



Pond water organisms and malaria

Developed by: Mike Sherlock

Subject: Science

Grade level: Grade 8

Brief overview

Students will make the connection between the pond water organisms that they can observe under the microscope and the malaria plasmodium, which is also a single-celled organism. They will then engage in co-operative and critical thinking activities to develop an action and future oriented plan.

Themes

- basic human needs
- combatting HIV/AIDS, malaria, and other diseases.

Time required

- three 80-minute classes.

List of required materials and/or equipment

- pond water sample
- microscopes
- slides and slide covers
- droppers
- computers with access to the internet
- chart paper
- student supplies
- text: Lionel Sandner, et al. *BC Science 8*. Toronto: McGraw-Hill Ryerson, 2006. (optional).

Procedure

Lesson one

1. If you have the *BC Science 8* text available, have students complete the “Find out activity 12: Observing organisms in pond water” and “Conduct an investigation, 1–3: Focusing on the microscopic world.”

2. If you do not have this text available, have students make a wet mount slide from a pond water sample and view it under the microscope. Have students draw a plant (green) and an animal cell (motile). If you can get amoeba or paramecium samples, these will do as well.
3. Have students complete scientific drawings of the organisms that they observe. See assessment strategies for criteria. Students will be able to easily draw the plant cells that they observe but will have difficulty with any animal cells as they will be mobile and too small to observe in detail. This will draw their attention to the problems faced when dealing with parasitic protozoa and help them understand the scale in relation to the mosquito, the plasmodium, and the red blood cells that they infect.

Lesson two

1. Divide the class into small [co-operative learning](#) groups and ask groups to decide upon [group roles](#) for each of their members (i.e. facilitator, recorder, reporter, encourager, or clarifier). Review the responsibilities associated with each group role (i.e. **facilitators** to ensure that all group members participate and that the activity is completed in the allotted time; **recorders** to record highlights of the group discussion on posters; **reporters** to report highlights of the group discussion to the class as a whole; and **clarifiers** to ensure that common understandings are shared by all group members).
2. Assign one of the following research topics to each small group. Groups are to research their topics on the internet.
 - a. **The life cycle of the anopheline mosquito.** (Search: The life cycle of the mosquito). Students can present their findings in poster format showing the adult (female only) stage, egg rafts, and larvae and pupae stages with accompanying descriptive text. Ensure that students do not become confused by the fact that these organisms also develop in pond water, but are much bigger than the plasmodium protozoan. They may wish to include the sizes in millimeters of each stage to avoid any confusion.
 - b. **The life cycle of the malaria Plasmodium.** (Search: malaria Plasmodium, or go to www.netdoctor.co.uk/conditions/infections/a5686/the-life-cycle-of-the-malarial-parasite/ and for an excellent animated presentation, go to www.sumanasinc.com/scienceinfocus/sif_malaria.html. The malaria parasite life cycle contains a lot of technical scientific language and students should focus primarily on the illustrations of the stages and present these in poster format. Students can research an extension to show the relative sizes of the Plasmodium compared to the size of the adult female mosquito. Students should also include some of their microscope drawings from lesson one as part of the poster to reinforce the connection between the protozoa they observed and the malaria Plasmodium.
 - c. **The distribution of malaria worldwide.** Use a poster presentation format showing a world map and the countries where malaria is prevalent. The poster should also list the social and economic conditions generally associated with malaria victims and the impact of the demographic, economic, and political pressures on them. Emphasis should be placed on issues of inadequate sanitation and health care.

d. **The effects of malaria on the human host.**

Relevant headings:

- What is malaria?
- What causes malaria, how can you catch malaria?
- What are the symptoms of the disease?
- What are the characteristics of a malaria attack?
- Prevention of malaria (the ABCD)

Present as a poster format. One good source to use is:

[www.netdoctor.co.uk/search/malaria?f__content_type=.](http://www.netdoctor.co.uk/search/malaria?f__content_type=)

Lesson three

1. Put all the posters from lesson two on the classroom walls with the students' pond organism drawings next to them.
2. If you have the *BC Science 8* text available, have students access page 484 or the 2007 IRP process skill on the *Processes of Societal Decision Making*. Students should work in groups and use the page 484 model with all the poster information to answer the questions below.

If you do not have the text, use the following headings:

- identify the issue
- gather relevant information
- identify all the alternatives
- weigh each alternative by clarifying its consequences
- make a decision
- evaluate the decision
- then **either**
 - the decision is the best alternative based on the risks/benefits and probable consequences, so take action/communicate the decision, **or**
 - one or more steps in the decision-making process were faulty; take no action until the faulty process is identified and repeat the process from that point to evaluate the decision again.

Questions

1. What steps should be taken to reduce and prevent malaria in the countries where it exists? What is preventing these steps from being taken? What should the future look like in these countries?
2. What steps should Canada take to help the people in these countries to reduce and prevent malaria? What steps is Canada taking? What would the future look like for the victims of malaria if these steps were taken?

3. What can individuals like us do to help reduce and prevent malaria in these countries?
Develop a class action plan that all students can participate in. This may be fundraising for the purchase of mosquito nets. See www.FreedomFromHunger.org.

Assessment strategies

The four-point criteria assessment rubric provided (see appendix) can be communicated to students prior to the first lesson. Students can evaluate their own work using the rubric and correct their final copies before submission to the teacher.

Extension

1. Observe prepared slides of red blood cells.
2. Follow up the class discussion with an action plan to purchase mosquito nets for a malaria affected country.

Appendix

1. Assessment rubric

	Incomplete	Developing	Capable	Excellent
Using a microscope rubric	Can name the parts of the microscope and demonstrate two functions of these parts.	As for incomplete, plus can demonstrate the function of three or four parts including proper placement of a slide on the stage.	As for developing, plus can make a wet mount slide and focus the microscope at low power.	As for capable, plus the wet mount slide has only a few very small bubbles and can focus at medium power.
Scientific drawing rubric	Can draw clear, uncluttered line drawings.	As for incomplete, plus drawings are clear representations of the real object.	As for developing, plus parts of the representations are labeled (i.e., cell wall, chlorophyll, cell membrane).	As for capable, plus can use labels to distinguish between plant and animal cells.
Scientific literacy and societal decision-making rubric	Can identify the main points in science articles (5 WH).	As for incomplete, plus can identify (match) examples of science and technology with their effect on individuals, society and their environment.	As for developing, plus demonstrates awareness of assumptions (own and author's) when making scientific and social decisions. Demonstrates respect for precision.	As for capable, plus uses criteria for evaluating evidence and sources that include ethical, responsible and co-operative behaviours.