BIOTECHNO ACTIVITY BOOK

Compiled by :

EduHeal Foundation
New Delhi

EDUHEAL FOUNDATION

103, Taj Apartment, Ground Floor, Ring Road, Near Safdarjung Hospital, New Delhi - 29.
Ph: 011-26161014, website : www.eduhealfoundation.org, e-mail : info@eduhealfoundation.org

Preface

Biotechno Activities book is a small step torwards 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 Tranining Programme in basics of genetics and Biotechnology.
- Career Development Workshop for Students.
- Virtual Genetic Lab.
- Networking to enhance school/Govt./ Industry Interface.

EDUHEAL FOUNDATION wishes to thank the following for their support

* EduSys Subject Experts
* **Mr. Ram Mohan Rao**
Former Principal Information officer,
Govt, Of India
Information Advisor to the Prime Minister
* **Prof. S.S. Mathur**
Former Prof. & Head,
Centre for Energy Studies, IIT
Delhi, Institutional Co-ordinator,
United Nations Unversity, Tokyo, Japan
Minister, Education & Culture,
Embassy of India, Washington DC, USA
* **Mr Ranglal Jamuda,** IAS
Commissioner
Kendriya Vidyalaya Sangathan,
New Delhi
* **Mr. Pervez Ali Khan**
NISCAIR, New Delhi
* **Dr. K. Sharma**, Dept. of Biotechnology,
AIIMS, Delhi
* **Dr. Saroj Mishra**
Prof. of Biotechnology, IIT, Delhi
* **Dr. A.N. Sinha**, MS, FAIS, FICS
Former Consultant Surgeon & Head,
VMMC & Safdarjung Hospital , Delhi
* **Dr. Dinkar Bakshi,** MD
Registrar, Deptt. of Paediatrics, Infirmary Hospital, Leeds,
U.K.
* **Dr. Sandeep Dham**, MD (Medicine)
Clinical Astt. Prof., SUNY Health Centre, Broklyn, New York,
USA
* **Dr Saurabh Shukla**
MD, (AIIMS) Delhi
(Presently associated with WHO Pulse Polio Programme)
* **Dr. Rajesh Kaushal**
MD (AIIMS) Delhi
* **Dr. N.K. Mendiratta**. MD, Anaesthesia, VMMC &
Safdarjung Hospital, Delhi
* **Dr. Nagendra P.** MS (Orthopedics), Bangalore Medical
College, Bangalore

* **Coordinator**, South African Agency for science and technology advancement.

For any query please contact Eduheal Foundation helpline : 09350232518

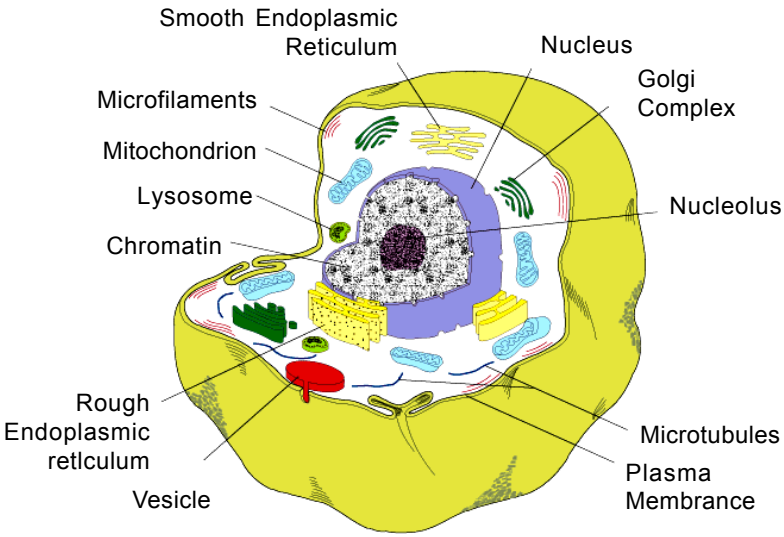
With best wishes

Dr. Sandeep Ahlawat
Managing Trustee
Eduheal Foundation

CLASS - VIII

DNA - Gene - Protein

Instructions providing all of the information necessary for a living organism to grow and live reside in the nucleus of every cell. These instructions tell the cell what role it will play in your body. What do these instructions look like?



