Lec. One
Parts of the Optical Microscope and Their Function

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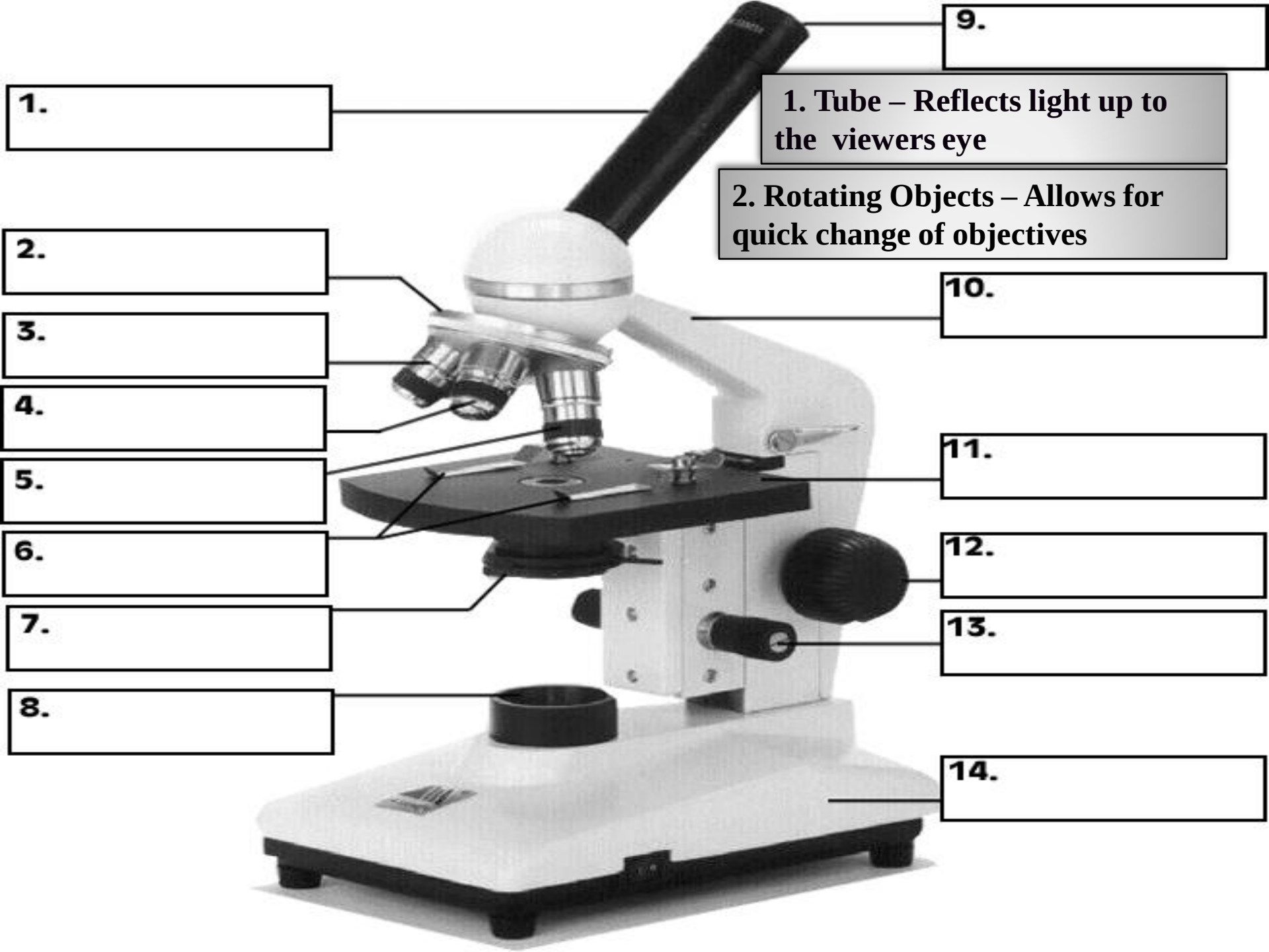
A microscope is a high precision optical instrument that uses a lens or a combination of lenses to produce highly magnified images of small specimens or objects.

Optical microscope is the simplest form of microscope uses visible light and a system of lenses to magnify images of small samples.

