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# **Plant Molecular biology**

**BOT 495**

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# Course Content

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- Introduction
- Gene chemistry
  - DNA
  - RNA
- Replication of DNA
- Gene expression (Prokaryotes & Eukaryotes)
  - Transcription
  - Translation
- Genetic code
- The structure of proteins
- Gene organization
- Control of gene expression (Prokaryotes & Eukaryotes)
- Recombination of genetic material
- Application of Genetic Engineering (GE) in Plants

## Reference books

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1. Miglani G, 2015, Essentials of Molecular Genetics, Alpha Science International, Oxford, U.K. and Narosa Publishing House, New Delhi, India
2. عبد الحسين الفيصل، ٢٠٠٠، الوراثة الجزيئية، دار نشر الأهلية، عمان، الأردن.
3. Robert E., 2012, Molecular Biology, fifth edition, MC GRAM Hill.
4. Molecular Biology of the Gene, (7th Edition) by Watson, Baker, Bello, Gann, Levine, Losick

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<b>Schedule of Assessment Tasks for Students During the Semester</b>		Proportion of Total Assessment
1	Monthly exam	20
2	Activity	10
3	Practical exam	30
4	Final exam	40

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# Introduction

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## INTRODUCTION

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1. Modern biology has its roots at the work of Gregor Mendel who identified the fundamental rules of hereditary in 1865.
2. The discovery of chromosomes and genes followed later and in 1953 Watson and Crick disclosed the double helix structure of DNA.



Organism



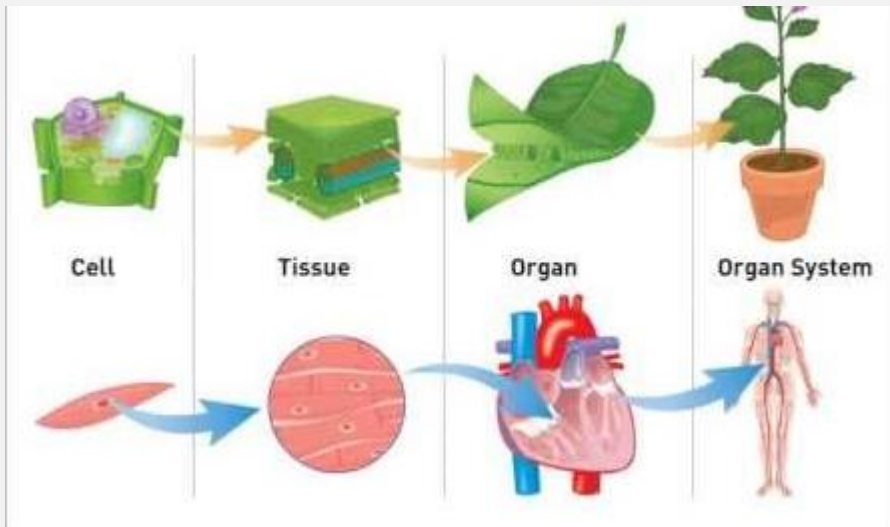
Organs



Tissues



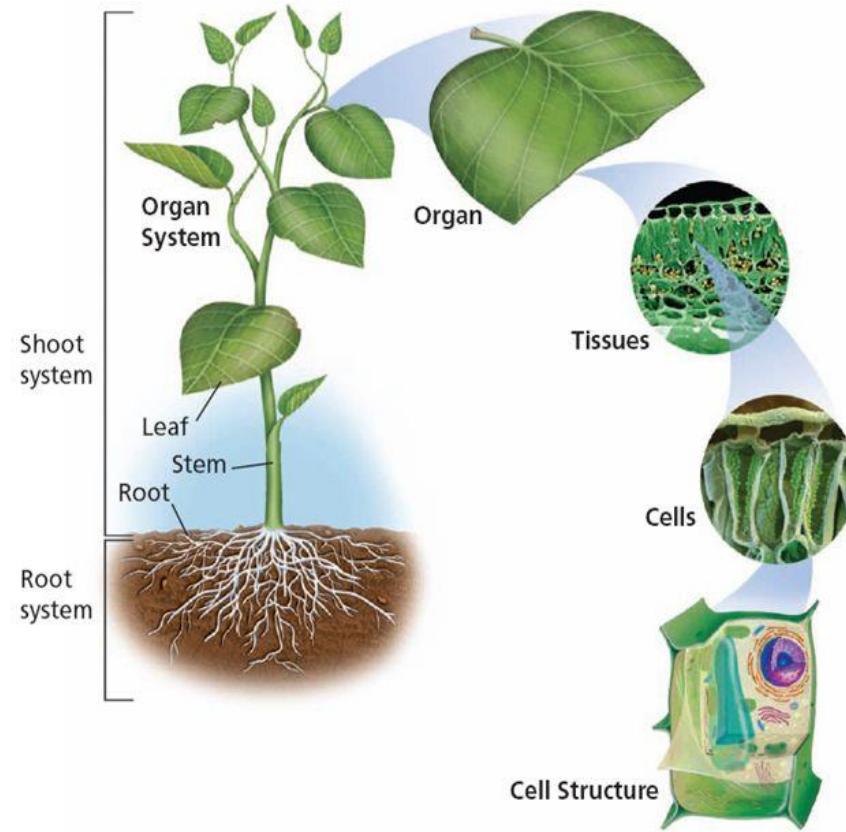
Cell



The basic unit of life in all living organisms and it has molecules that have fundamental functions for life.

