BIOL 104 Forensic Biology

Chapter 7 The Microscope

I. Basics of the Microscope

* Simple Microscope- one lens

e.g. magnifying lens

* Compound Microscope- 2 lenses that “compound” or magnify each other
* Stereoscope or Dissecting Microscope- no special slide preparation necessary

II. The Compound Microscope

A. Parts of The Compound Microscope

* **Eyepiece**

- the part of the microscope you look into

- usually magnifies material being viewed by 10x

- sometimes contains a pointer that can be seen as you look into the eyepiece

- may also be called the ocular because it contains the ocular lens

- may be monocular or binocular

* **Body tube**

- connects eyepiece to nosepiece

* **Nosepiece**

- part of microscope to which the objectives are attached

- rotates to allow for the changing of objectives to increase or decrease

magnification

* **Arm**

- a secure part of the microscope to hold on to when the microscope is being

carried

* **Objectives**

- scanning/low (4x)

- medium (10x)

- high (40x)

- oil immersion (60x)

* **Stage**

- platform on which microscope slide rests

* **Stage Clip**
* **Mechanical Slide Adjuster**

**-** used for adjusting the position of the slide for viewing

* **Coarse adjustment/focus knob**

- controls large movements of the stage or nosepiece

* **Fine adjustment/focus knob**

- controls more precise focusing under higher powered objectives

* **Diaphragm**

- regulates the amount of light passing through the slide

* **Illuminator**

- light source

* **Base**

- provides support for microscope

1. **Total Magnification**- power of the **ocular lens** (10X) multiplied by power of the **objective lens**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Objective** | **Ocular** | **Total Magnification** |
| **Scanning/Low Power** | 4x | 10x |  |
| **Medium Power** | 10x | 10x |  |
| **High Power** | 60x | 10x |  |

1. **Field of View**

* Field of View (FV) is the illuminated circle that you see when looking through the microscope.
* If we know the diameter of the FV then we can estimate the size of our specimen.
* With our microscopes the diameter of the FV under low power is 4 mm.
* FV is measured in micrometers or microns.
* 1 mm = 1000 microns
* Therefore, our FV under low power is 4000 microns.

1. Using the Field of View to Estimate Microscopic Measurements

* If a specimen takes up ½ of the FV under low power, it must be about 2000 microns in length.

2. How does the FV change as Magnification increases?

* As magnification increases, the size of the FV gets smaller.
* If magnification increases 2x, the FV is divided by 2x, or 2x smaller.
* If we switch from scanning/low power (4x) to medium power (10x), the increase in magnification is 2.5 times (10x/4x).
* The FV under medium power will be 1600 microns (4000/2.5).

3. Calculating the Diameter of the Field of View

* Step 1 Calculate the Increase in Magnification.

New Objective

Old Objective

* Step 2 Divide the old FV by the increase in magnification calculated in Step 1.

Old FV (microns)

Increase in Mag

1. Comparison Microscope

* Uses two stages and sets of objectives connected by one body tube to one eyepiece

1. Electron Microscopes

* Use electrons to illuminate a specimen instead of light

- Scanning Electron Microscope (SEM)

- Transmission Electron Microscope (TEM)

**Assignment: Chapter 7 case analysis questions #1-4**