WHAT AM I MADE OF?

"What am I made of?"
Asked curious little Mel.
"That's easy" said Miss Fahey
"You are made up of cells."

"Cells?" cried her pupils,
"But what on earth are those?"
"Why, they're the body's builders
That make your head down to your toes."

"Every living creature
From a fruit fly to a whale,
Is made up of tiny cells
It's a fascinating tale.

Daffodils and jumping frogs
Bananas, fruit and rice
Are made up of these tiny cells
They're the building blocks of life.

Your hair, ears and eyes
Your skin and many bones,
Your strong and flexi muscles
Which give your body tone.

Your lungs and heart and all the rest
That's locked up safe inside,
Are made up of these special cells
That keep us all alive.

They come in different sizes
And in some strange shapes too.
It takes a whopping 75,000,000,000
To build someone like you!"

"But what's it all made up of?
Like, what's inside the cell?
Please tell us quick" asked Johnny Flynn
"Before we hear the bell."

"Listen carefully" said Ms Fahey
"If you want to take it in.
I told this once to Uncle Mick
And his head was in a spin!

The outside's called a membrane
Which is the cell's security.
It controls what goes both in and out
Its pores are like the keys.

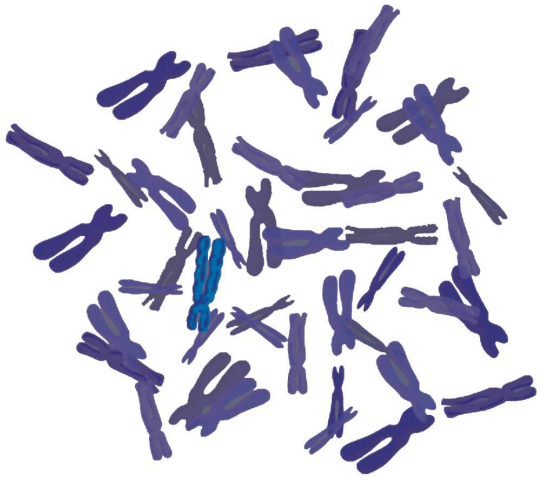
Then inside that is cytoplasm
A sticky jellyish blob
And hanging down inside this goo
The powerful nucleus bobs.

The nucleus is the cell's brain
It tells it what to do.
Then the bits called organelles
Listen close and follow through.

They break down food and dispel waste
To keep you good and strong.
With orders from the nucleus
They rarely get it wrong.

So now you know what cells are
And what they have to do,
Day in, day out, without a break
To keep on making you!"

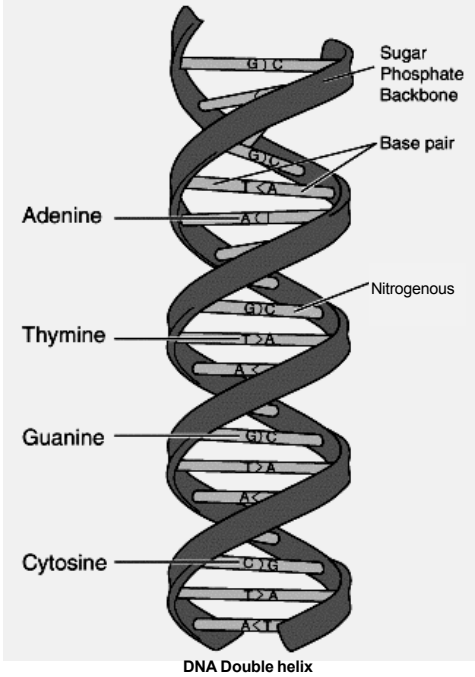
These instruction lies in the chromosome. Chromosomes are thread like structure found in the nucleus of cell. There are 46 chromosomes in a cell of human. Chromosome is composed of coiled up DNA molecule.



