جامعة الانبار

كلية: الصيدلة

قسم: العلوم المختبرية السريرية

اسم المادة باللغة العربية: الاحياء المجهرية

اسم المدة باللغة الإنكليزية: **microbiology**

المرحلة: الثانية

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عنوان المحاضرة باللغة العربية: التوجه إلى المختبر

عنوان المحاضرة باللغة الإنكليزية: **Orientation to the laboratory**

محتوى المحاضرة

Orientation to the laboratory

A microbiology laboratory, or lab, is the place that most of the testing, culturing, and research that they do occurs. This location contains the supplies and equipment needed for these activities, as well as provide an extremely clean, and sterile place to work.

A microbiologist studies very small life forms, including bacteria, viruses, and fungi. These life forms live everywhere — in the soil, in the air, in the water, and even inside animals and human causing many infections. Many of these life forms are so small that they cannot be seen by the unaided eye, and are called microorganisms. Often, a microbiologist will have to separate and grow the microorganisms in order to better see, study, and experiment on them. All of these activities occur in the lab.

Why are we study microbiology?

Microorganisms are extremely important in our everyday lives. Applications of microorganisms include biotechnology, agriculture, medicine, food microbiology and bioremediation.

 In medicine, microbiology has helped to treat and prevent diseases that are caused by viruses, bacteria, and fungi.

 microbiologists provide services to aid the diagnosis and management of infectious diseases.

 In the pharmaceutical industry, microorganisms are used to produce antibiotics, vaccines, and medically-useful enzymes

 Pharmacists and microbiologists work synergistically to ensure that drug therapies target the opportunistic microbes without harming its human host.

Rules of conduct and general safety

Laboratorians working with microorganisms' potential risks including ingestion of or skin penetration by infective bacteria. These risks can be minimized by adopting universal precautions as well as standard microbiological laboratory practices. These include:

1. Wear protective safety glasses, gloves and laboratory coat when processing specimens.
2. Long hair should be bound back neatly away from shoulders.
3. Keep fingers, pencils, bacteriological loops, etc. out of your mouth.
4. Do not lick labels with tongue (use tap water).
5. Do not wander about the laboratory: uncontrolled activities cause:
- Accidents
- Distract others
- Promote contamination.
6. Use biological safety cabinets as needed.
7. Do not place contaminated pipettes on the bench top.

8. Do not discard contaminated culture, glass ware, pipettes, tubes or slides in wastepaper basket or garbage can.
9. Do not eat, drink, smoke, apply cosmetics or manipulate contact lenses in work area.
10. Avoid dispersal of infectious materials.
11. Decontaminate work surface at least once a day and after any spill of potentially infectious material.
12. If you have cuts or abrasions on the skin of your hands, cover them with adhesive dressing.
13. If you use any sharp instruments, dispose of them in a “sharps” container for decontamination.
14. Remove gloves and wash your hands after completing any task involving the handling of Pathological specimens.

"soap and common sense can prevent 80% of nosocomial infections". This fact points to the importance of soap and hand washing in the control of infectious diseases.