It has tools that are used to observe the small organisms or object and even macromolecules. It has wide variety of microscopic tools for studying the biomolecules and biological processes. It includes all forms of microscopic methods that use electromagnetic radiation to achieve magnification.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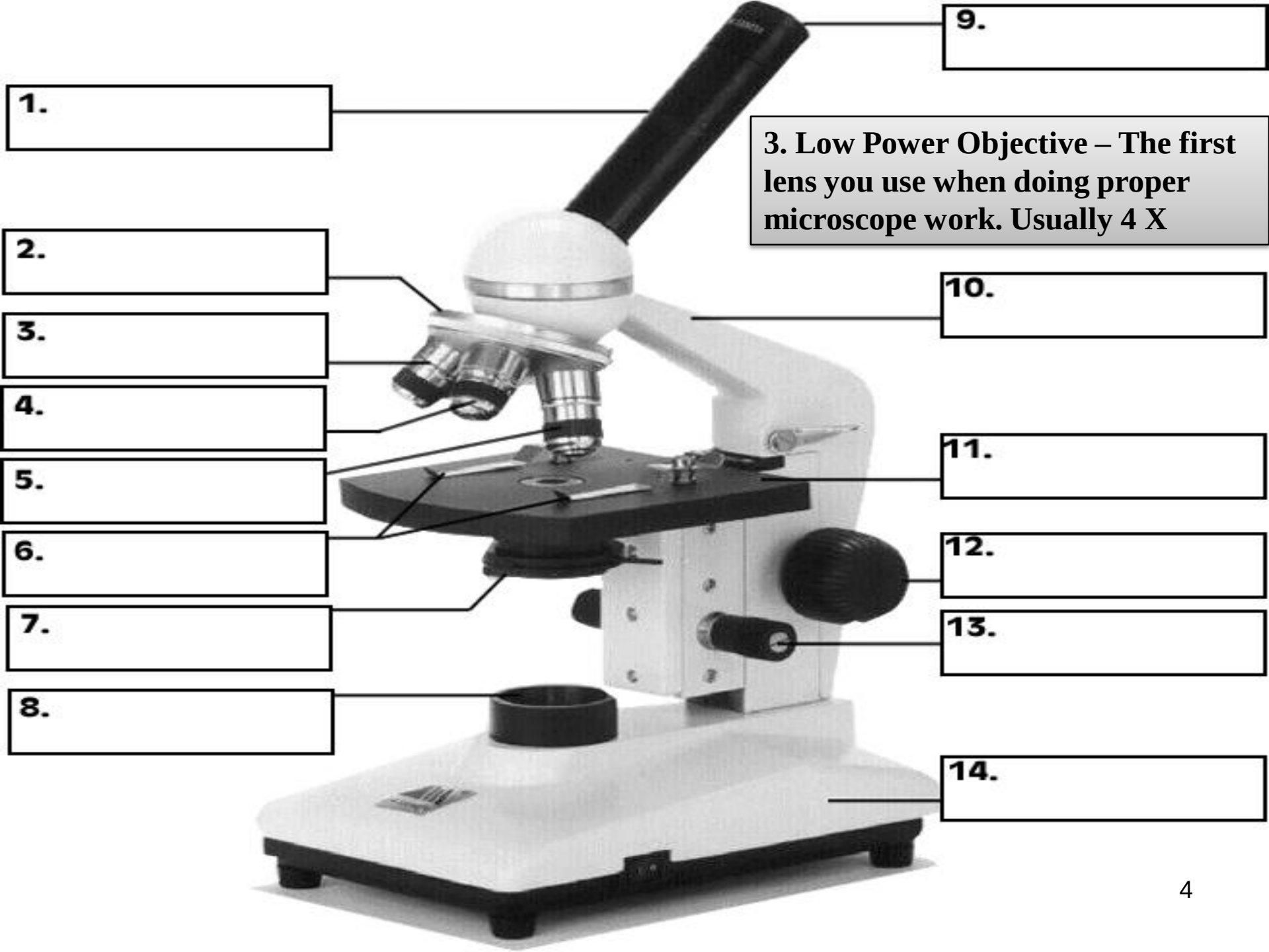
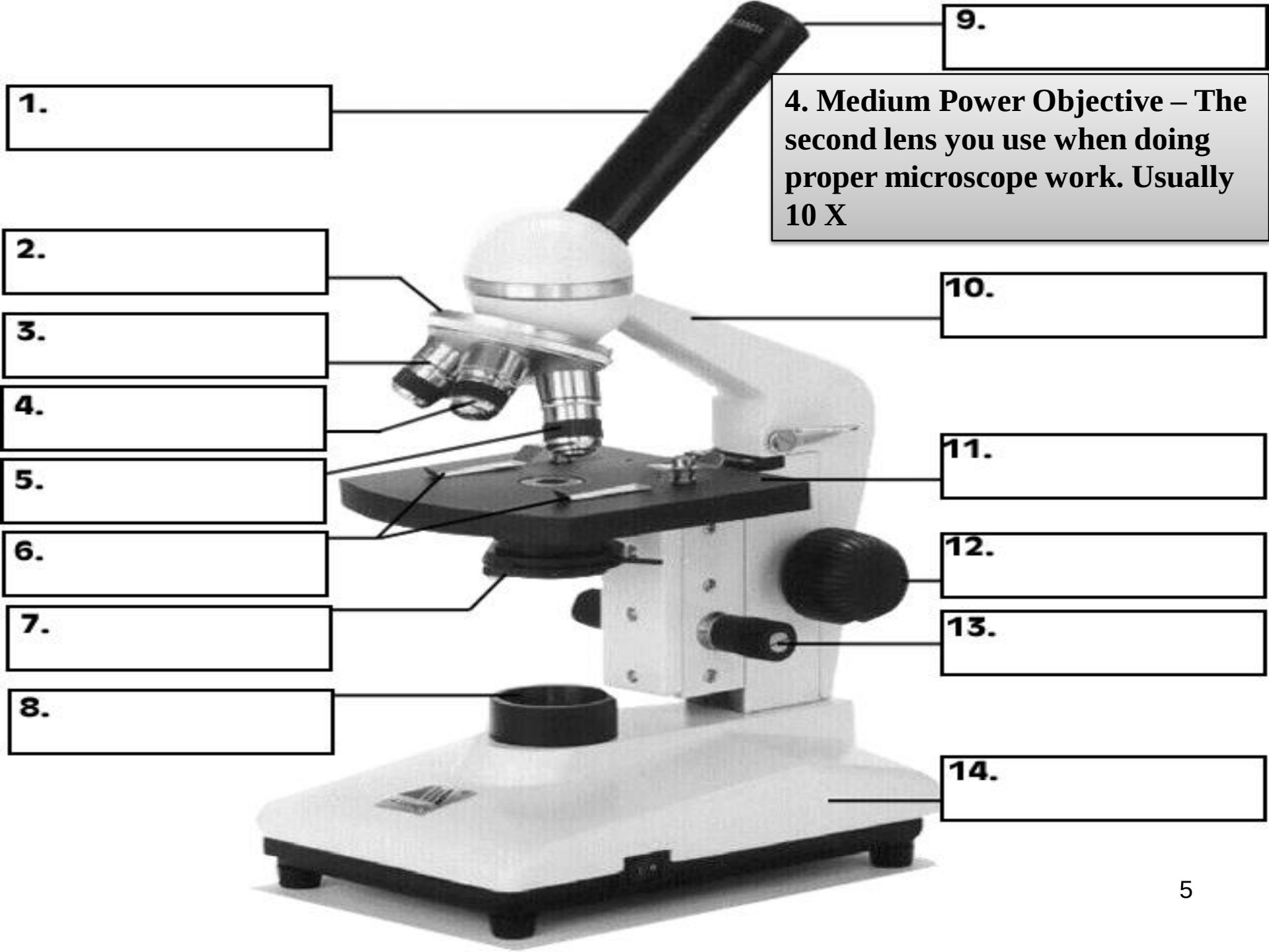
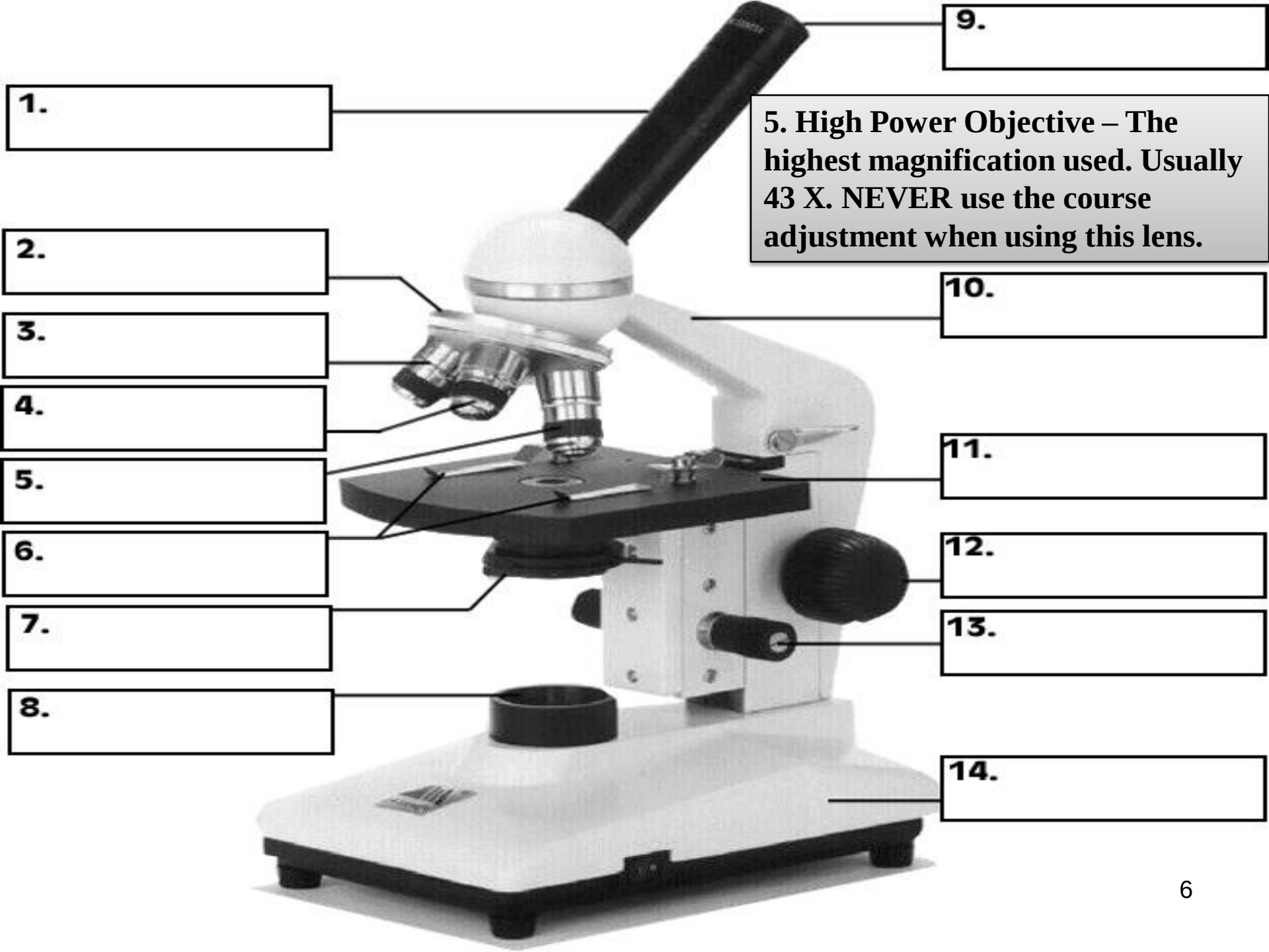
1. Tube – Reflects light up to the viewers eye
2. Rotating Objects – Allows for quick change of objectives