46 HUMAN CHROMOSOMES

At the chemical level the cells of all plants and all animals contain DNA in the same shape - the famous "double helix" that looks like a twisted ladder. What's more, all DNA molecules - in both plants and animals - are made from the same four chemical building blocks - called nucleotides. These nucleotides are adenine, thymine cytosine, guanine or simply represented as A, T, C, G. What is different is how these four nucleotides in DNA are arranged.

DNA is an acid that carries (as genes) all the information which we inherit from our parents. It controls everything about the way you look, from the colour of your eyes to how tall you are, to the width of your feet. Your DNA is like your thumbprint. It is yours and yours alone. Unless you have an identical twin, no one else on the planet has exactly the same DNA as you.



DNA Double helix

The DNA strand is made of letters :

ATGCTCGAATAAATGTCAATTTGA

The letters make words :

ATG CTC GAA TAA ATG TCA ATT TGA

The words make sentences :

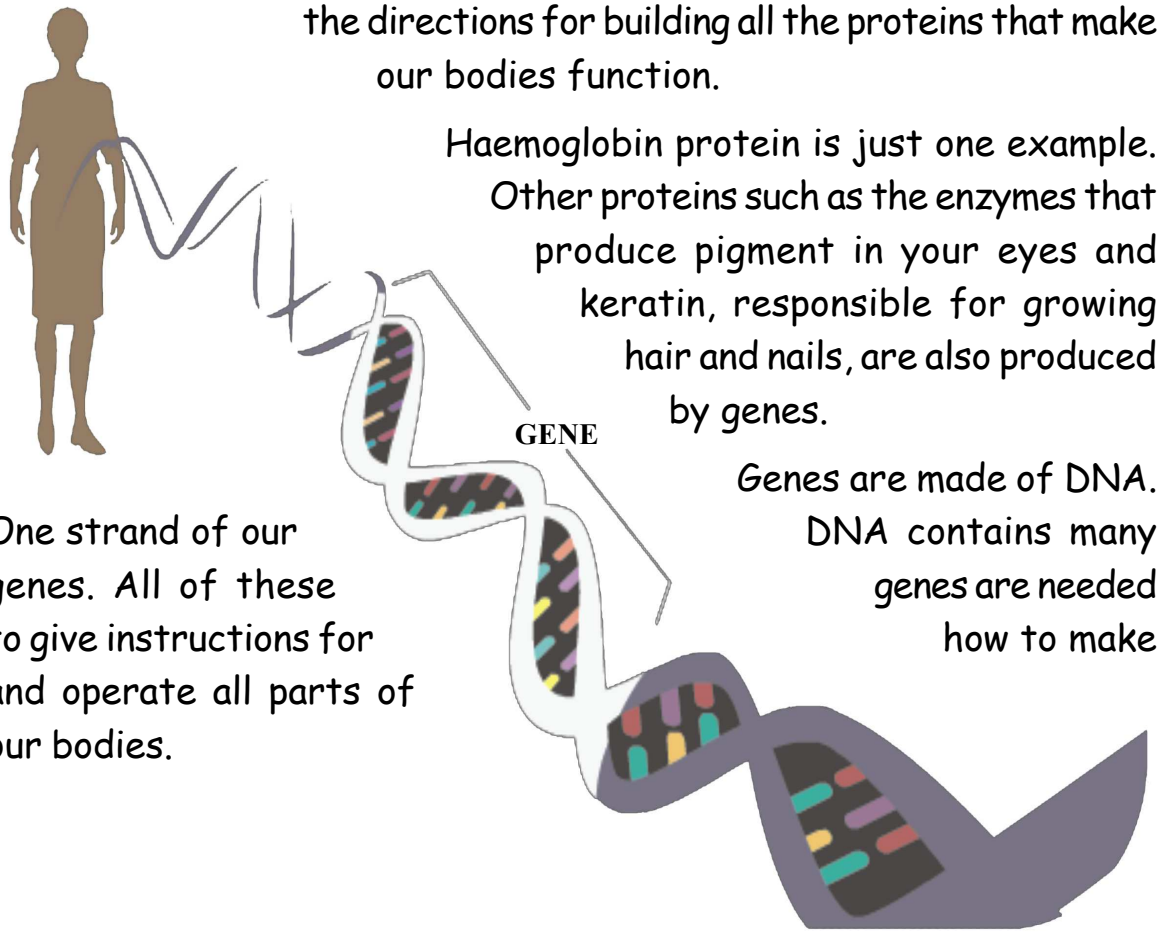
<ATG CTC GAA TAA> <ATG TCA ATT TGA>

These "Sentences" are called genes. Genes tell the cell to make other molecules called proteins. Proteins enable a cell to perform special functions, such as working with other groups of cells to make hearing possible.

What is a Gene?

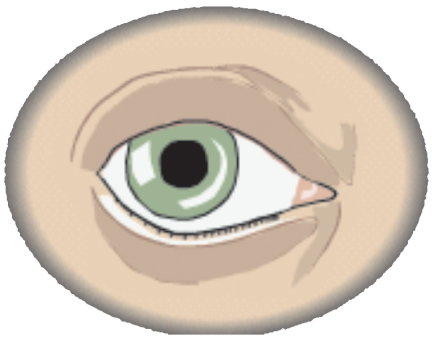
Genes are instruction manuals for our bodies. They are the directions for building all the proteins that make our bodies function.

Haemoglobin protein is just one example. Other proteins such as the enzymes that produce pigment in your eyes and keratin, responsible for growing hair and nails, are also produced by genes.

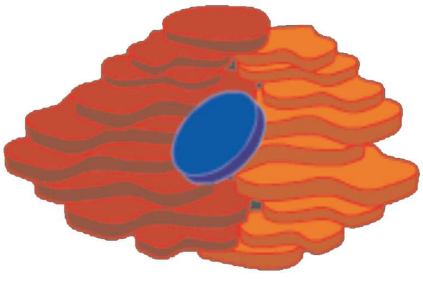


Genes are made of DNA. DNA contains many genes are needed how to make

One strand of our genes. All of these to give instructions for and operate all parts of our bodies.

