

Instructional Scenario

Identifying Cell Types and Functions Using a Microscope



Course/Duty Area: Biological Applications in Agriculture/Understanding Cell Structure and Functions

Scenario:

Your teacher has created an assignment for the veterinary science class on microscopy. She has tasked your class with creating cell models to display in class so that the veterinary science students can practice differentiating between animal, plant, fungal, and bacterial cells. You will prepare slides using microorganisms purchased through an established biological/scientific supply company. Students are required to receive instruction and training on aseptic techniques prior to handling any microorganisms and preparing the slides.

Big Question:

What differentiates cells when viewed under a microscope?

Focused Questions:

- What microscope skills are necessary for proper viewing?
- What types of models will be most appropriate for each cell?
- How can one distinguish between the different cell types?
- Why are stains used in microscopy?
- What are the steps for preparing a wet mount and dry mount slide? What determines which method to use?
- What cell types are veterinary science students likely to focus on? Why?
- What types of slides do veterinarians prepare, and for what purpose?

Student Project or Outcome:

Cell models that distinguish between cell types will be displayed in the classroom.

Microorganisms and Biotechnology

The 2018 Science Standards do not require students to use microorganisms in the classroom. If microorganisms are used, be sure that the teachers and students are trained in aseptic technique. Microorganisms should be purchased through a scientific supply company.

The primary hazards of working with microorganisms include the contraction of an infectious disease, the infection of an open wound, and unknown microbes in cultures. To avoid this potential hazard, use only cultures that are obtained through an established biological supply company.

Control procedures are necessary to minimize the potential hazards. These control procedures include the following:

- Only sterile equipment should be used, and all equipment and work surfaces should be properly cleaned and disinfected.
- Microorganisms need to be appropriately handled to ensure that they are not released into the environment as aerosols.
- Unsealed but covered containers should be disinfected by autoclave for 0.5 hours at 15 lbs. of pressure or soaked in bleach by flooding with 10 percent bleach for 0.5 hours.

- Mouth pipetting is prohibited.
- Cultures of pathogenic microorganisms are prohibited. This includes cultures obtained from soil, mouth, plants, or other local environmental sources.
- All agents need to be treated as if they are pathogens.

Students need instruction on appropriate procedures and must always be supervised to ensure proper control of cultures. Students and instructors should also never have anything in their mouth while working with bacterial and viral cultures and should wash their hands thoroughly before and after conducting laboratory work. Local, state, and federal regulations should be consulted regarding the safe disposal of cultures.

Blood and Other Body Fluids

The use of human body fluids or tissues is generally prohibited for classroom laboratory activities. See OSHA Standard 1910.1030 for detailed explanation of the dangers and precautions involving body fluids.

Field Study

Safety is important in more than the classroom, and it extends to work out in the field. Injuries may result from impact, cuts and punctures, poisoning, and allergic reactions. Instructors should conduct a survey of the area before the field study. The survey should include:

- conditions that may cause students to fall (steep terrain, slippery or unstable rocks),
- unstable objects overhead, which may fall onto students,
- animal burrows or holes into which students could step,
- footbridges or other elevated crossings that may collapse under student weight,
- deep water or streams with currents strong enough to sweep a student off balance,
- animals capable of attacking and injuring students, including poisonous, venomous and infected animals, insects, or arachnids,
- allergenic and poisonous plants, and
- vehicle traffic.

Precautionary measures include:

- mapping the safest passage through the study area,
- confirming that all students are physically capable of participating in the field study (heart condition, severe allergenic reactions, and ambulation difficulties must be considered),
- obtaining permission from parents for children to be involved in studies off the school grounds,
- avoiding areas which have been sprayed with herbicides or pesticides, and
- using school board approved means of transportation.

Students should be instructed in:

- safe methods of personal and equipment transport over the study area,
- recognition and avoidance of poisonous plants and animals,
- the use of appropriate foot gear and other clothing,
- safe methods of working in deep or turbulent bodies of water, including the wearing of life jackets, and
- the proper use of equipment, including the wearing of eye protective devices.

Students must always be supervised by an adult, whether in a classroom, laboratory, or field setting.

Scenario submitted by Renee Hypes, Gloucester High School, Gloucester County Public School