

## SCIENTIFIC DRAWINGS FOR BIOLOGICAL COURSES

Scientific drawings are an important part of the science of biology and all biologists must be able to produce good quality scientific drawings regardless of your artistic ability.

Drawings not only allow you to record an image of the specimen observed, but more importantly, they help you to remember the specimen as well as the important features of the specimen. You will be required to look at a large number of specimens during this course and you are much more likely to remember them if you have to draw each one.

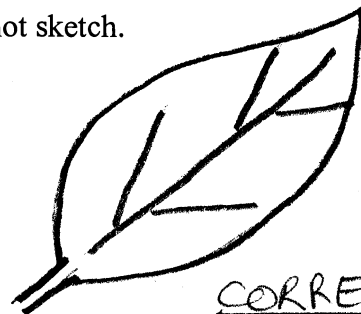
Drawing a specimen requires you to pay attention to detail so that you can re-create it on the sheet. While doing this, your brain is recording these same features in such a way that you can recall them if necessary (for example in an exam). Simply observing pictures of specimens in a book or on a computer screen is less effective when it comes to remembering and understanding what you observed.

All drawings done for this course must adhere to standard rules of scientific illustration. The following are some guidelines that you are to use when illustrating specimens:

- 1) Look at the specimen carefully and examine the significant features that will be included in the drawing.
- 2) DRAW ONLY WHAT YOU SEE!! Do not include what you think you should see.
- 3) All drawings must be done in pencil ONLY.
- 4) Drawings must be large and clear so that features can be easily distinguished.
- 5) No more than two drawings should be on a single page.
- 6) Always use distinct, single lines when drawing. Do not sketch.



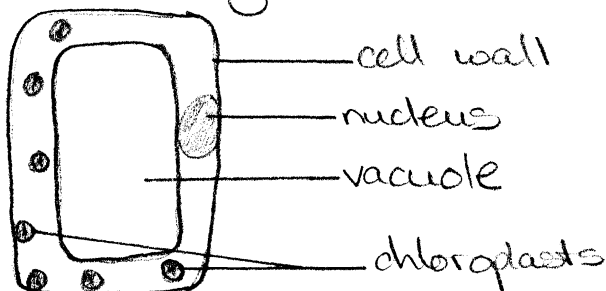
WRONG



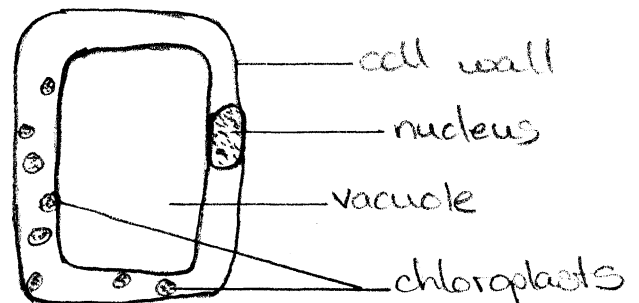
CORRECT

- 7) To illustrate darker areas on a specimen, use stippling or dots. Do not shade in any area of your drawing.

Drawings of leaf cells



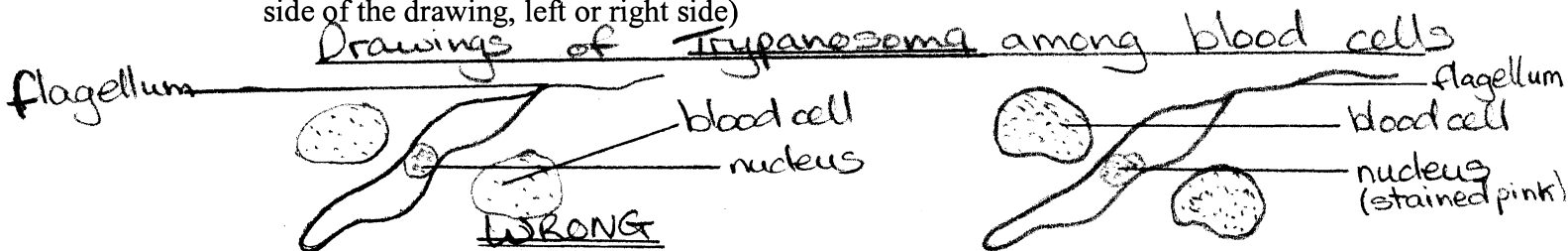
WRONG



CORRECT

8) All drawings must have the following indicated:

- Title (give a full, clear and concise title that explains what is being illustrated)
- Magnification (indicate the magnification at which the specimen was observed)
- Labels (always include labels of the important features of the specimen. Each label line must be straight and should not overlap with other label lines; all labels must be to one side of the drawing, left or right side)



- Annotations can also be included on your drawing, neatly written next to or under a label. Annotations are used to give information about the specimen that cannot be seen on the diagram (e.g. you may want to record that the nucleus was stained blue or that the two flagella on the organism could not be seen and so are not included on the diagram).
- Scale (always include a scale bar indicating the length or width of the specimen drawn)

9) Be sure to underline scientific names. All scientific names must be written as follows: Genus (beginning with a capital letter) species (beginning with a common letter) e.g. Amoeba proteus.

10) There are three main types of drawings:

- Habit "sketches": these drawings are used to illustrate an entire organism and shows all the basic features that can be seen when looking at the organism in its entirety. (e.g. Figure 1 and 2)
- Low plan drawings: these drawings show the basic plan of sections of specimens. For example, you may want to examine the cross section or longitudinal section of a dicotyledonous stem. There are several cells seen in a cross section of a stem, and these cells are grouped into tissue types (e.g. epidermis, pith, xylem, phloem). A low plan drawing shows the position of the tissue types, without showing the cells. (e.g. Figure 3) Cell types are illustrated in a high power diagram.
- High power detailed drawings: these drawings are used to show detailed cells within a section of a specimen (e.g. cells within the vascular bundle of a stem section) (e.g. Figures 4). These drawings can also be used to show the details of microscopic or unicellular organisms (e.g. Amoeba (a protozoan), Chlamydomonas (a unicellular algae)). (e.g. Figures 5 and 6).

When doing scientific drawings, use the following checklist to make sure your drawings have all the required components:

- Two drawings per page
- Drawing title
- Magnification
- Labels and annotations
- Scale bar
- No shading, only stippling (dotting)
- No sketchy lines, only single lines
- All scientific names underlined
- All drawing neat and clean

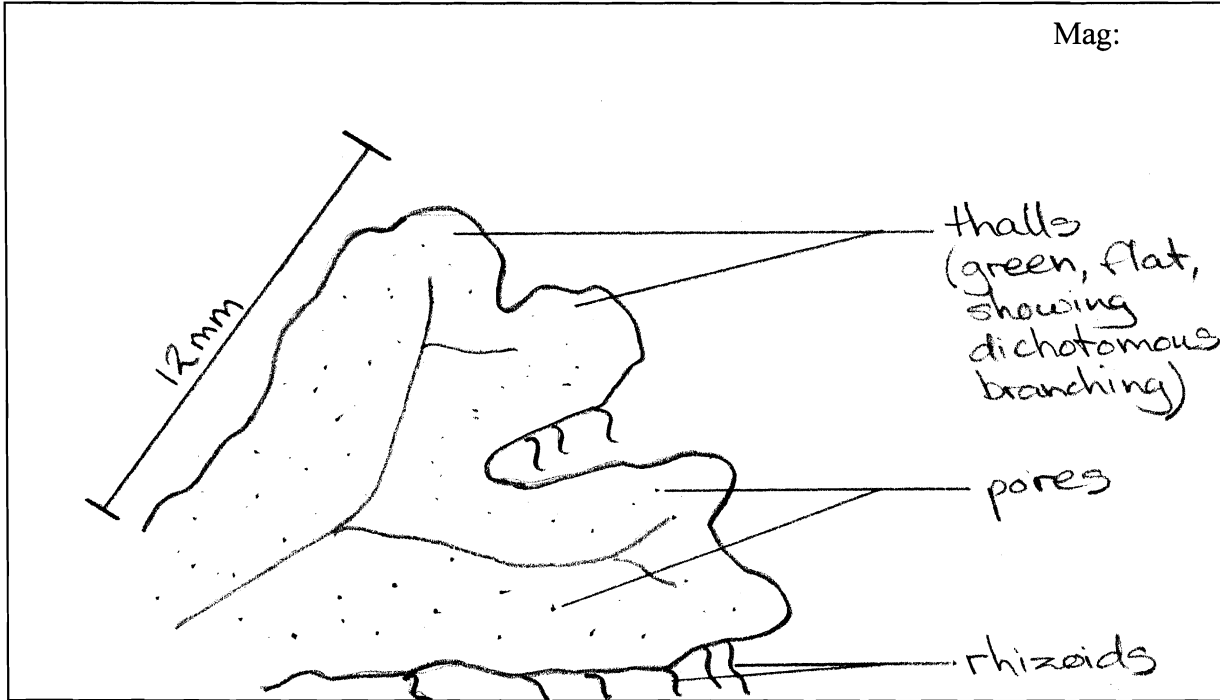
**EXAMPLES OF SCIENTIFIC DRAWINGS**

Kingdom: Plantae  
Order:

Phylum: Hepaticophyta Class:  
Genus: Marchantia Species:

(Figure 1)

Title: Habit sketch of Marchantia thallus

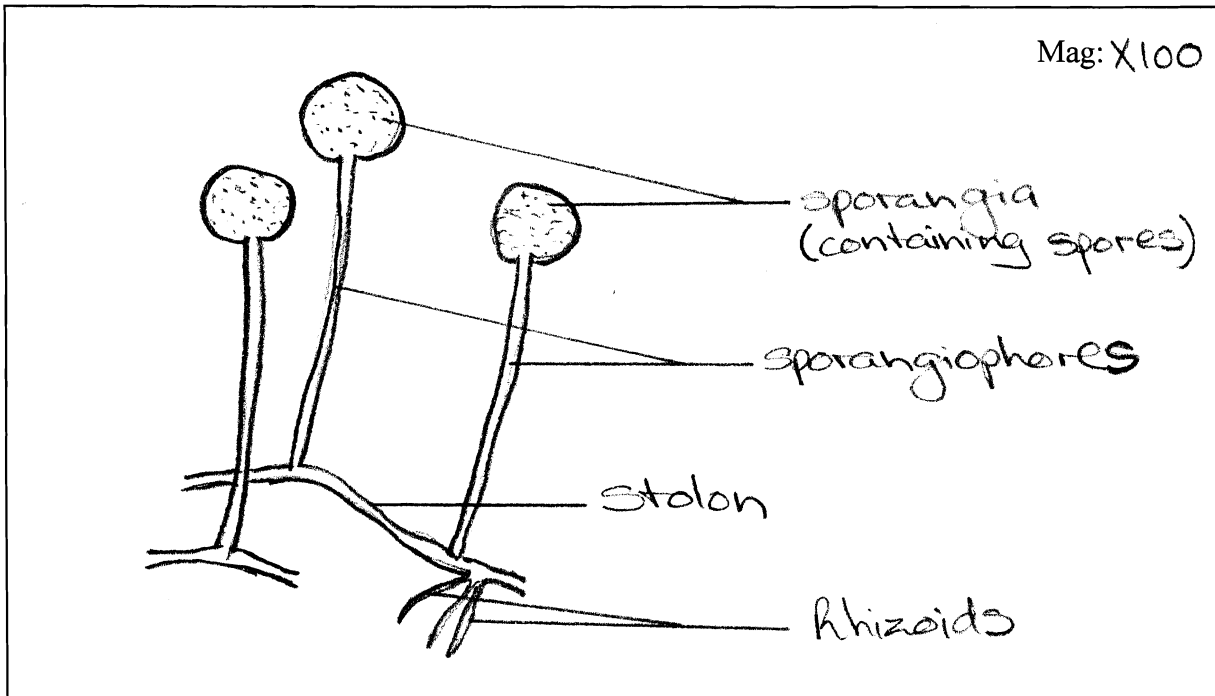


Kingdom: Fungi  
Order:

Phylum: Zygomycota Class:  
Genus: Rhizopus Species:

(Figure 2)