7.91

Plant Body Structure





## **Molecular biology field overlaps with**

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- Biology
- Chemistry
- Genetics
- Biochemistry
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## **Molecular biology concerns with**

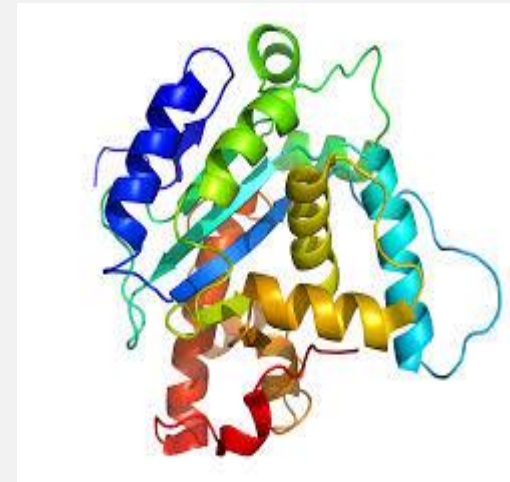
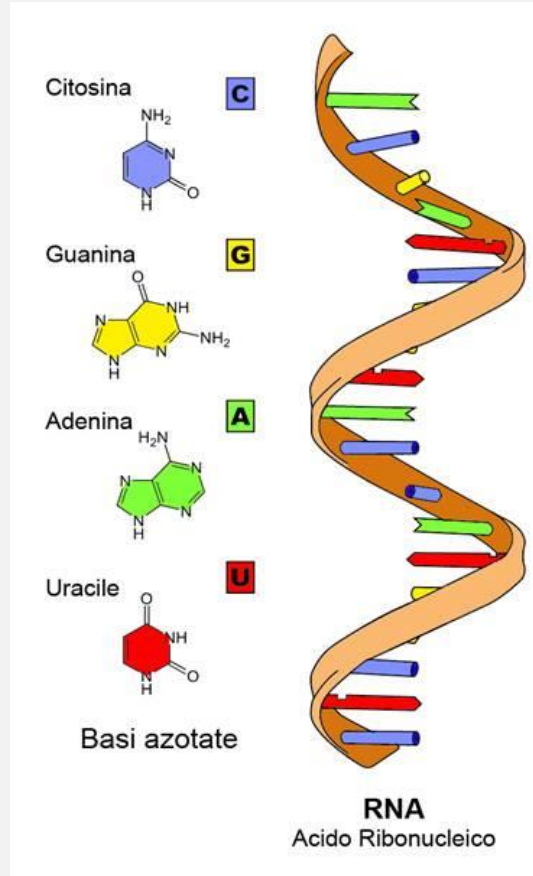
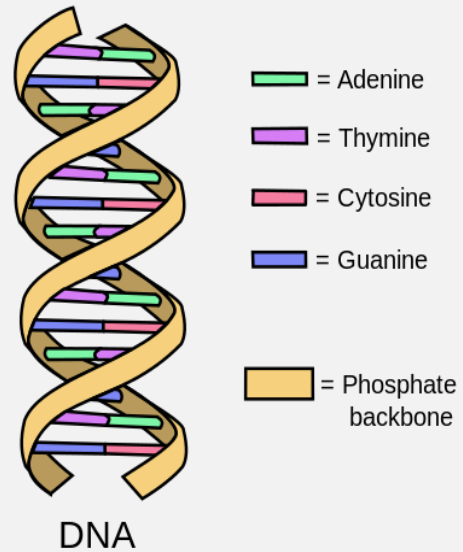
- Understanding the interactions between the various systems of a cell
- Interactions between DNA, RNA
- Protein biosynthesis
- How these interactions are regulated

# Molecular biology

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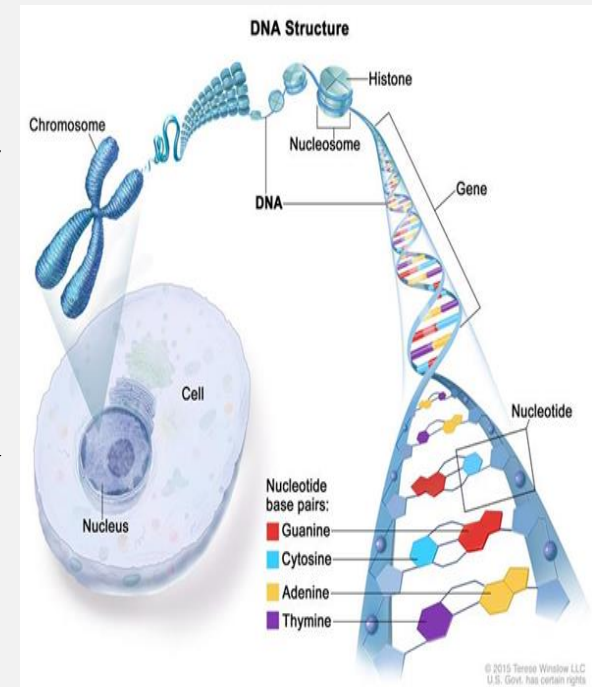
- **Molecular Biology** is the study of molecular underpinnings the process of replication, transcription and translation of the genetic material.
- Since the late 1950 and early 1960, molecular biologists have learned to characterize, isolate and manipulate the molecular components of cell and organisms includes: genetic DNA, the repository of genetic information; RNA, close relative of DNA; and Proteins, The major structural and enzymatic type of molecule in cells.

