Drawing Zoological Specimens

Over the past two centuries zoology students the world over have been trained to carefully observe structural and morphological details of the specimens understudy. This observation of detail includes all specimens from microscopic forms to dissected frogs. All of these students have been trained in the fundamentals of biological illustration.

Enrollment in Zoology 5 does not preclude that you are an accomplished artist nor does it presume that you have any artistic ability. Regardless of a student’s abilities, all students are expected to produce neat, complete and timely drawings of the assigned exercises.

The biological illustrations will employ the technique of stippling, a time tested way to give depth and relief to a planer drawing. If executed correctly this technique will produce fine reproducible illustrations. Stippled illustrations will produce more detail than a photograph. Stippling is a means of producing the illusion of three dimensions by carefully positioning a series of neatly placed dots on your illustrations wherever you wish to denote curvature. Slight curvature requires a few dots, while sharp curves demand numerous dots. Artistically or graphically this technique could be termed a sort of pointillism. True pointillism, however, allows both dots and dashes. Use only dots, dashes will not be used in Zoology 5. Remember, dots are round.

Tools useful for learning the stippling technique of biological illustration will include the following:

1. **Sharp** pencils at all times a (pencil sharpener is mounted near the south entrance to room 134).
2. A clean, gum-type eraser.
3. One transparent plastic 6 inches (15 centimeters) ruler.
4. Biology / botany paper (approximately 25 sheets).

Some students prefer to submit their illustrations in ink. Although pencil stippled illustrations are acceptable for a completed assignment, ink drawings are encouraged if certain rules are followed. Felt tipped pens and ballpoint pens are not acceptable. A Technical Drawing Pen (e.g. Rapidograph pen) will be acceptable provided waterproof, indelible ink is used (either Pelican, KohiNoor or Higgins Brands). The suggested pen point size should be 1 or 0. To avoid clogging, do not mix ink brands. If you elect to use ink, sketch all work in pencil before applying ink. Wait twenty-four hours after the last ink stipple was applied before lightly erasing all pencil markings. The ink will remain if the correct ink was applied.

Remember that milk will remove ink stains from clothing. Scrub the spot with milk while the ink is still wet. This hint will save you many a favored shirt, blouse, pants or dress. You may smell like a dairy worker but your clothes will be saved.
How to make a Laboratory drawing

Materials:

1. Use three-hole Biology / Botany paper for all drawings.
2. If you choose not to use ink, sketch drawings with a 4H pencil and finish with a 2H pencil.
3. If you choose to ink illustrations use a Technical Drawing Pen.
4. Use a ruler for making horizontal label lines.

Layout:

1. Student heading includes name (last name first), class section and date on the top right hand corner of the page.
2. Plate (illustration) heading is printed in upper case letters and includes the plate number and title, i.e. what group (taxon) of animals you are illustrating.
3. Plate explanation printed in lower-case letters at the bottom of the page. It should include the purpose of the exercise, that is, what you are trying to show on this plate.
4. You may place several drawings on one page, but avoid overcrowding.
5. Center your drawing to allow enough room to label and annotate.

Drawing:

1. Lightly sketch the drawing with a 4H pencil before finishing to make sure all structures are correct and in the proper proportions to each other. Make sure the drawing is properly centered and the correct size. Instructions regarding the size of each drawing are in the lab manual.
2. Review the instructions on stippling (page ).
3. Each individual illustration will have a figure number and title below it. This will include a) the common name and the binomial, b) source of the drawing (always specify where you got your information i.e. drawn from a live specimen, a prepared slide or a dissected animal) and c) magnification used (i.e. drawn from a compound microscope at 400X or drawn from a dissecting microscope at 15X, or drawn from the naked eye, etc.).

Labels:

1. All lines must be dotted or very fine.
2. All labeling must be done horizontally and with a ruler.
3. Each labeled line should end in a small arrow at the exact spot on the drawing that you are referring to.
4. Label to both the right and left of the sketch to balance the drawing.
5. All labels must be printed in very small lower case letters.
Printing Instructions for Zoological Drawings

General Instructions

1. Letters should be plain and uniform, similar to those seen in mechanical drawing; avoid flourishes, curlicues and calligraphy.
2. Keep printing small and neat in order to avoid detracting from your drawings.
3. Keep all letters on a uniform slant, or labels, etc. will appear messy.

Upper and Lower Case Lettering and Numbers

1. Upper case letters should be used in titles.
2. Capitalize whenever you would do so in ordinary longhand.
3. Lower case should be used almost universally on an illustration, except for the above,
4. Use Arabic numbers whenever possible.

Helpful hints

1. Print along the upper edge of a separate piece of drawing paper that is superimposed on your drawing; this will keep your printing horizontal.
2. Plan your drawings so labeling can be placed on each side of a diagram. this will promote symmetry.
4. Practice lettering at home. Try copying the samples below.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890

ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890

abcdefghijklmnopqrstuvwxyz

These lower case letters may be used with the upper case letters in the first row (above).

Annotations

1. These call attention to important features of a drawing and should be placed in parentheses following the name of a structure. Annotations indicate functions of structures, meanings of words used, peculiarities, etc. and are useful aids when preparing for laboratory exams.
Answering Questions

1. All questions should be answered either in pencil on the back side of a drawing page or on a separate sheet of paper (see your instructor for specific instructions). Answers may be written or in printed form but must be in complete sentences in order to clearly inform the reader of the nature of the question as well as the answer. For example:

**Question:** Should capital letters be used in the drawing?

**Your Answer:** Capital letters should be used in the drawing for titles and when capitals are appropriate in ordinary writing.

Important Things to Remember

1. Only draw on one side (the front) of a plate (i.e. page).
2. Answers to questions may be placed on the back of an illustration sheet or on a separate piece of lined, 8.5X10 inch notebook paper (see instructor).
3. If ink is used erase all extraneous pencil marks before submitting your work.
4. If you draw in ink and make a mistake do not use “white-out”, simply cross out the error and place a new label above or below the mistake.
5. Plan your drawings. Provide adequate margins on all sides, do not overcrowd, leave room for labels, figure titles below the drawing, etc.
6. If finishing in ink, do not use pencil on the final product.
7. Do not enclose drawings in circles or squares (check with your instructor).
8. Do not overwhelm the drawing with large printing.
9. Do not copy drawings from textbooks or lab manuals unless instructed to do so. Use actual specimens whenever available.

**Drawing Practice Exercise 1**

<table>
<thead>
<tr>
<th>Ectoplasm (clear outer layer)</th>
<th>Pseudopodia (for locomotion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasmogel (firm inner layer)</td>
<td>Food vacuole (food digestion)</td>
</tr>
<tr>
<td>Plasmosol (liquid cytoplasm)</td>
<td>Nucleus (control center)</td>
</tr>
<tr>
<td>Plasmalemma (cell membrane)</td>
<td>Water vacuole (water storage)</td>
</tr>
</tbody>
</table>

Draw from a living specimen. Observed under a magnification of 400X.

Purpose: The above drawing of an amoeba was done as a practice drawing to acquaint the student with the technique of making a typical zoological drawing for Zoology 5.