3. Low Power Objective – The first lens you use when doing proper microscope work. Usually 4 X



4. Medium Power Objective – The second lens you use when doing proper microscope work. Usually 10 X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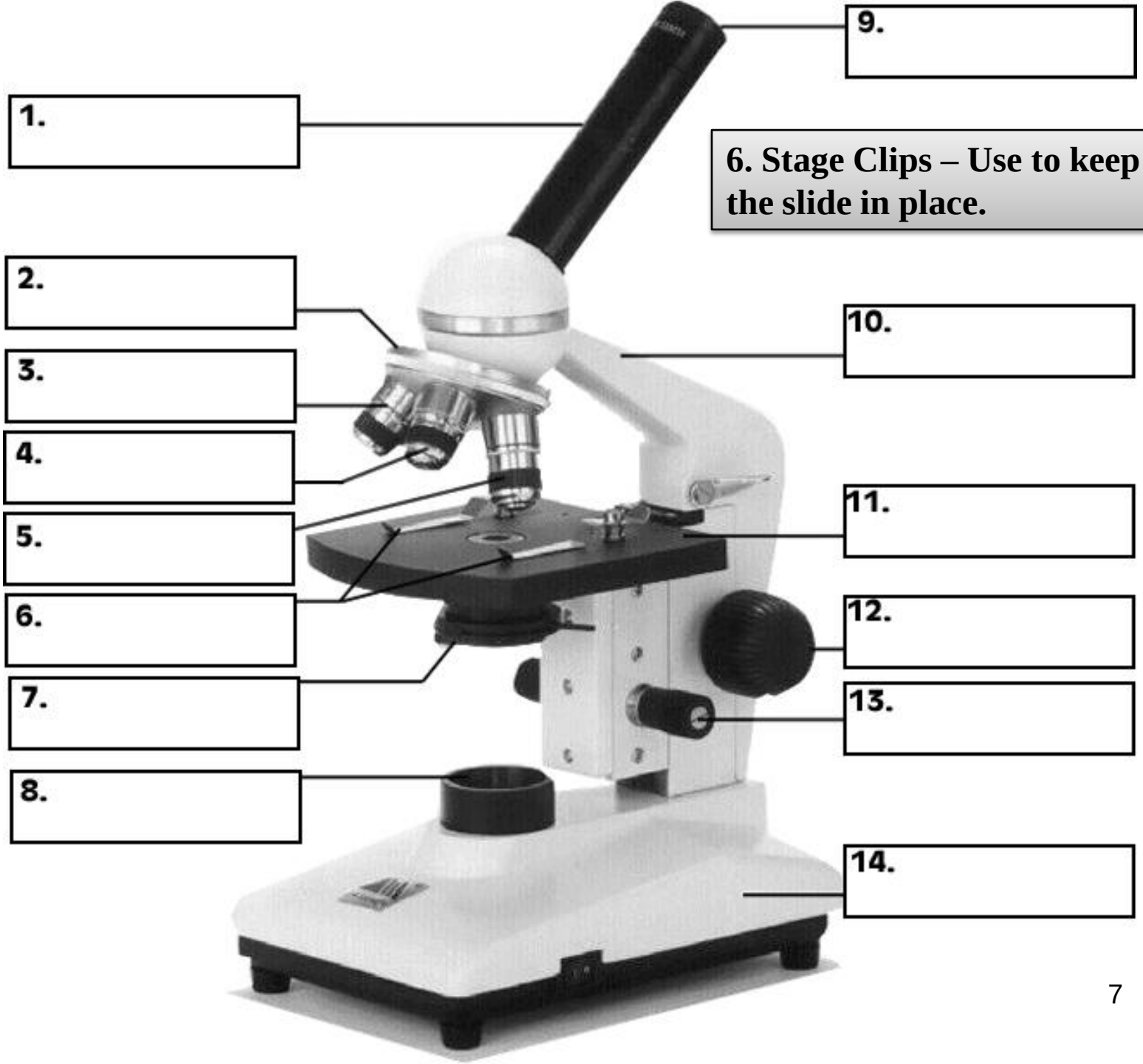
5. High Power Objective – The highest magnification