

BIOTECHNO ACTIVITY BOOK

Compiled by : EduHeal Foundation, New Delhi



EDUHEAL FOUNDATION

• LEARNING FOR LIFE •

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Preface

Biotechno Activities book is a small step towards encouraging school students to take up biotechnology. We at EduHeal Foundation still need lot of help and encouragement from school teachers and Principal in accomplishment of our goal. It is you who form the vital link between EduHeal Foundation and students as you can further encourage students to know about biotechnology on a day to day basics. We would also not sit idle but make efforts to increase interest :

- By publishing books like Biotechno Activities Books.
- Create awareness by conducting Nationwide Biotechnology Olympiad.
- Teacher Training Programme in basics of genetics and Biotechnology.
- Career Development Workshop for Students.
- Virtual Genetic Lab.
- Networking to enhance school/Govt./ Industry Interface.

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With best wishes

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CLASS - VI

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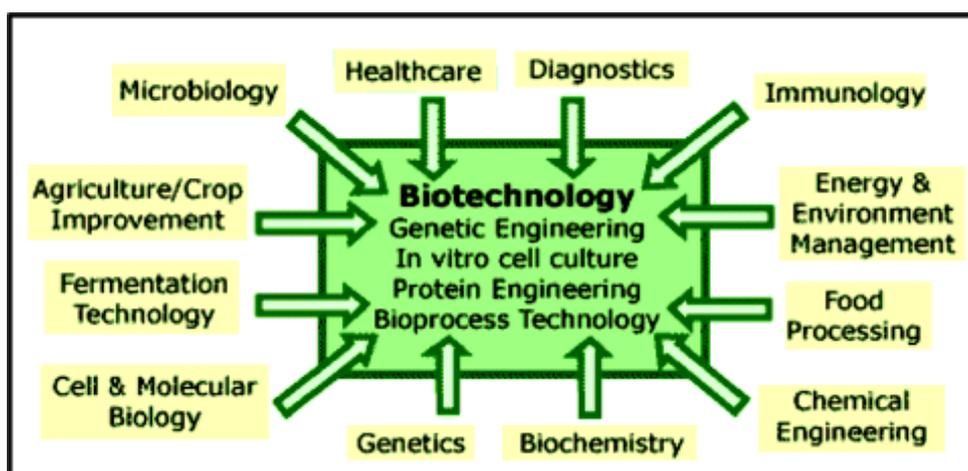
An Introduction

All of you must be familiar with the buffing of bread. Do you know this is one of the section of biotechnology. In the past century biotechnology emerged as the tool for improvement of life with respect to agriculture, medicine, new races of organism, cloning etc.

You may think that biotechnology is a subject of higher classes. But if you are aware of dolly the cloned sheep, forensic science or DNA fingerprinting or genetic pattern then you are no more unfamiliar to **Biotechnology**. With the vision to give you more information on this topic this book is designed especially for you.

What is biotechnology

"Biotechnology means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use."



Some historic events in Biotechnology

buffing of bread	prehistoric period
Fermentation of juices to alcoholic beverages	prehistoric period
Knowledge of vinegar formation from fermented juices	prehistoric period
Cultivation of wine	before 2000 BC
Manufacture of beer in Babylonia and Egypt	3rd century BC
Wine growing promoted by Roman Emperor Marcus Aurelius Probus	3rd century AD
Production of spirits of wine (ethanol)	1150
Vinegar manufacturing industry	14th century
Discovery of the fermentation properties of yeast by Erxleben	1818
Description of lactic acid fermentation by Pasteur	1857
Detection of fermentation enzymes in yeast by Buchner	1897
Discovery of penicillin by Fleming	1928/29
Discovery of many other antibiotics	from about 1945

To study biotechnology some information on basic Genetics is required which we deal in next chapter.

Activity :

Name three food items which are fermented products.

1. _____ 2. _____ 3. _____

Activity :

Name any two techniques of biotechnology.

1. _____
2. _____

Activity :

Which type of organisms are used in biotechnology (✓the correct Answer).

Living

Non Living

Basic Genetics of Genes & Chromosomes

Do you look different to other people?



Do you and your brothers look alike in some way?

Have you ever noticed you look a bit like your mum and a bit like your dad?

This is because of your genes!

Genes are the instructions inside you that tell your body what to look like, and how to work.

There are genes which tell your hair to be curly or straight, genes which tell your body to grow tall (or not so tall!), genes which tell your stomach how to digest food, and so on... for every little detail of your body! Of course, your body is also affected by the things you do and the things that go on around you. If you dye your hair, you will look different. If you couldn't eat a healthy diet, you might not grow as tall. We call the things outside your body that can affect it 'environmental influences'. So really, the way your body looks and functions is a combination of your genes and your environment.

Genes + Environment = YOU!



These 'gene' things seem really important...so where are they?

Your genes are in almost every part of your body, so that every part can be made and can work properly in its place.

Your body is made up of billions of tiny building blocks called **cells**. They are very small so you can only see them with a microscope. Each one of these cells has a special shape and its own jobs to do, depending on where it is in your body. Your muscle cells are long and thin, and make you strong. Your white blood cells are round, and help you fight infections.

