavage, and both strands of the double-stranded structure store the same biological information. This information is replicated as and when the two strands separate. A large part of DNA (more than 98% for humans) is non-coding, meaning that these sections do not serve as patterns for protein sequences.

The two strands of DNA run in opposite directions to each other and are thus antiparallel. Attached to each sugar is one of four types of nucleobases . It is the sequence of these four nucleobases along the backbone that encodes biological information. RNA strands are created using DNA strands as a template in a process called transcription. Under the genetic code, these RNA strands are translated to specify the sequence of amino acids within proteins in a process called translation.

Within eukaryotic cells DNA is organized into long structures called chromosomes. During cell division these chromosomes are duplicated in the process of DNA replication, providing each cell its own complete set of chromosomes. Eukaryotic organisms (animals, plants, fungi and protists) store most of their DNA inside the cell nucleus and some of their DNA in organelles, such as mitochondria or chloroplasts. In contrast prokaryotes (bacteria and archaea) store their DNA only in the cytoplasm. Within the eukaryotic chromosomes, chromatin proteins such as histones compact and organize DNA. These compact structures guide the interactions between DNA and other proteins, helping control which parts of the DNA are transcribed.

DNA was first isolated by Friedrich Miescher in 1869. Its molecular structure was first identified by James Watson and Francis Crick at the Cavendish Laboratory within the University of Cambridge in 1953, whose model-building efforts were guided by X-ray diffraction data acquired by Raymond Gosling, who was a post-graduate student of Rosalind Franklin.

# MATERIALS REQUIRED

- ½ peeled ripe banana (you can also use strawberries and other fruit)
- ½ cup hot water
- 1 tsp salt
- ½ tsp liquid dishwashing soap
- Resealable zip-top bag (quart size)
- Very cold rubbing alcohol (isopropyl alcohol) and place in freezer ahead of time.
- Coffee filter
- Narrow glass
- Wooden stirrer

# PROCEDURE

- We have took ½ cup of water and the pieces of banana into a small container or Ziplock bag. We then Mashed the banana with a spoon until it is completely pulverized.
- Then we took the mixture into a beaker or beaker.
- We have Mixed 1 teaspoon of soap with ¼ teaspoon of salt in a 16-ounce plastic cup. And added 2 tablespoons of distilled or tap water. We have Stired the mixture gently to avoid creating a foam layer. Continued for a few minutes until the soap and salt are dissolved.
- We have added 2 tablespoons of banana mixture to the cup with the soap solution. And used a spoon to stir the mixture for 10 minutes.
- We then inserted a coffee filter into a clean plastic cup so it does not touch the bottom of the measuring cylinder.
- We took the mixture from step 3 into the filter. After 10 minutes, a liquid, called filtrate, should have collected in the bottom of the measuring cylinder. We Gently stired the mixture in the filter and let it sit for another minute. Then we removed the filter (there will be some contents in filter) and set it aside. Cheesecloth can be used in place of the coffee filter and will take less time, although the filtrate may not be as clear.
- We Slowly added alcohol to the measuring cylinder with the filtrate until there are roughly equal parts of filtrate and alcohol. The alcohol is less dense than the filtrate and floated on top of the filtrate.
    - ✓ Please note: ensure you follow the warnings on the side of bottle of rubbing alcohol – in particular, it should be used in a well-ventilated area and is poisonous if ingested, inhaled or otherwise consumed.

- And finally the mixture was set undisturbed for about ten minutes. Then white material was appeared in the solution is DNA.
- Then we dipped the wooden stir stick into the alcohol layer, slowly rotating it to spool out the banana's DNA.

## OBSERVATION & ANALYSIS?

Let's think of three of the main items we added to the bananas.

- Saltwater - The bananas were mashed with saltwater before anything else was added. But this was a special step preparing for the addition of the dish soap. Once the dish soap helps release the DNA, this salt will help the DNA strands to stick to each other in clumps large enough for you to see.
- Dish soap - The soap solution contains sodium laurel sulfate, which can break up fats and proteins. During the DNA extraction, the soap pulls apart the fats (lipids) and proteins that make up the membranes surrounding the cell and nucleus. Once these membranes are broken apart, the DNA is released from the cell. The salt enables the DNA strands to come together, or aggregate.
- Alcohol - The DNA clumps are soluble (can be dissolved) in some liquids, but not in alcohol. So adding alcohol helps the clumps of DNA to form. DNA doesn't dissolve in alcohol, so this step helps DNA clumps form.

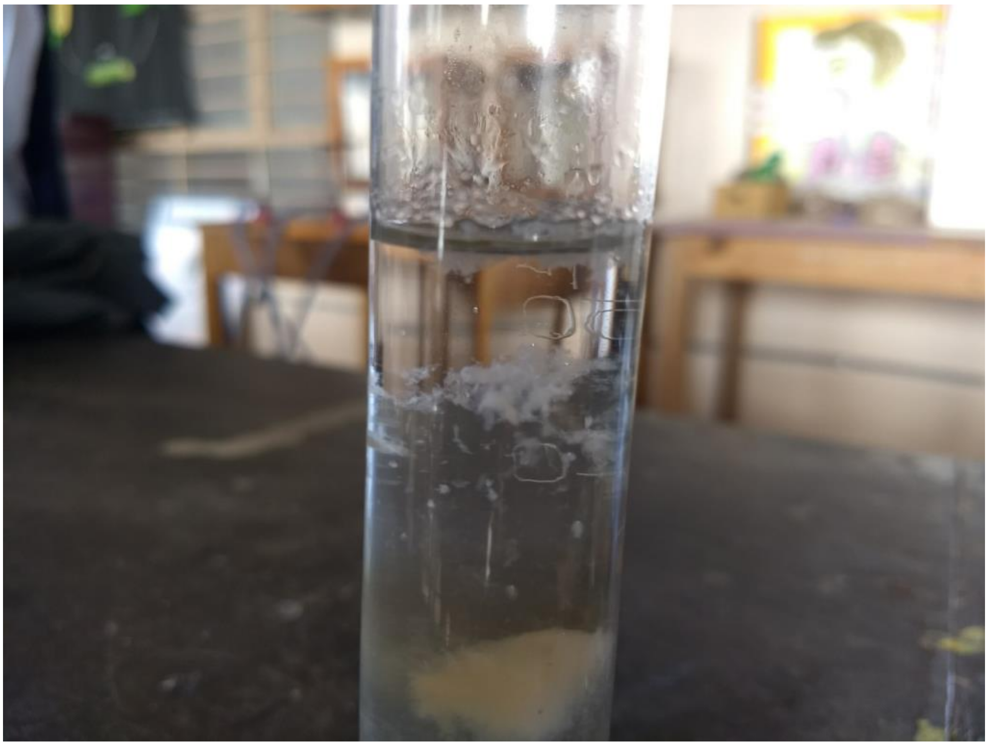

Fig. The DNA nucleotides(White substance)

# CONCLUSION

The DNA will appear white and will form a clump made of string-like strands that wrap onto the glass rod.

# BIBLIOGRAPHY

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