

Microscope depth of field

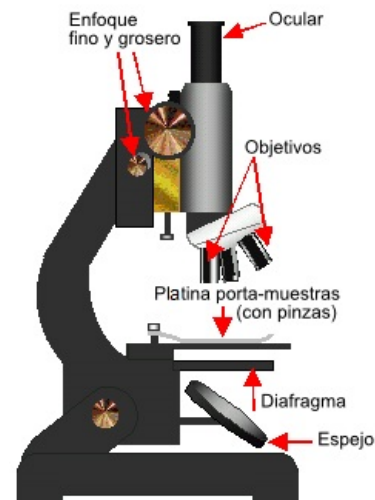
By the depth of field of the microscope we mean the thickness of the layer of the preparation in which the sharply displayed objects are located. The depth or thickness of such a layer of the object indicates the depth of field, or depth of field (**penetration ability** i.e. "ability to draw sharply in depth") of the lens. **Objects that lie above and below this layer are seen out of focus or are not visible at all.**

Affecting the depth of field of the microscope

Lenses with lower magnification (eg 4x, 10x) have a greater depth of field than lenses with higher magnification (eg 40x, 60x, 100x). **Depth of field can be increased by zooming in or lowering the position of the condenser** ([https://cs.wikipedia.org/wiki/Kondenzor_\(optika\)\)](https://cs.wikipedia.org/wiki/Kondenzor_(optika)))). Thus, details and impurities lying above and below the object can be displayed. **On the contrary, we achieve a decrease in the depth of field as the aperture of the lens increases.**

The depth of field depends inversely on the numerical aperture ([https://cs.wikipedia.org/wiki/Numerick%C3%A1_ap](https://cs.wikipedia.org/wiki/Numerick%C3%A1_apertura)

ertura) of the lens, i.e. for a strong lens the depth of field is quite small.



Working with a microscope with a strong objective

When viewing the transparent preparation, we make a cut through the preparation, we can clearly observe only a thin layer. We are talking about „**the optical section**“. The microscope will clearly show us the structures that lie in it. So focusing is actually just the localization of object structures, or the entire observed object into this layer. By turning the micrometric screw, which allows us to focus on the given object, we pass a series of consecutive optical sections through the observed object.

Depth of field has three sources:

1. **Geometric depth of field** – results from a geometric display without optical defects. It is given by the thickness of the object, from which the angular size of the displayed circles (as an image of points outside the plane of the object) is less than or equal to.
2. **Wave depth of field** – increases the depth of field, it follows from the fact that the image of the object is a three-dimensional structure due to bending (diffraction).
3. **Accommodative depth of field** – includes the influence of the eye's accommodative ability to increase the depth of field.

Related Articles

- Construction and function of a light microscope
- Microscope image contrast

Resources

- <https://www.mikroskop-mikroskopy.cz/popis-mikroskopu/>
- Medical biophysics (Leoš Navrátil, Jozef Rosina and colleagues), GRADA Publishing, as, 2005
- Václav Prosser et al. Experimental methods of biophysics. Academia, Prague 1989
- HEITMANEK, Milan. Introduction to light microscopy. Palacký University Publishing House in Olomouc, Olomouc 1993