Title: Habit sketch of Rhizopus



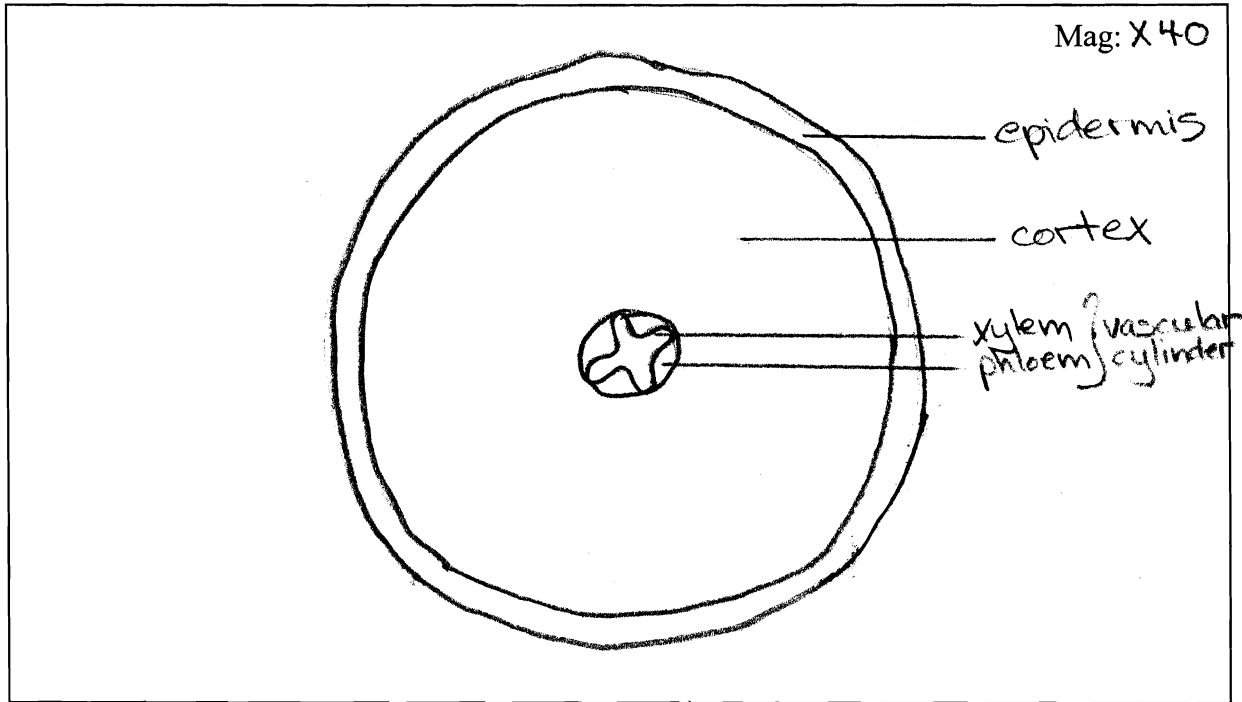
## EXAMPLES OF SCIENTIFIC DRAWINGS

Kingdom: Plantae  
Order:

Phylum: Anthophyta Class:  
Genus: Ranunculus Species:

(Figure 3)

Title: Plan drawing of Ranunculus root cross section

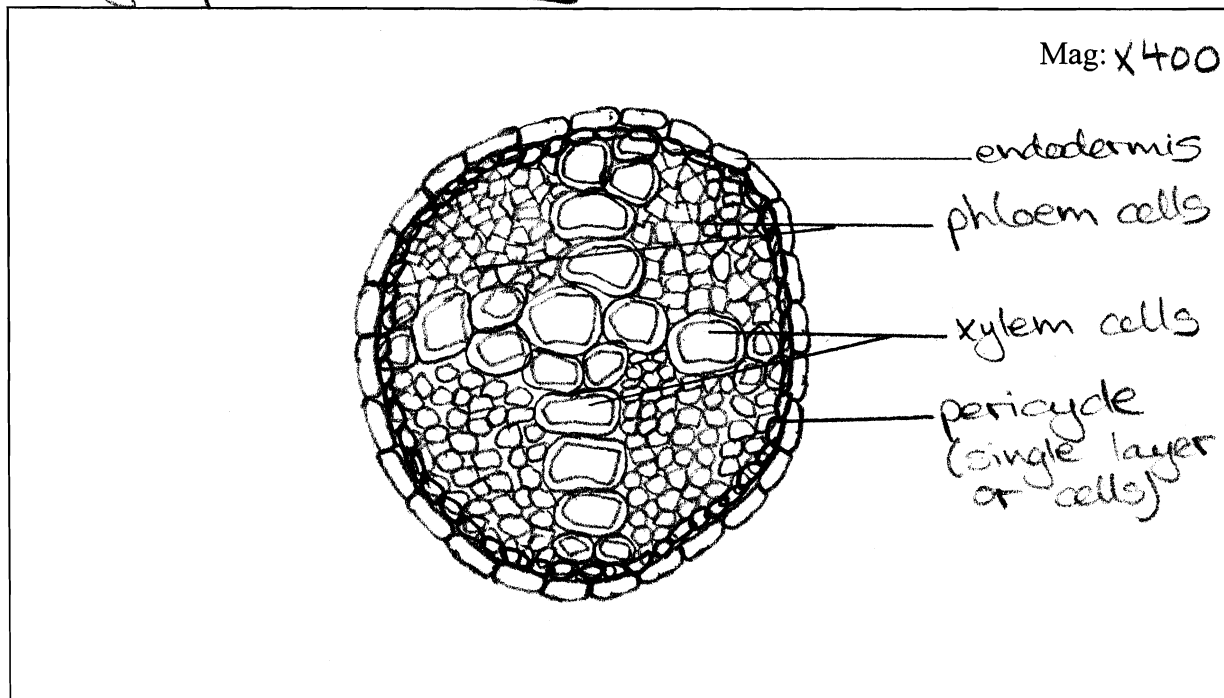


Kingdom: Plantae  
Order:

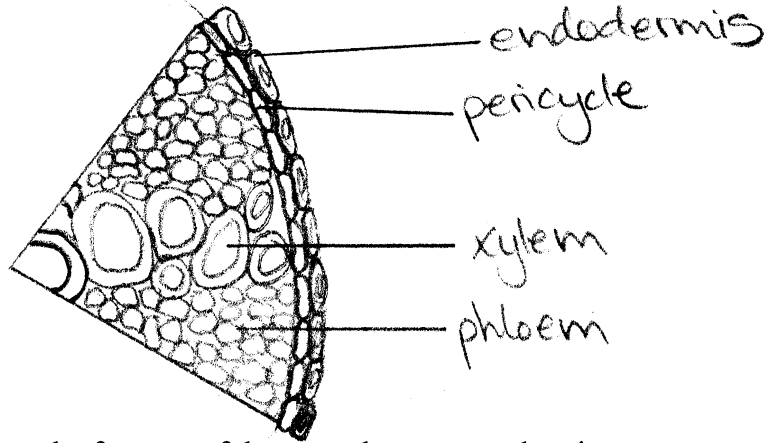
Phylum: Anthophyta Class:  
Genus: Ranunculus Species:

(Figure 4)

Title: High power drawing of Ranunculus root vascular cylinder



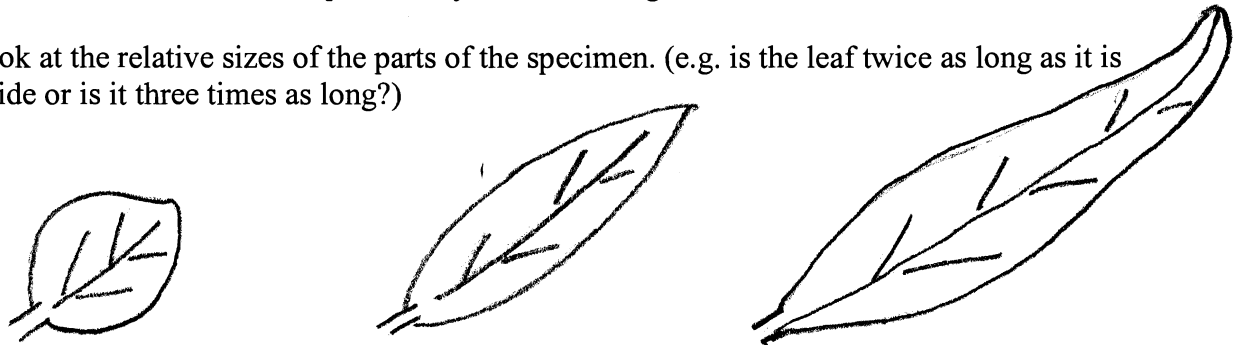
11) If there are a lot of cells in the high power view of the specimen, you can draw one section of the specimen as a representative of the entire specimen:



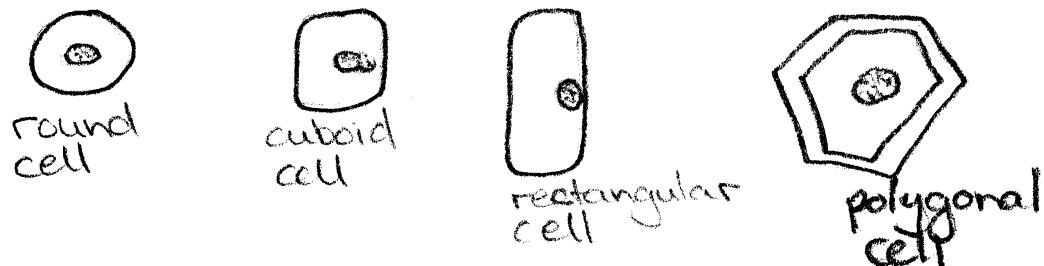
Mag: X400

12) Pay attention to the features of the parts that you are drawing:

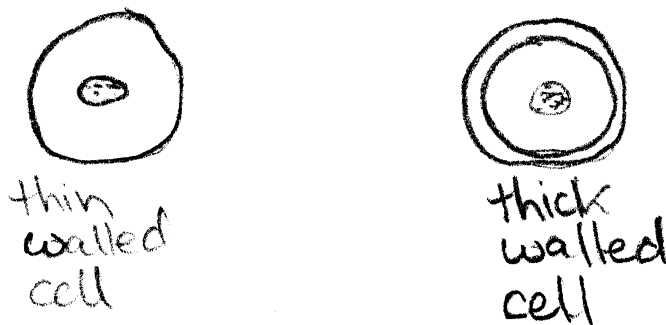
- look at the relative sizes of the parts of the specimen. (e.g. is the leaf twice as long as it is wide or is it three times as long?)



- Look at the shapes of the parts. (e.g. is the leaf more oval or more elongated? Are the cells rounded or cuboid or rectangular in shape?)



- Look at the thickness of cell walls. Thin walled cells are to be drawn with a single line. A double line is used to show a thicker cell wall.



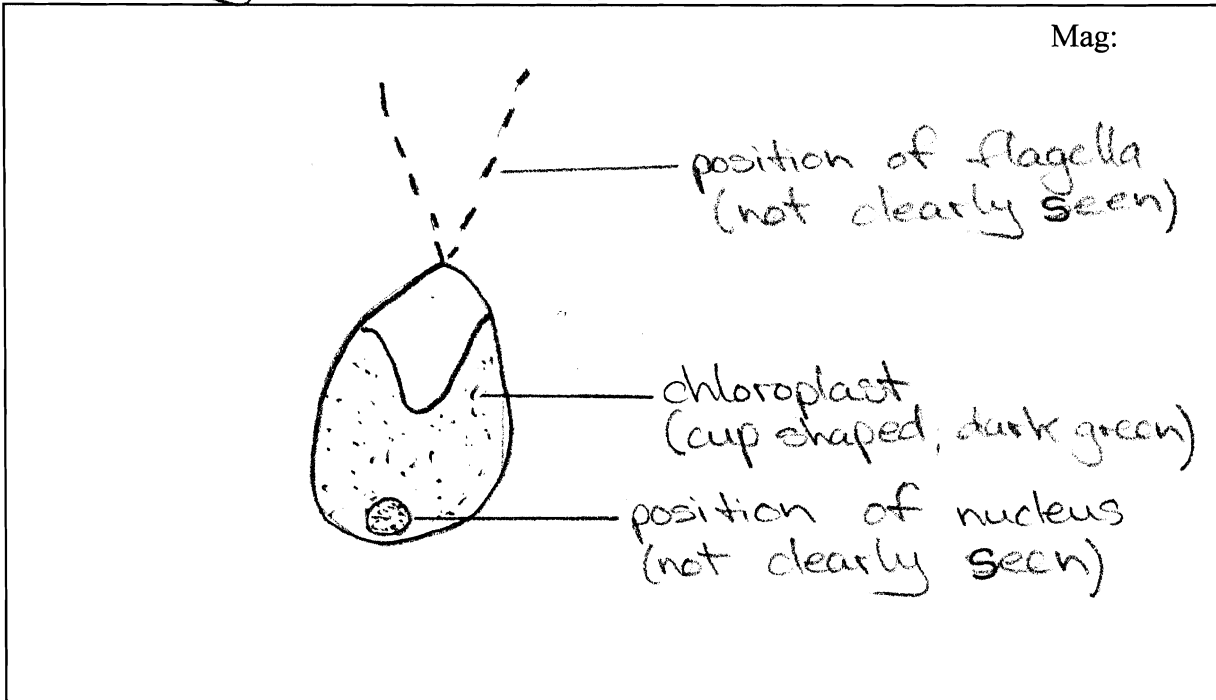
EXAMPLES OF SCIENTIFIC DRAWINGS

Kingdom: Protista  
Order:

Phylum: Chlorophyta Class:  
Genus: Chlamydomonas Species:

(Figure 5)

Title: Drawing of Chlamydomonas cell



Kingdom: Protista  
Order:

Phylum: Rhizopoda Class:  
Genus: Amoeba Species: proteus

(Figure 6)

Title: Drawing of Amoeba proteus

