LESSON 5 What Is The Work Of The Blood? ==========

Objectives

When students have completed this lesson, they will be able to:
- describe the makeup and function of the blood plasma and each type of blood cell;
- recognize the shapes of red blood cells and white blood cells;
- explain the role of the plasma and the blood platelets in clot formation.

Exploring Science / Historical Steps

A "unit" of dried plasma is enough to make a pint of reconstituted liquid plasma. During World War II, thanks to Dr. Drew, transfusions of blood plasma saved the lives of many wounded soldiers and citizens. You might use Dr. Drew's heroics to initiate a conversation on the degree of racism that was present at this point in history. White and black American troops were kept separate. The blood of white donors was even kept separate from the blood of black donors - something Dr. Drew spoke out against.

In peacetime, plasma is used in such emergency situations as highway accidents and fires, to which emergency medical technicians (EMTs) and paramedics may respond. Plasma is always among their supplies. It is used for the treatment of shock, which often results from serious wounds.

The answer to the inference question is: Water and (simple) sugar are supplied by the fruit juice and candy. From the previous lessons, students should reason that the blood absorbs these and other digested nutrients from the intestines. Discussion around this question provides a link between the study of foods in Unit 3, the study of digestion in the first part of Unit 4, and the study of the blood and circulation that starts with this lesson.

The Work of the Blood

Encourage students to share whether they have had their blood tested. Ask if blood was drawn only from a pricked finger, or did the health worker also take blood from a vein in the arm? If blood was drawn only from a finger, it was probably used to determine blood type and, perhaps, to determine whether there were too many white blood cells (compared to the number of red blood cells). An elevated white count is a sign of infection somewhere in the body. If blood was drawn from a vein, then tests of its chemical makeup were probably performed, and the blood may have been separated into liquid and solid parts, as shown in the illustration. It would be helpful to clarify that, in a centrifuge, the test tubes are positioned at an angle (with the bottom further from the center) - forcing heavier parts to move to the bottom.

You may also wish to discuss how all medical caregivers know that using sterile equipment is imperative in preventing the spread of diseases.

Blood clotting is a complex process in which both plasma chemicals and the platelets play a role. If blood is lacking in a certain protein, as in the hereditary condition called hemophilia, death can result from a small wound (because clotting cannot occur). Fortunately, hemophiliacs can combat this condition by taking shots of the missing protein. (Hemophilia will be studied in Unit 9, Lesson 7 "What Are Genetic Disorders?").

Students should know from their experience with small cuts and scrapes that, in time, a scab drops off. Ask what was happening during that time. (The broken skin and other tissues were healing themselves. After that, the scab was no longer needed to prevent the loss of blood).

Be sure that students are clear on the difference between the left and right rectangles displayed in the diffusion diagrams. The concept of diffusion could be elaborated upon by simply opening a bottle of perfume at one end of the classroom, and having students raise their hands as they begin to smell it. Ensure that students grasp that diffusion continues even after a balance has been reached. As mentioned in the final sentence of this lesson, the concept of diffusion is key to students' appreciation of the next lesson.

Review

Please note: I have not made the answers available online, on the small chance that a student might discover them. Of course, the answers to these questions will be included in the version of the Teacher's Guide provided to teachers who purchase the book.

Reinforce / Enrich

The video below provides a concise, clearly illustrated description of diffusion. This is followed (from the 2:09 to the 2:22 mark) by a 13-second mention of facilitated diffusion via carrier proteins - material that a teacher might want to skip. The remaining 3 minutes cover osmosis, but in a more simplistic manner that avoids mentioning solutes.

- Transport in Cells / Diffusion and Osmosis / Cells / Biology / FuseSchool [3:51]

The video below provides a more detailed description of diffusion, including a good explanation of net movement during diffusion and some of the key factors that affect the rate of diffusion.

- Amoeba Sisters - Diffusion [7:20]

The video below provides a more detailed explanation of osmosis - including the terms solute, hypotonic and hypertonic.

- Amoeba Sisters - Osmosis and water potential (Updated) [9:34]