used. Usually 43 X. NEVER use the course adjustment when using this lens.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6. Stage Clips – Use to keep the slide in place.
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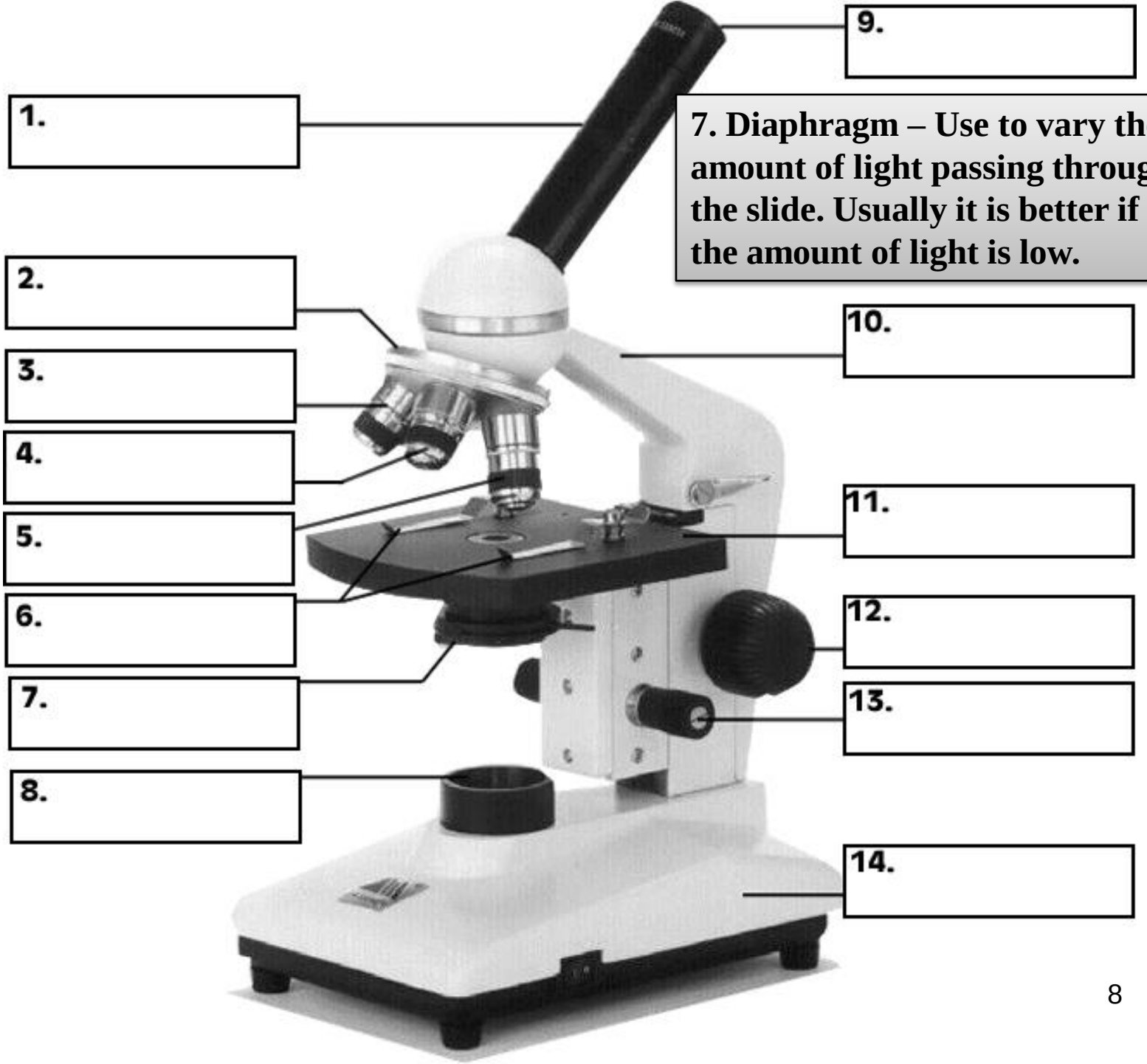
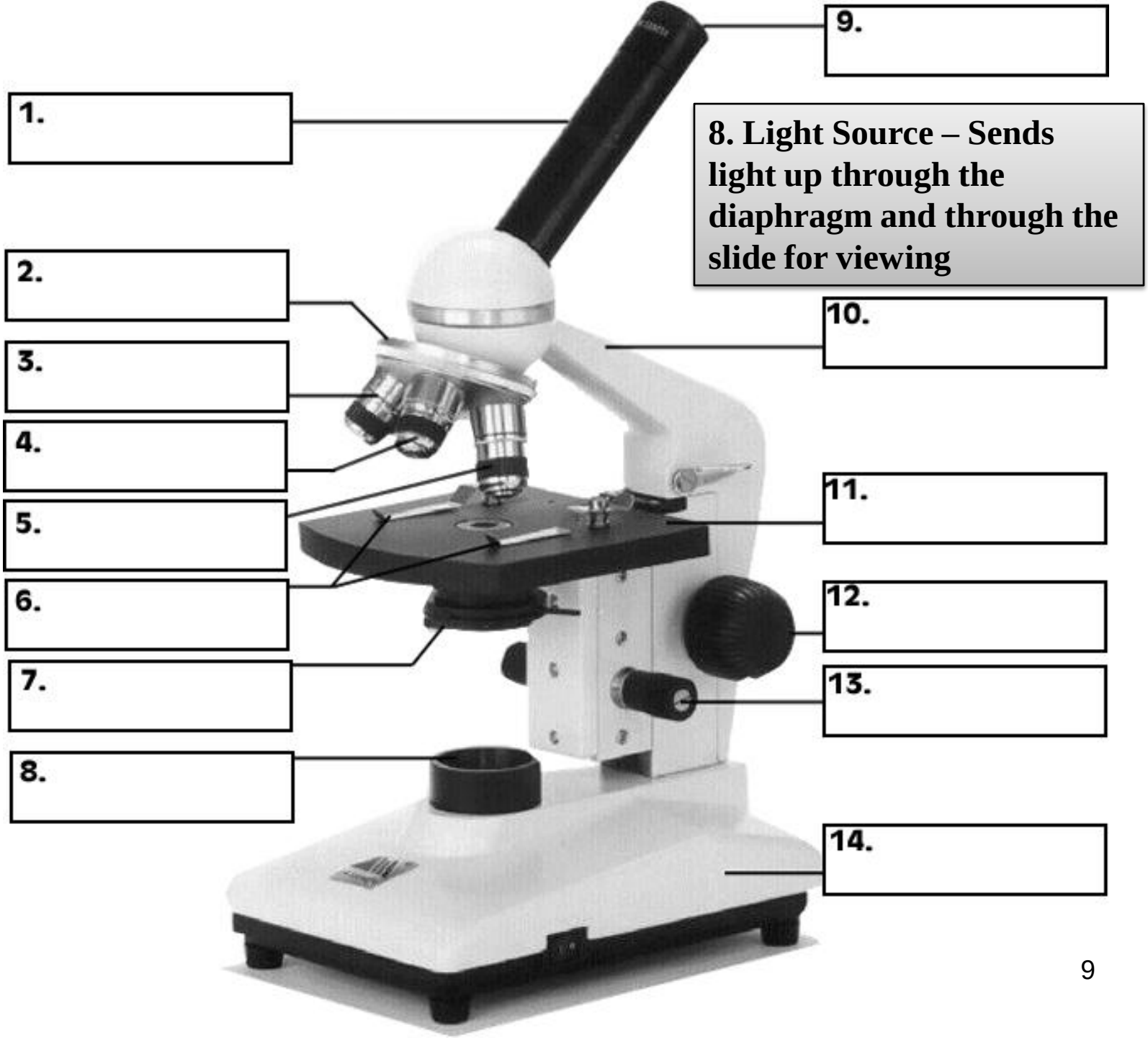
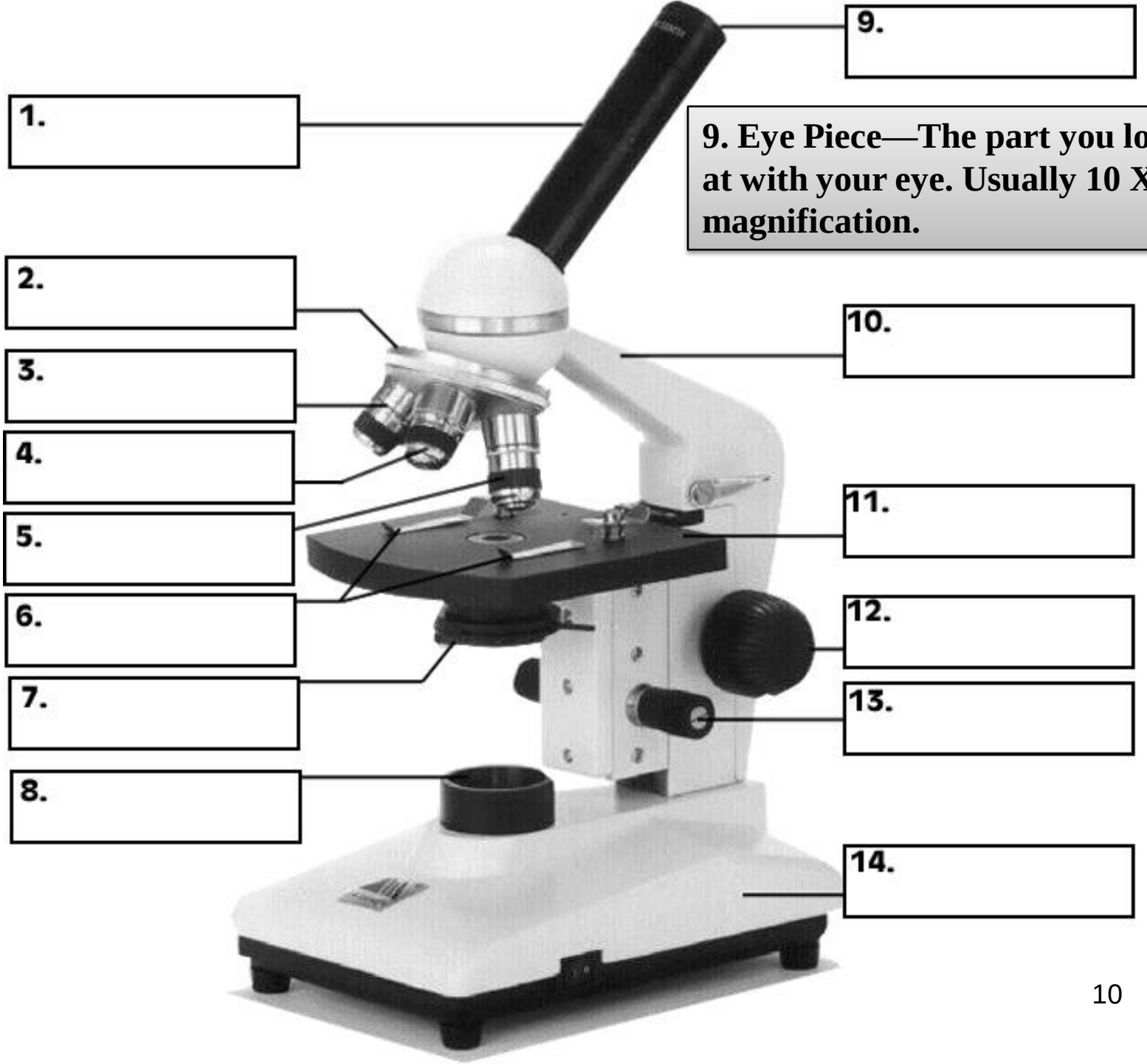