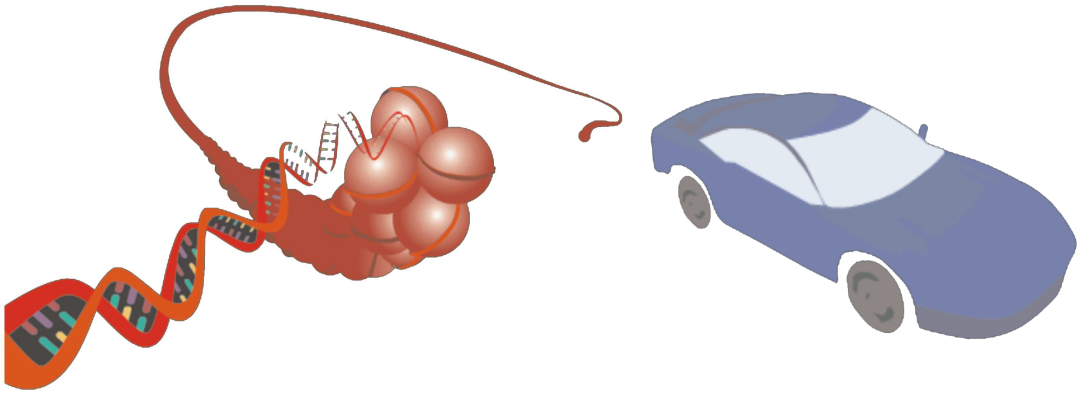


Pigment Enzymes which Determine Eye Color

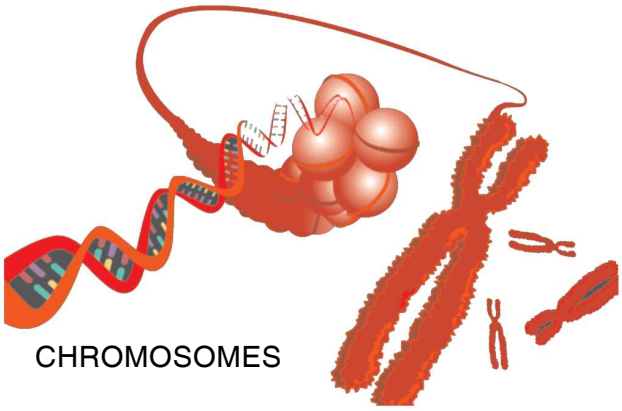


Haemoglobin Molecule

Each cell in our body contains a lot of DNA. In fact, if you pulled the DNA from a single human cell and stretched it out, it would be three meters long! That's about as long as a small car!



The packaging of DNA into a chromosome is done in several steps, starting with the double helix of DNA. Then the DNA is wrapped around some proteins.
These proteins are packed tightly together until they form a chromosome. Chromosomes are efficient storage units for DNA.

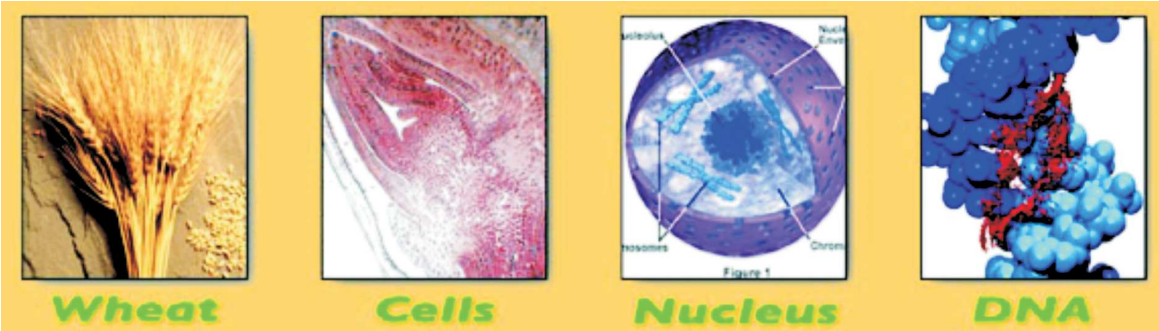


CHROMOSOMES

How many chromosomes does one cell hold?

The correct answer to this depends on whether you're a fish or a fly, or a human. Human have 46 chromosome, mosquitoes have 6 onion have 16 and carp have 104 chromosome.

Activity : Isolate DNA from wheatgerm!



DNA is a microscopic molecules but through the following activity you can see the DNA with your eyes. Do this activity under supervision of your science teacher.

1. A cup of wheatgerm (you can buy it at any health shop or even at some grocery stores)
2. Normal table salt (about 8 teaspoons full)
3. Clear alcohol (something like Cane spirit or Gin would do just fine!)
4. Washing-up liquid (not the gel type)
5. Lemon juice (bottled lemon juice is fine)
6. Two glass bottles or large glasses
7. A sieve or even a tea strainer
8. Clean water
9. A teaspoon

STEP 1 : BREAK DOWN THE CELL WALLS OF THE WHEATGERM.

Using a large glass, dissolve one level tablespoon of salt in 300ml of cold water. Add four squirts of lemon juice. Now add half a cup of wheatgerm to the solution and stir gently for 15 minutes. The lemon juice will break down the cell walls of the wheatgerm. Press this mixture