OPTICAL MICROSCOPE
INVERTED OPTICAL MICROSCOPE
FLUORESCENCE MICROSCOPE

GÖRKEM ANIT
20419666

21.04.2011
OUTLINE

- MICROSCOPE
  - OPTICAL MICROSCOPE
    - HISTORY
    - PARTS OF OPTICAL MICROSCOPE
    - WORKING PRINCIPLE
    - USAGE AREA
    - ADVANTAGES AND DISADVANTAGES
  - INVERTED OPTICAL MICROSCOPE
    - HISTORY
    - PARTS OF INVERTED OPTICAL MICROSCOPE
    - WORKING PRINCIPLE
    - USAGE AREA
    - ADVANTAGES AND DISADVANTAGES
  - FLUORESCENCE MICROSCOPE
    - HISTORY
    - PARTS OF FLUORESCENCE
    - WORKING PRINCIPLE
    - USAGE AREA
    - ADVANTAGES AND DISADVANTAGES

- SUMMARY
- REFERENCES
A microscope is an instrument to see small objects.

Consist the combination of the words “micros (small)” and “skopeein (look)” in Greek.

It is seen first in XVII. Century

Anton van Leeuwenhoek invented the basic microscope in Netherlands
A primitive microscope was invented in 1590 in Middelburg, Netherlands, by the eyeglass makers Hans Lippershey, Zacharias Jansen and his father Hans Jansen.

- Consist of two lens system; objective and ocular.
- Pick up the image and magnify
PARTS OF OPTICAL MICROSCOPE

- **Eyepiece**: contains the ocular lens, which provides a magnification power of 10x to 20x.

- **Nosepiece**: holds the objective lenses and can be rotated easily to change magnification.

- **Objective lenses**: usually, there are three or four objective lenses on a microscope, consisting of 4x, 10x, 40x and 100x magnification powers.

- **Stage clips**: hold the slide in place.
PARTS OF OPTICAL MICROSCOPE

- **Stage**: supports the slide being analyzed.
- **Diaphragm**: controls the intensity and size of the cone light projected on the specimen.
- **Light source**: projects light upwards through the diaphragm, slide and lenses.
- **Base**: supports the microscope.
- **Arm**: supports the microscope when carried.
- **Coarse adjustment knob**: adjust coarse the focus.
- **Fine adjustment knob**: adjust fine the focus.
WORKING PRINCIPLE

- Optical microscope consist of two lens system.
- Objective and ocular
- Objective enlarges the image with lens (100x)
- Ocular magnifies the image much bigger (20x)
- Total enlargement calculate objective*ocular
- The optical microscope makes the image 2000 times bigger.
Optical microscope is used extensively in:

- Microelectronics
- Nanophysics
- Material science and geology
- Biotechnology
- Pharmaceutic research
- Non-transparan objects (ex: metals and alloys)
- Minerology and microbiology
ADVANTAGES AND DISADVANTAGES

- Enlarge only 2000 times, because of using light.
- Optical microscopes are not able to display details that smaller than 250 nm which is the half wave length of the light.
- Fast and adaptable to all kind of systems.
- No need pre-treatment.
- Low resolution.
INVERTED OPTICAL MICROSCOPE

- It was invented in 1850 by J. Lawrence Smith, a faculty member of Tulane University (then named the Medical College of Louisiana).
- It was seen first the world fair in London in 1852.
- It has been used at the beginning of 20th century.
PARTS OF INVERTED MICROSCOPE

Differences from the optical microscope are,

- The light sources and the condenser are on the top of the stage.
- The eyepiece is not upside but places standard viewing angle
- Working principle is same with the optical microscope
Inverted microscopes can be configured for:

- Work in electrophysiology,
- In vitro fertilization,
- Micromanipulation,
- High-resolution DIC,
- Video-enhanced observations,
- A variety of advanced fluorescence techniques
ADVANTAGES AND DISADVANTAGES

- Expensive to built
- Magnification limited (maximum 60x)
- Allows you to work alive microorganism much longer time
- Fine focus
In 1904, August Kohler invented the ultraviolet absorption microscope that preceded the fluorescence microscope.

Made the fluorescence microscope with Wilhem Siedentopf, who works in Carl Zeiss firm.
PARTS OF FLUORESCENCE MICROSCOPE

- Arc Lamp
- Excitation Diaphragm
- Excitation Filter
- Dichroic Filter
- Objective
- Ocular
- Emission Filter
WORKING PRINCIPLE

- Labeled the sample with fluorophore
- Illuminated with light source
- The fluorophore absorbed the light
- Causes them to emit a longer lower energy wavelength light
- Filters separated the these light to visible wavelength
AREA OF USAGE

- Imaging structural components of small specimens, such as cells
- Conducting viability studies on cell populations (are they alive or dead?)
- Imaging the genetic material within a cell (DNA and RNA)
- Viewing specific cells within a larger population with techniques such as FISH
ADVANTAGES AND DISADVANTAGES

- Easy to use
- Rapid testing
- Sensitive
- High cost
- Need very low voltage
SUMMARY

- Optical microscope is the oldest and most common microscope. It enlarges the images 2000 times and works in visible light.
- Inverted microscope has the same properties with optical microscope but enlarges the images only 60 times. Its very important property is working with alive organism much longer time.
- Fluorescence microscope uses high intensity light sources which was absorbed by fluorophore. It is used to investigate the cells.
REFERENCES

- http://www.nuveforum.net/1104-genel-araclar/62811-mikroskop-optik-mikroskop/
- http://inventors.about.com/od/mstartinventions/a/microscope.htm
- http://nobelprize.org/educational/physic/microscopes/fluorescence
- http://serc.carleton.edu/microbelife/research_methods/microscopy/fluromic.html
REFERENCES

- http://industrial-microscope.com
- http://www.ehow.co.uk/facts_5527433_different-kinds-microscopes.html
- http://inventors.about.com/od/mstartinventions/a/microscope
- www.books.google.com
THANKS

FOR YOUR ATTENTION...