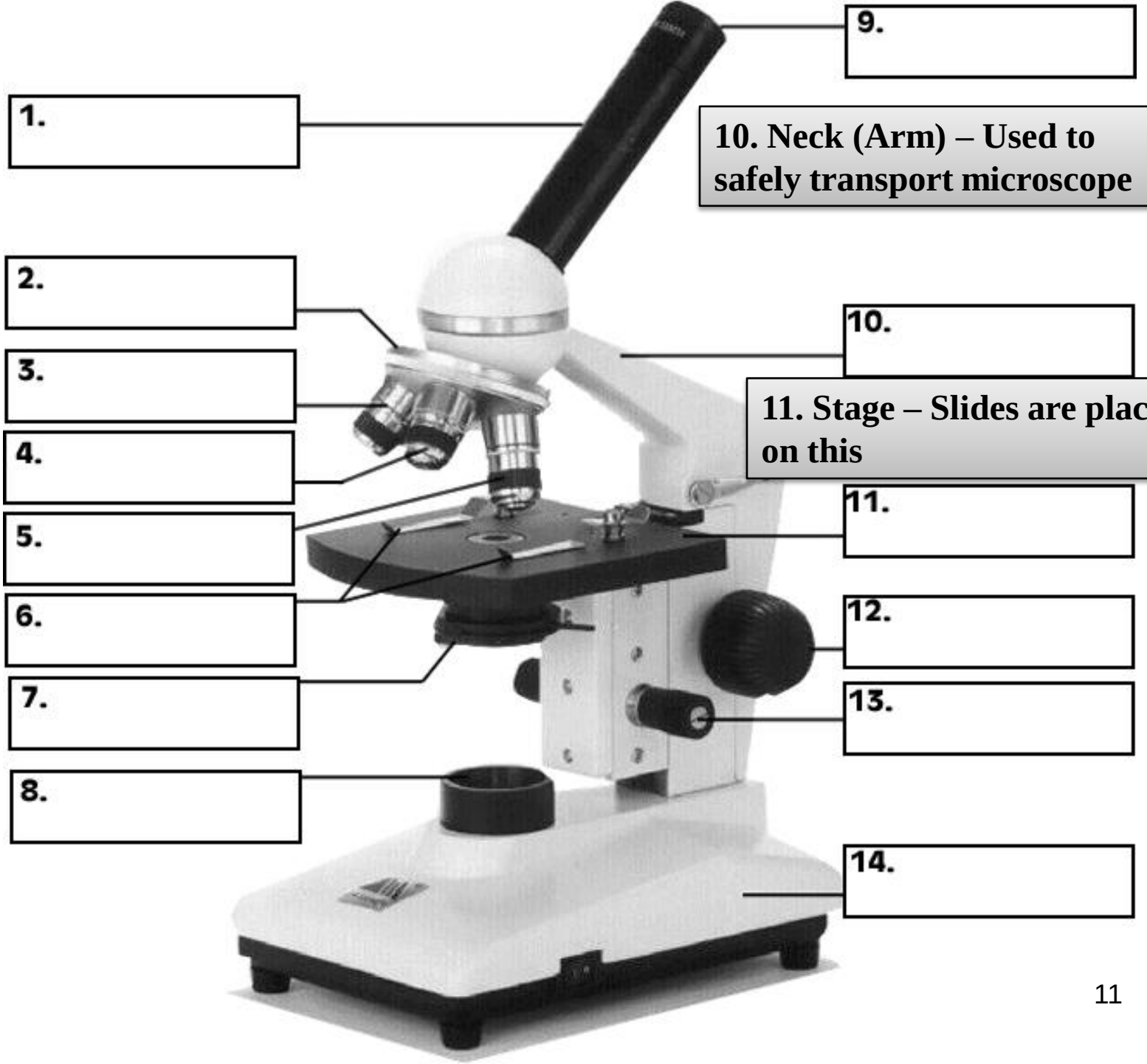
7. Diaphragm – Use to vary the amount of light passing through the slide. Usually it is better if the amount of light is low.



