Chapter 6: Cells

Skills Lab 6.1: Drawing cells

Experiment worksheet answers (pages 96–97 and 196)

Questions

1 Which cells, in your opinion, were the most unusual?

Student answers will vary.

2 Which cells had very obvious walls around them?

Plant cells have the most obvious cell walls. Animal cells do not have cell walls.

3 Which cells were the smallest?

Bacteria cells are the smallest.

4 Which cells were the largest?

Plant cells are usually the largest.

5 How did your view through the microscope compare with the images of the cells in Figure 6.17?

Student answers will vary.

6 Describe some of the difficulties of drawing cells seen through a microscope.

Student answers will vary.

Skills Lab 6.2: Getting to know your microscope

Experiment worksheet answers (pages 98–99 and 197)

Questions

1 Describe what the newspaper letter looks like through the microscope. What does this mean for all things you see through this type of microscope?

The image of the newspaper will be upside down, meaning that anything viewed through this microscope will be the opposite to what is seen without the microscope.

2 What features could you see on the tissue paper and sticky tape that you could not see with the naked eye?

Student answers will vary. However, students should be able to see the detail such as fibres and glue.

3 Use a series of cause-and-effect graphic organisers, similar to that shown in Table 9.13, to record the results of your experiment when you moved the slide in different ways. For example, the cause link may be ‘move the slide to the left’. Then write what happened in the effect link.

Student answers will vary. However, students should communicate that anything that is done actually occurs in the opposite way. For example, an organism moving to the right is actually moving to the left of the slide.

Challenge 6.3: Comparing the size of cells and their parts

Experiment worksheet answers (pages 100–103 and 198)

Discussion

PART A

1 Using a scale of 1 cm : 1 µm, draw a series of circles to represent the average size of various cells and microbes according to the measurements given in Table 9.14.

Student diagrams should convert measurements as per Table 9.14.

2 Rank the cells and microbes from smallest to largest.

Staphylococcus bacterium, Escherichia coli bacterium, human red blood cell, human white blood cell, human cheek cell, epidermal plant cell

PART B

1 Use the measurements given in Table 9.15 to add a chloroplast and a mitochondrion (singular) to your set of diagrams

Student diagrams should convert measurements as per Table 9.15.

2 Which of the cell organelles in Table 9.15 are not visible under the light microscope?

mitochondrion.

3 Viruses are much smaller than bacterial cells. For example, the influenza virus, which causes the flu, is 0.1µm in diameter. Add the influenza virus to your diagrams.

Student diagrams should be very small (1 mm based on conversion 1 cm : 1 µm).

Experiment 6.3A: Looking at organelles

Experiment worksheet answers (pages 100–103 and 199)

Discussion

1 How does the use of a stain change the image of the onion cells?

Staining helps identify the structures of the cell.

2 Both types of cells viewed are from plants. Suggest why there are differences between each of the cell types. (Hint: Consider which part of the plant the cells come from.)

Different cells have different jobs and, therefore, have slightly different structures to enable them to perform their jobs.

3 It is often difficult to identify the nucleus in the Hydrilla verticillata cells. Can you suggest why?

It is often difficult to see the nucleus in Hydrilla cells because chloroplasts may ‘mask’ the nucleus from view. Additionally, Hydrilla nuclei tend to be located near the edges of the cell and often blend in with either the cell membrane or cell wall.

4 The Hydrilla verticillata cells contain another structure that is very prominent. What could be the role of this structure within the cell?

Chloroplasts are a prominent structure in Hydrilla a cells. This structure is responsible for photosynthesis.

5 Can you suggest why it is not necessary to stain the Hydrilla verticillata cells?

It is not necessary to stain Hydrilla cells because the structures are large and chloroplasts are coloured and easy to see.

Conclusion

What do you know about the organelles in onion cells and Hydrilla verticillata cells?

Student answers will vary. However, students should note that both Hydrilla and onion cells are plant cells, so will be similar. Some organelles will differ due to the specialised functions they are required to undertake.

Experiment 6.3B: Measuring cells

Experiment worksheet answers (pages 100–103 and 200)

Discussion

Does your ranking match Table 9.14 from Challenge 6.3?

The students’ ranking should be similar to that of Table 9.14 from Challenge 6.3.

Conclusion

What do you know about the relative sizes of plant and animal cells?

Student answers will vary. However, students should understand that the sizes of plant and animal cells differ depending on their functions.

Challenge 6.4: Classifying using cells

Experiment worksheet answers (pages 104–105 and 200)

There are no questions for this experiment.

Experiment 6.4: Plant and animal cells

Experiment worksheet answers (pages 104–105 and 201)

Discussion

1 What is the purpose of staining the onion skin cells?

Staining allows some features (such as organelles) of a cell to be seen more clearly.

2 What kind of living thing did the onion skin come from?

a plant

3 Compare the two sketches you have prepared with the images of plant and animal cells in Figure 6.17. List any differences and similarities.

Student answers will vary.

4 Use the Venn diagram in Figure 9.51 to show how plant and animal cells are similar and how they are different.

Features only found in animal cells: All features found in animal cells are also found in plant cells.

Features only found in plant cells: cell wall, chloroplast, vacuole

Features found in both plant and animal cells: cytoplasm, nucleus, membrane

Conclusion

What do you know about plant and animal cells?

Both plant and animal cells contain cell membrane, cytoplasm and nucleus.

Plant cells also have cell wall, vacuoles and chloroplasts.

Experiment 6.5: Microbes all around

Experiment worksheet answers (pages 106–107 and 202)

Discussion

1 Describe the growth on your sample plates after the incubation period. A labelled diagram may assist your description. Did you observe the growth of both bacteria and fungi? What were some of the differences between them?

Student answers will vary depending on locations swabbed.

2 If your sample plate showed evidence of bacterial growth, do you think that there was more than one type of bacteria present? Justify your response.

Student answers will vary. However, any answer is acceptable as long as the student justifies the answer. If there is more than one type of bacteria present, these should look different on the agar plate. There shouldn’t actually be much, if any, bacterial growth on the control plate.

3 Was your detergent effective in controlling bacterial growth?

Student answers will vary.

4 Suggest why there may be some differences between the growth on your plates and those of other students.

Growth on the plates may differ between students for many reasons, including location of swab, how well the area was swabbed, the transfer of the swab onto the agar, and the sterility of the agar plate and swab prior to exposure.

5 Explain why it is important that both the swab and the plate are sterile and are only exposed to the environment for a short period while collecting the sample.

Both the agar plate and swab need to be sterile prior to exposure to the environment to ensure that the results are reliable. If both are not sterile, there may be contamination and, therefore, unreliable results.

6 If the negative control plate was sterilised appropriately prior to the beginning of this activity and then incubated alongside the sample plate, it should have shown no bacterial or fungal growth. Explain the purpose of the negative control plate.

The control plate is used to compare growth with that on the exposed plates. This enables us to determine whether the growth on the exposed plates is a result of the environment or not. It also provides a way to identify what types of microbes are present in different environments.

Conclusion

What do your results conclude about the effectiveness of your detergent?

Student results will vary.

Challenge 6.6: Microbes all around

Experiment worksheet answers (pages 106–107 and 203)

Discussion

Student answers will vary.