

Introduction to Molecular Biology

What is Molecular Biology?

Molecular Biology is the study of biology at the molecular level. It is the study of essential cellular macromolecules, including **DNA, RNA, and proteins**, and the biological pathways between them (replication, transcription, translation). Researchers in Molecular Biology field, design and perform experiments to gain insight into how these components operate, organization and communicate.

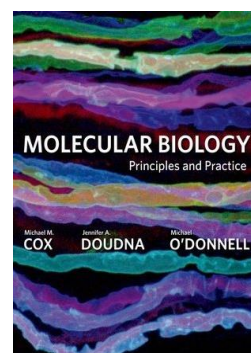
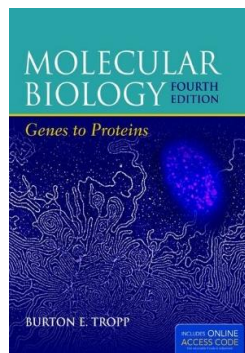
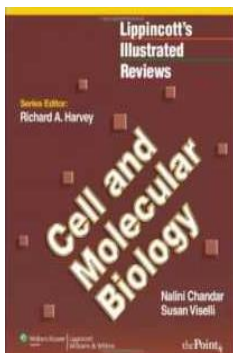
The techniques used for these studies are **referred to as: "Techniques of Molecular Biology"**.⁽¹⁾

Why Understanding of Molecular Biology is Important?

Molecular biology may have a relatively short history, but its impact on the human experience is already considerable. Medicine, modern agriculture, forensic science, and many other efforts rely on **technologies developed by molecular biologists**. Our current understanding of information pathways has given rise to diagnostic tests for genetic diseases, forensic DNA analysis, crops with improved yields and resistance to disease, new cancer therapies, track pandemics, new treatment methods, new approaches to the generation of energy, and much more.⁽¹⁾

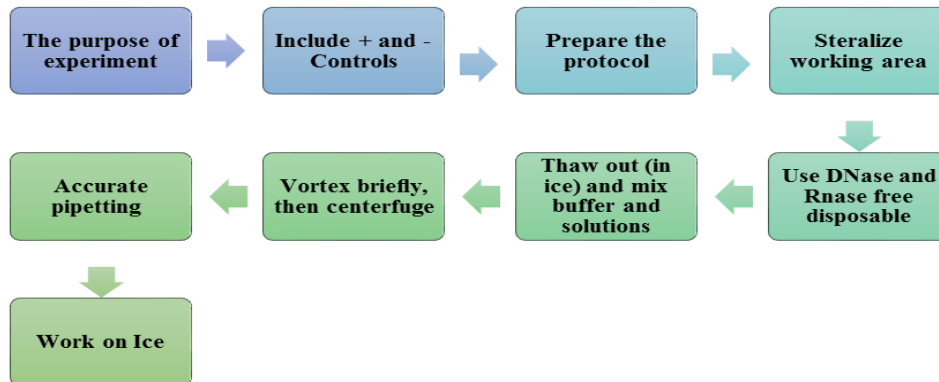
Things you must to know as Molecular Biologist:

- Basic Molecular Biology background:



➤ Molecular Biology techniques.

For conducting a successful molecular biology experiment:



➤ Lab safety:

1. Before Start Working:

- Wearing of laboratory coats.
- Wear gloves and goggles when working with toxic chemicals or UV light.
- Disinfect your lab bench at the beginning using 70% ethanol.

2. During Working:

- Clean up as you proceed through experiments and keep your work area organized.
- Do not work with UV light on.
- Read the labels on the chemical that you are using carefully, some chemical are mutagens like ethidium bromide.

3. After Working:

- Wash your hands.
- Disinfect your lab bench at the beginning using 70% ethanol.
- Wash your glassware and organize your working area.

➤ Types of hazards in molecular biology lab:

1. Biological hazards:

Include human body fluids that may carry infections. All experiments with tissue and cell cultures should be conducted in microbiological cabinets that are provided with a sterile airflow away from the operator.

2. Chemical hazards:

All chemicals are, to varying extents, capable of causing damage to the body.

***Ethidium bromide (EtBr):** is a mutagen and a potential carcinogen and must be treated with respect. EtBr solutions can be handled safely as long as gloves are worn.

3. Physical, Electrical and Mechanical hazards:

- **Ultraviolet (UV) light.**
- **Electricity:** Electrophoresis experiments present a potential shock hazard. It is advisable not to touch any part of the apparatus while the unit is on.
- **Centrifugation:** certain that appropriate tubes or bottles are used containers not designed for centrifugation may shatter or collapse under the forces generated in centrifugation. Be certain that tubes and rotors are balanced.

➤ Website Sources of information:

- The most fundamental skill in bioinformatics is the ability to carry out an **efficient** and **comprehensive search** of the scientific literature to find out what is known about a specific subject.
- **Source of information:** Books, Articles, Websites.
- **Some academic research tools:**



- **Types of scientific articles:**

1. **Primary research article:**

It's a peer-reviewed report of new research on a specific question (or questions).

2. **Review article:**

Review articles are also peer-reviewed, and don't present new information, but summarize multiple primary research articles, to give a sense of the consensus, debates, and unanswered questions within a field. **It is better to start with it for reading new topic.**

➤ Writing a lab report.

🔗 **References:**

1. Cox M, Doudna J, O'Donnell M. Molecular Biology genes to proteins. p.3. (2012)