8. Light Source – Sends light up through the diaphragm and through the slide for viewing

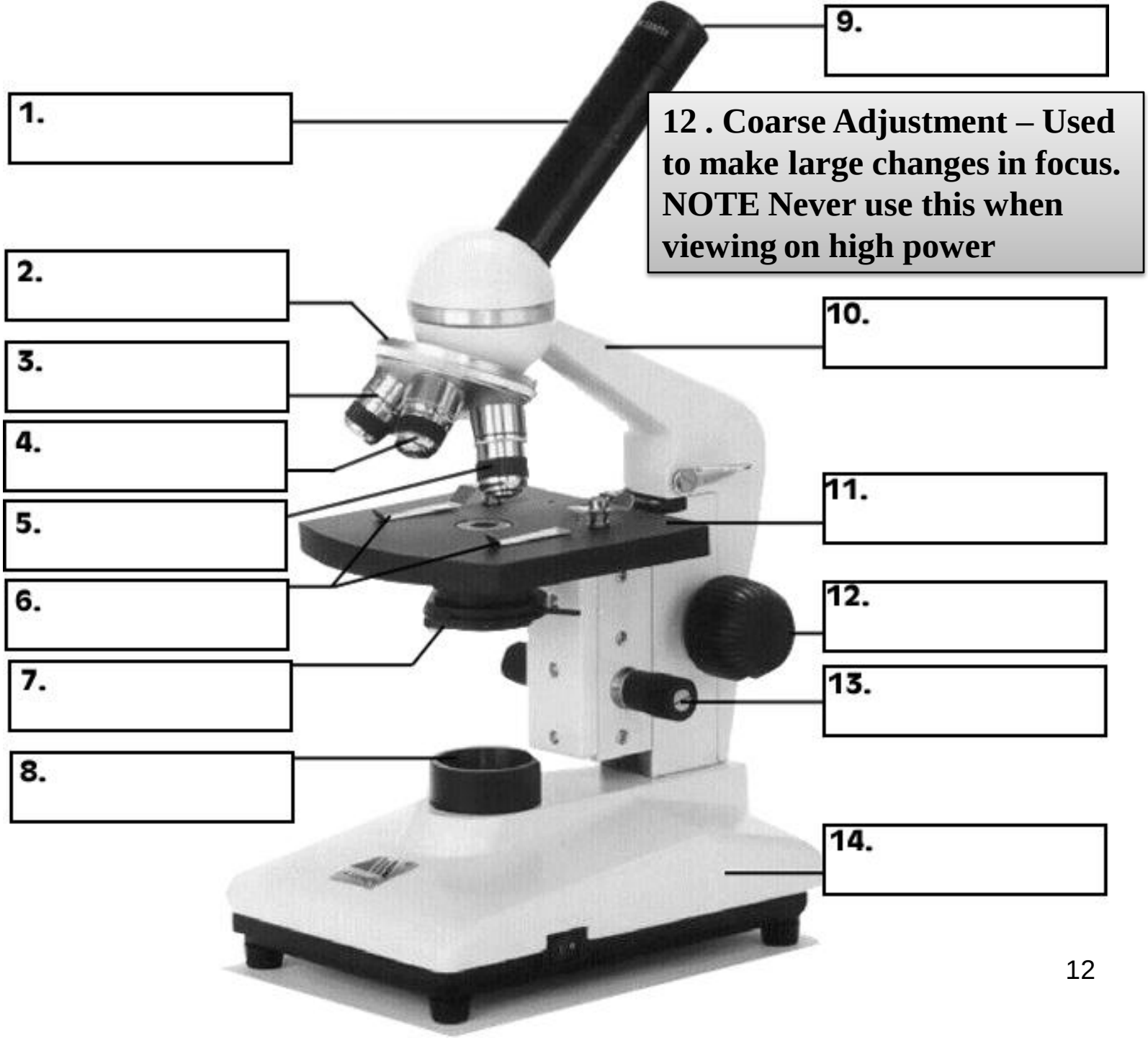


9. Eye Piece—The part you look at with your eye. Usually 10 X magnification.

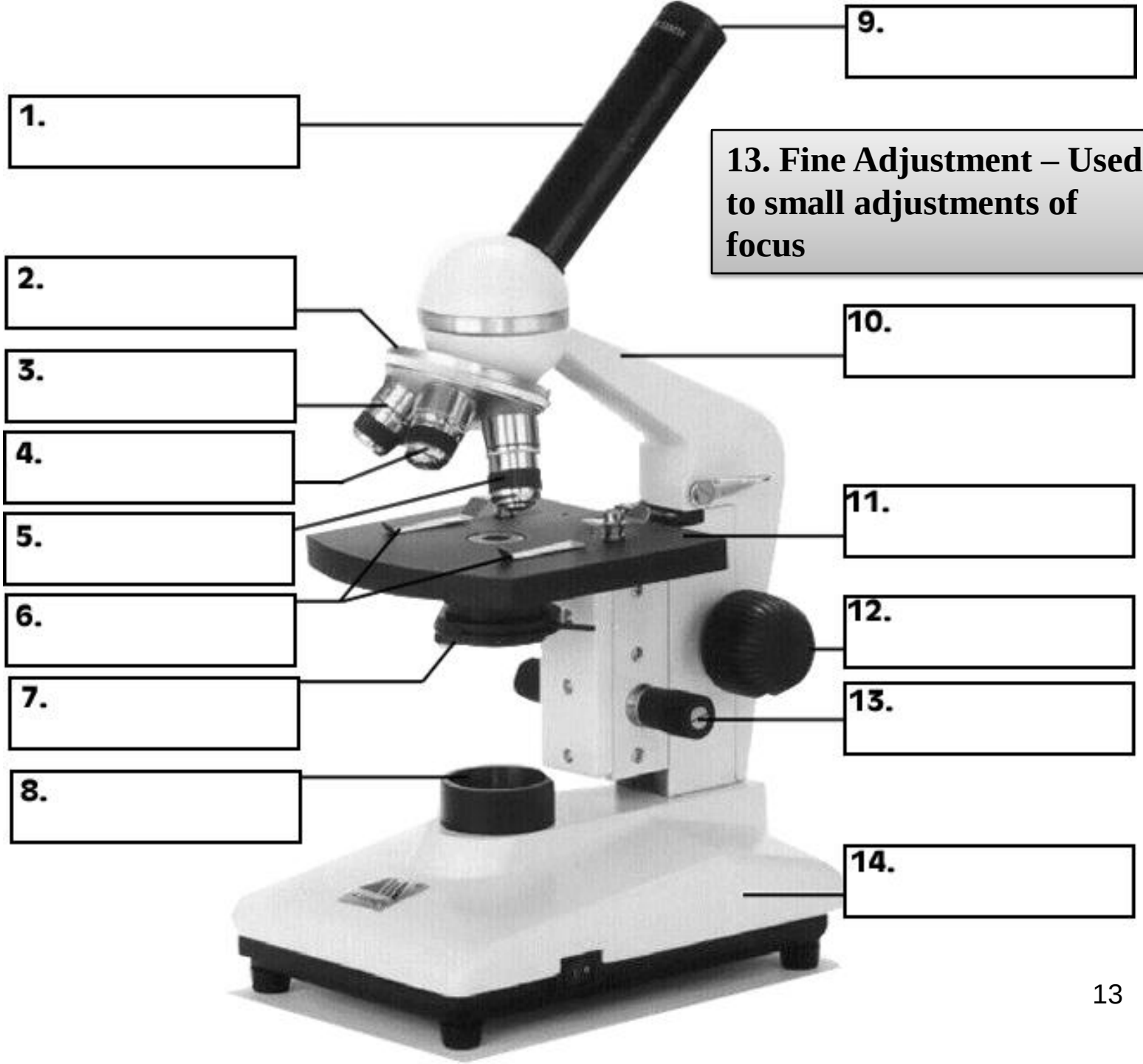


10. Neck (Arm) – Used to safely transport microscope

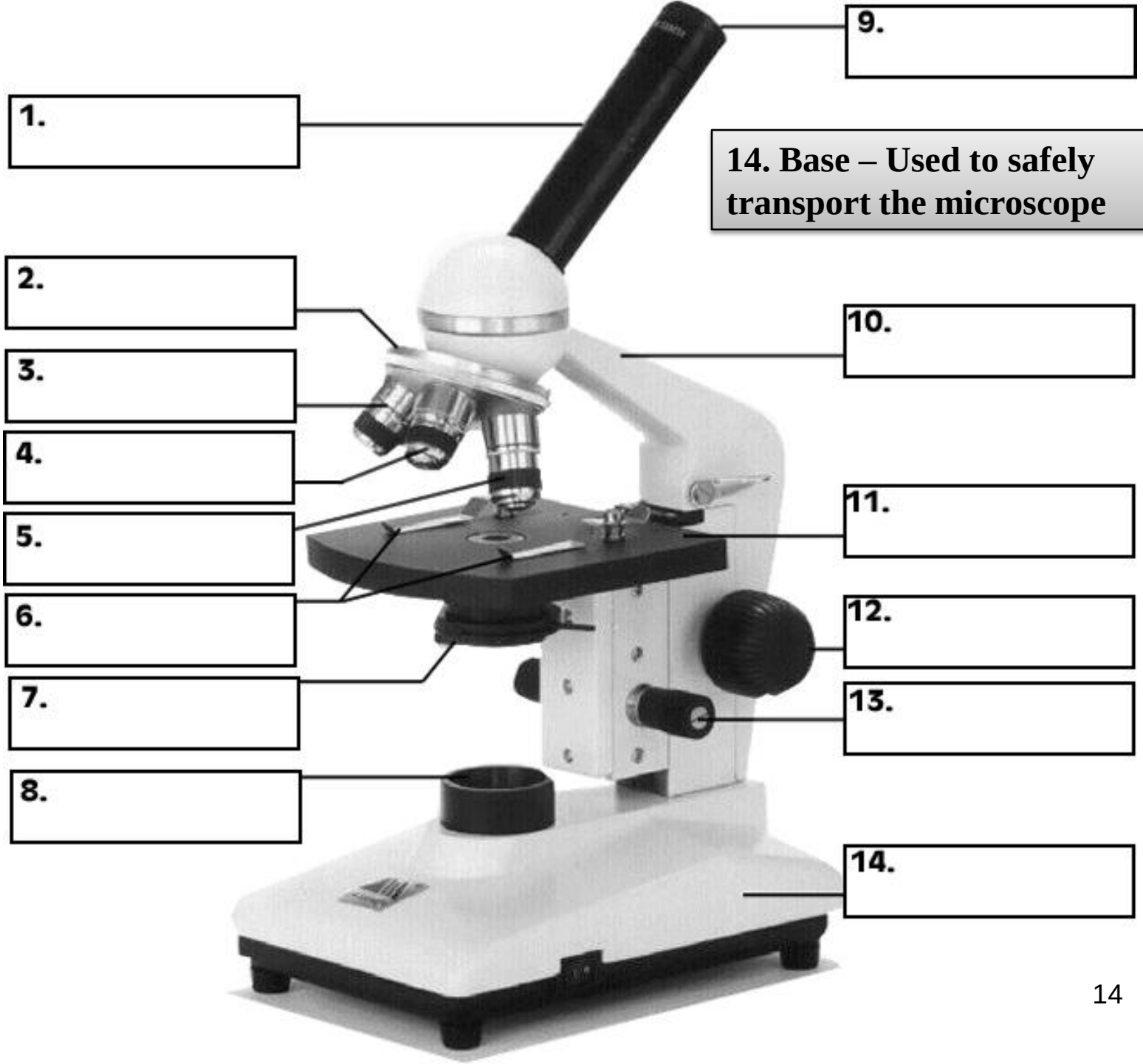
11. Stage – Slides are placed on this



12 . Coarse Adjustment – Used to make large changes in focus. NOTE Never use this when viewing on high power



13. Fine Adjustment – Used to small adjustments of focus

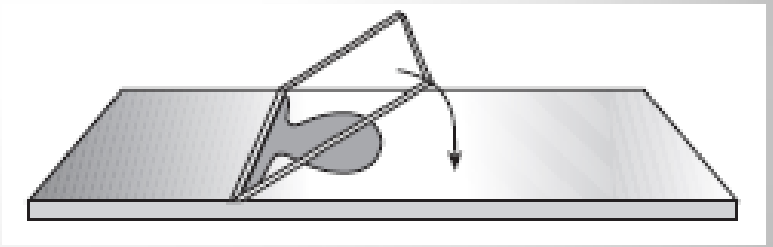


14. Base – Used to safely transport the microscope

How a Light Microscope Works

1. **Use lenses to make small objects appear larger**
2. **Compound light microscope: Two lenses separated by a tube**
3. **Lenses magnify an object by bending the light that passes through the lens**
4. **Magnification: ability to make things appear larger than they are (Multiply the eyepiece magnification (10X) by the objective magnification (4X, 10X, 40X) Example: 4 x 10 = 40X total)**
5. **Resolution: fineness of detail that can be seen in an image**

How to Prepare a Slide



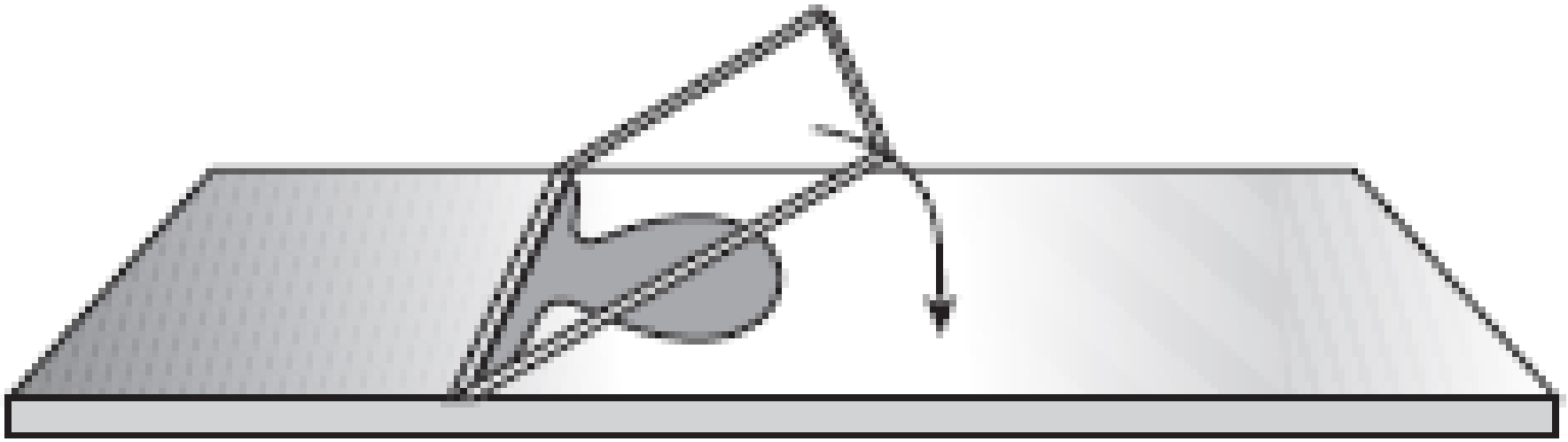
1. **Place slide on a flat surface.**

2. **Place a drop of water on the slide. Add the specimen to the drop of water (at times, you may want to have the specimen already on the slide before adding the water).**

3. **Hold the coverslip by its sides and lay its bottom edge on the slide close to the specimen. Holding the coverslip at a 45° angle helps.**