# Components Involve In Molecular Biology

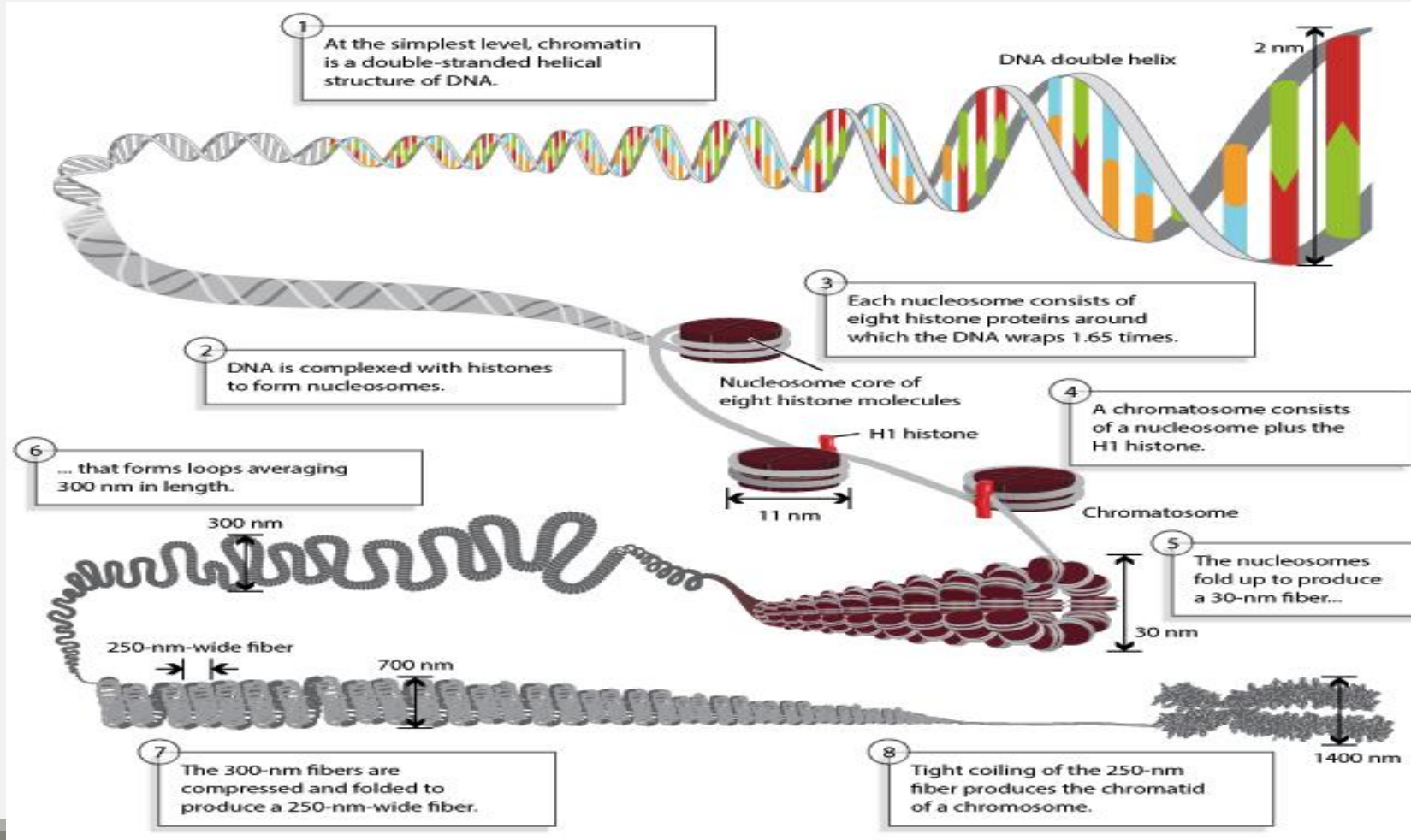


# Where is genetic material located?

- In a non-dividing cell the nucleus is filled with a thread-like material known as "**chromatin**".
- **Chromatin** is made up of DNA and proteins (mainly histones and some non-histone acidic proteins).
- Chromatin condenses to visible **chromosomes** during cell division.
- **Genes** are carried by **Chromosomes** and are segments within the very long strand of DNA.
- **Genes** are basic units of heredity.



# Chromosome packaging



# Overview of the History of Molecular Biology