1. Rub palm to palm

2. Rub palm over back of hand, fingers interlaced

3. Palm to palm, fingers interlaced

4. Fingers interlocked into palms

5. Rotational rubbing of thumb clasped into palm

6. Rotational rubbing of clasped fingers into palm

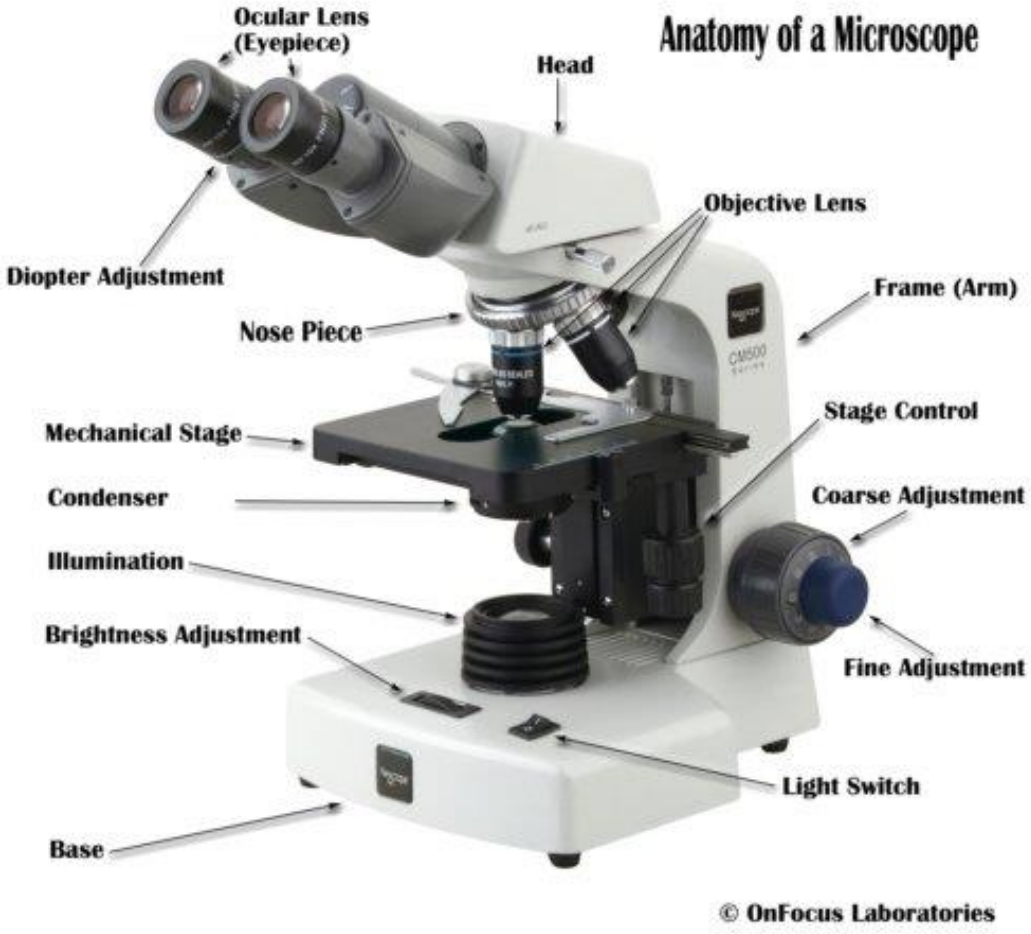
Microscope

Microscope was invented by Antony Van Leuwenhoek (1632-1723). He was Dutch lens maker and was the first person to observe bacteria.

Microscope is an essential optical instrument of microbiology laboratory. It consists of combination of lenses which will give a magnified image of minute objects or microorganisms like bacteria, fungi, and protozoa.

Parts of compound microscope:

Microscope that is suitable for the study of microorganisms is the light compound microscope.



Eyepiece (Oculare): The lens the viewer looks through to see the specimen. The eyepiece usually contains a 10X or 15X power lens.

Objective lenses: One of the most important parts of a compound microscope, as they are the lenses closest to the specimen.

Diopter Adjustment: Useful as a means to change focus on one eyepiece so as to correct for any difference in vision between your two eyes.

Body tube (Head): The body tube connects the eyepiece to the objective lenses.

Arm: The arm connects the body tube to the base of the microscope.
Coarse adjustment: Brings the specimen into general focus.

Fine adjustment: Fine tunes the focus and increases the detail of the specimen.

Stage height adjustment (Stage Control): These knobs move the stage left and right or up and down.

Nosepiece: A rotating turret that houses the objective lenses. The viewer spins the nosepiece to select different objective lenses.

Stage: The flat platform where the slide is placed.

Stage clips: Metal clips that hold the slide in place.

Aperture: The hole in the middle of the stage that allows light from the illuminator to reach the specimen.

On/off switch: This switch on the base of the microscope turns the illuminator off and on.

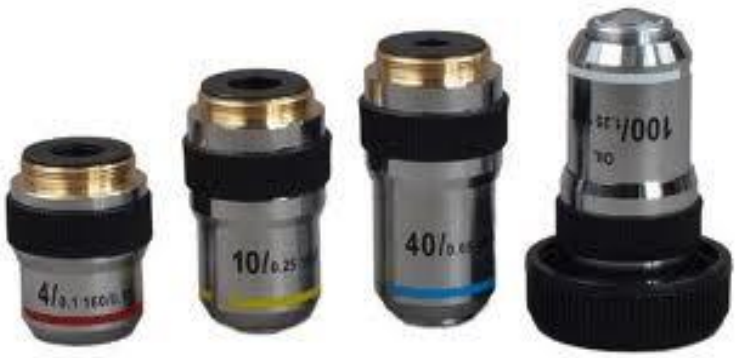
Illumination: The light source for a microscope. Older microscopes used mirrors to reflect light from an external source up through the bottom of the stage; however, most microscopes now use a low-voltage bulb.

Iris diaphragm: Adjusts the amount of light that reaches the specimen.
Condenser: Gathers and focuses light from the illuminator onto the specimen being viewed.

Base: The base supports the microscope and it's where illuminator is located.
Specimen or slide: The specimen is the object being examined. Most specimens are mounted on slides, flat rectangles of thin glass.
The specimen is placed on the glass and a cover slip is placed over the specimen. This allows the slide to be easily inserted or removed from the microscope. It also allows the specimen to be labeled, transported, and stored without damage.

Magnification

Magnification is the ability to view an object as larger. A good image is obtained when the amount of specimen detail is also increased. Magnification alone will not achieve this.
In order to ascertain the total magnification when viewing an image with a compound light microscope, take the power of the objective lens which is at scanning objective (4x), low power objective (10x), high power objective (40x) or oil immersion objective (100x) and multiply it by the power of the eyepiece which is typically 10x.



Therefore, a 10x eyepiece used with a 40X objective lens, will produce a magnification of 400X. The naked eye can now view the specimen at a magnification 400 times greater and so microscopic details are revealed.

Notes

1. The specimen is placed on the glass and a cover slip is placed over the specimen. This allows the slide to be easily inserted or removed from the microscope. It also allows the specimen to be labeled, transported, and stored without damage.
2. When focusing the microscope, be careful that the objective lens doesn't touch the slide, as it could break the slide and destroy the specimen.
3. The oil immersion lens is required for viewing individual bacteria. In order to clearly see an object with this lens, immersion oil must be placed directly on the sample being viewed.

   Cedar wood oil used with oil immersion lens. It has same refractive index as that of glass, addition of oil in the gap between objective and object prevent refraction of light rays in order to get a bright image of the object.