4. Slowly lower the coverslip so that it spreads the water out. If you get air bubbles (looking like little black doughnuts), gently press on the coverslip to move hem to the edge. If there are dry areas under the coverslip, add a little more water at the edge of the coverslip. Too much water can be dabbed off with a piece of paper towel

The diagram below shows how a cover-slip should be lowered onto some single-celled organisms during the preparation of a wet mount.



Why is this a preferred procedure?

A.The cover-slip will prevent the slide from breaking.

B.The organisms will be more evenly distributed.

C.The possibility of breaking the cover-slip is reduced.

D.The possibility of trapping air bubbles is reduced.

Rules of using a microscope

- **Always carry with 2 hands**
- **Only use lens paper for cleaning**
- **Do not force knobs**
- **Always store covered**
- **Be careful of the cords**

Inverted microscope

- An **inverted microscope** is a microscope with its light source and condenser on the top, above the stage pointing down, while the objectives and turret are below the stage pointing up. It was invented in 1850 by J. Lawrence Smith, a faculty member of Tulane University (then named the Medical College of Louisiana)

The stage of an inverted microscope is usually fixed, and focus is adjusted by moving the objective lens along a vertical axis to bring it closer to or further from the specimen.

The focus mechanism typically has a dual concentric knob for coarse and fine adjustment. Inverted microscopes are useful for observing living cells or organisms at the bottom of a large container (e.g., a tissue culture flask) under more natural conditions than on a glass slide, as is the case with a conventional microscope

Inverted Microscope