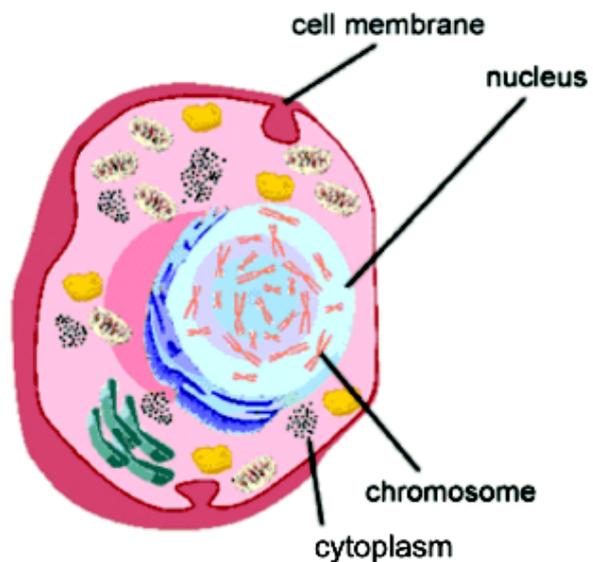
In the centre of each cell is a small walled-off section called the nucleus. **It is here in the nucleus that your genes are found.**

There are so many **genes** - more than thirty thousand - that they need to be arranged in order, or they would all get mixed up.

let's look!



These are your cells



If you were to think of your whole set of genes as a set of recipes for you, then you could imagine all these recipes arranged in 23 recipe books. Each of these recipe books is known as a **chromosome**. A chromosome looks a bit like this:



Thus each cell has two sets of 23 chromosomes, so in each cell you have a total of 46 chromosomes, which is quite fortunate. Imagine if a page was ripped from one of your recipe books - luckily you would have a spare copy,

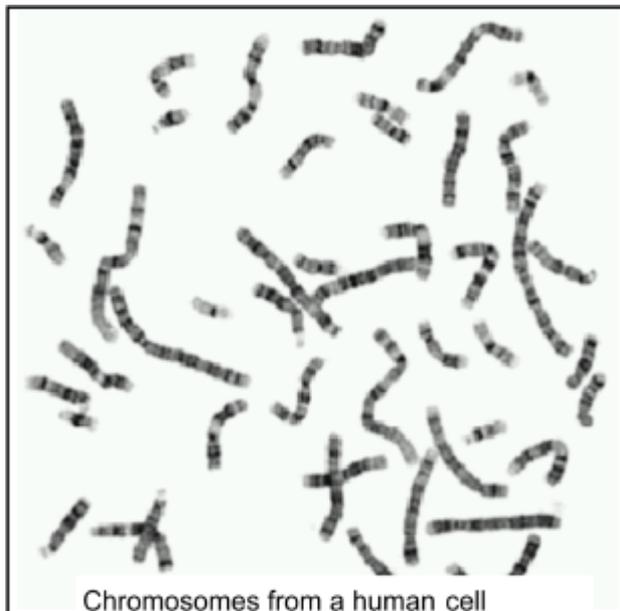
so your cells would still know how to make that part of you.

Our genes are arranged along the length of the chromosome (just like you stand while your assembly time in your school), in the same order in every cell in



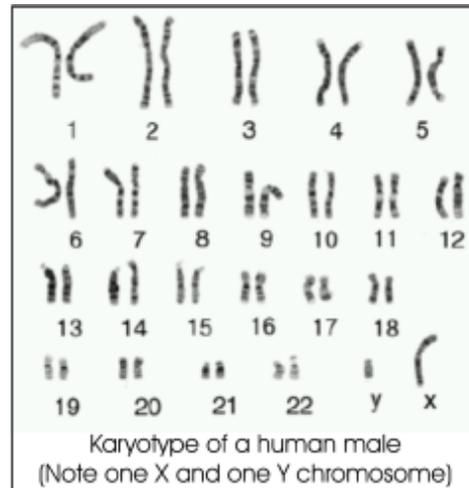
every person. In humans there are about one lakh genes located on 46 chromosomes. Obviously, one chromosome must contain many genes.

Scientists can look at your cells under microscopes to see your chromosomes. They can check that you have all 46 chromosomes, and that none of them are broken. Here's what they might see if they looked at a cell.



Chromosomes from a human cell

It can be difficult to count all the chromosomes when they're all jumbled up like this, so the scientists like to take a photo of the chromosomes, and cut each one out. Then they paste them onto another sheet, arranging them in pairs, from biggest to smallest. This special kind of cutting and pasting is called 'karyotyping'. They can also tell whether



you are a male or a female, just by looking at the chromosomes. All people - males and females - have 22 pairs of chromosomes which have numbers for names. Chromosome 1, Chromosome 2, and so on up to Chromosome 22 - you can see these in the picture above. We also have one last pair which have letters for names. If you are a male, you will have an X and a Y (as in the karyotype above). If you are a female, you will have two Xs. These are called your **sex chromosomes**.

23 pairs of Chromosomes	=	22 pairs of numbered chromosomes	+	1 pair lettered chromosome
Male = 22 pairs + XY				
Female = 22 pairs + XX				

