

**Lab 1****Metabolism**

**Metabolism:** It is the total of all chemical reactions that occur in cell. Metabolism includes are thousands of different reactions, most of them divide into two groups:

- A- **Anabolism:** the reactions that consume energy in order to build large molecules and cellular structures from smaller and simpler one. they are endergonic reactions.
  
- B- **Catabolism:** is the opposite or complement of anabolism that involve the breakdown of relatively large complex organic molecules into smaller and simpler molecules and often release energy, they are exergonic reactions.

The organisms have difference to get their energy that due to their different nutrition, therefore they divide into two categories:

**A-Phototrophic:** the organisms use the energy from light to to carry out various cellular metabolic processes.

**B-Chemotrophic:** are organisms that obtain energy by the oxidation of electron donors in their environments. These molecules can be organic or inorganic. This process takes place in the dark.

**Laboratory equipment:**

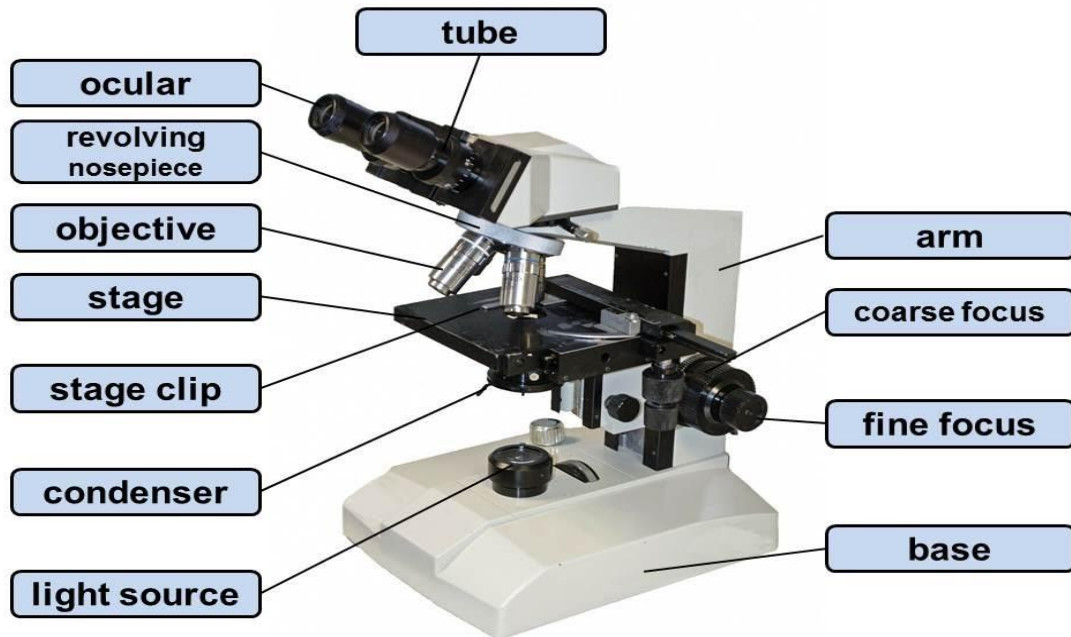
**1-Refrigeration:** pure cultures can be stored at 0-4°C, thus bacteria growth continues slowly, the death of the microbes late sometime.

**2-Incubator:** is a device used to grow and maintains microbiological cultures or cell cultures. The incubator maintains optimal temperature.

**3- Water bath:** uses for maintaining a temperature set points over a long period of time and melting the media.

**4- Spectrophotometer:** it uses to determine turbidity, used to measure the mass of microscopic cells, used to measure the optical density.

**5- The Microscope:** is an instrument used to see objects that are too small to be seen by the naked eye.



<http://light-microscope.net>

### **Bacterial strain used in the laboratory**

#### ***Escherichia coli* (E. coli)**

General Information: Gram negative bacteria from the family Enterobacteriaceae.

*E. coli* is rod-shaped bacterium, facultative anaerobe, It also can be found in environments at higher temperature, so has been recovered from contaminated plant (fruits & vegetables), water and soil.

*Escherichia coli* normally live in the intestines of human and animals. Most *E. coli* are harmless but actually some *E. coli* are pathogenic, meaning they can cause illness, either diarrhea or illness outside of the intestinal tract. *Escherichia coli* has become a model organism for studying many of life's essential processes.

A model organism is a species that has been widely studied, usually because it is easy to maintain and multiply in laboratory condition and has particular experimental advantages, due to rapid growth rate, simple nutritional requirements.

Easily isolated from natural sources that grow them. It is normally live in the intestines of human and animals, and are rarely found in soil, water and plants, so the ease of isolation, develop and follow up this growth and reading the results make *E. coli* has since been commonly used for biological laboratory experimental and research, are dealing with this bacteria for several reasons:

**1-Generation time** is very short between (18-20 minutes) *E. coli* has a cell 20 min enabling rapid adaptation to two division rate of about once every the environmental. This rapid division rate has facilitated a long term evolutionary

Experiment conducted in the lab.

**2-Easy growth** on natural media such as nutrient broth because it is **non fastidious**.

3-These bacteria often is nurse, but there is **opportunistic** when outside the intestines also when the body's immune weakness will have caused of many diseases such as urinary tract infection , meningitis , inflammation of otitis media and ophthalmitis.

### Practical part

1-Preparation of MacConkey and EMB(Eosin Methylen Blue) agar.

2-Culturing *E.coli* in the previous media.

3-Prepare a slide from *E.coli* bacteria and examine it under Microscope.