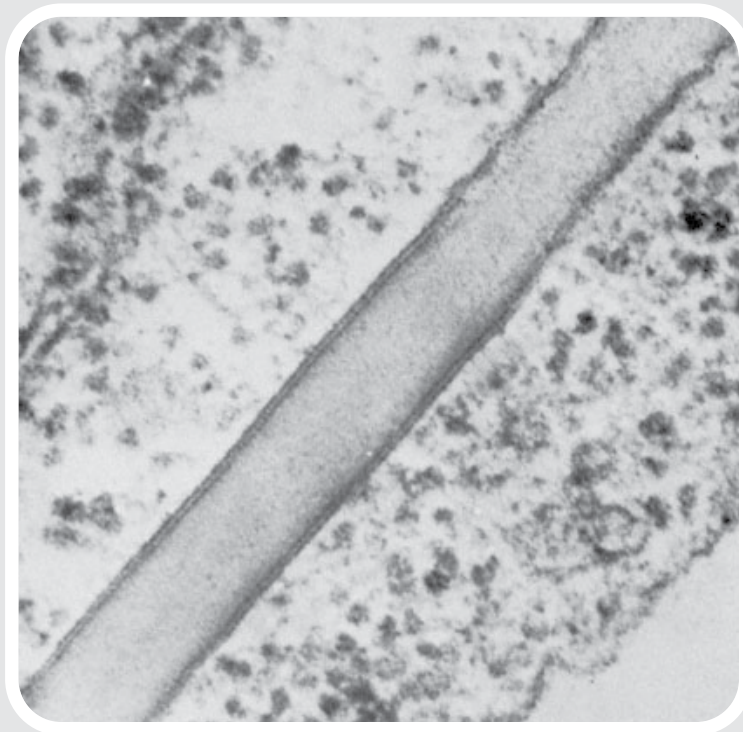


Diffusion Through a Membrane



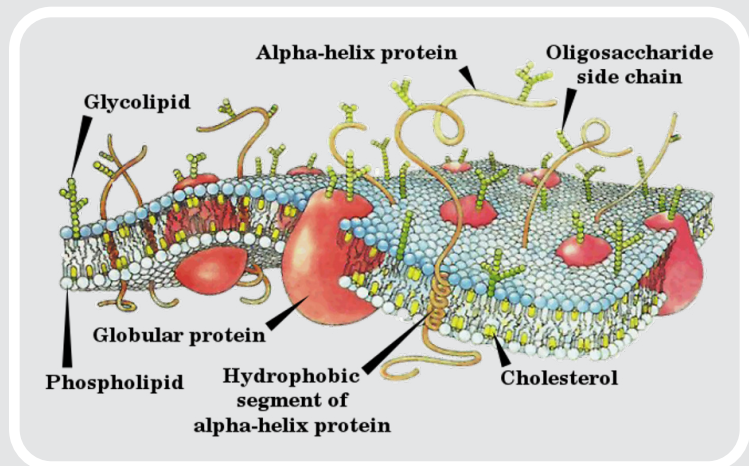
Diffusion Through a Membrane

Do you need an idea for a scientific study?

Try out one of our ideas or make one of your own.

Diffusion is a type of passive transport driven by a concentration gradient. Take the following brief quiz to see how much you already know about diffusion. See the bottom of page 4 to check your answers.

- Which gland in the human body causes bones to release calcium that diffuses into the bloodstream to enhance nerve signal propagation and muscle movement?
 - pineal
 - thymus
 - thyroid
 - hypothalamus
- When a helium balloon goes flat, this is caused by helium gas diffusing through the walls of the balloon.
 - True
 - False
- Who is credited with quantifying the behavior of atoms and molecules in the process known as diffusion?
 - Thomas Edison
 - Thomas Graham
 - Archimedes
 - Thomas Smith
- Who is credited with “discovering” that cells have thin membranes that surround the cell?
 - Robert Hooke
 - Zacharias Janssen
 - Rene Laennec
 - Galileo
- Who is credited with “discovering” that cell membranes are semipermeable and let some substances pass through the membrane while others are restricted from passing?
 - Anton van Leeuwenhoek
 - Tomas Smith
 - Justin Time
 - Moritz Traube



Credit: William Crohot

Pass on Through

Natural sausage casing is made from the intestines of cows, sheep, or pigs. Artificial casing is made from collagen, cellulose, and plastic. Based on these facts, natural casings can be eaten while artificial casings are inedible. In this investigation, you'll experiment to identify properties of different casings. Get started now.

Materials

1 – 15-cm length of sausage casing
red food coloring
string

1 – latex balloon
2 large water containers
water supply

Procedure

1. Make sure to have permission before conducting this investigation.
2. Tie one end of the sausage casing with a piece of string to secure that end.
3. Fill the sausage casing about $\frac{3}{4}$ with water.
4. Place two drops of red food coloring in the sausage casing.
5. Tie the open end of the sausage casing with a piece of string to secure that end. Make sure the casing does not leak.
6. Fill the latex balloon about $\frac{3}{4}$ with water.
7. Place two drops of red food coloring in the balloon.
8. Tie the open end of the balloon with a piece of string to secure that end. Make sure the balloon does not leak.
9. Fill each of the water containers with enough tap water to cover either the sausage casing or balloon.
10. Place the sausage casing in one water container and the latex balloon in the other container.
11. After about one hour, observe and record in Table 1 the appearance of the water in each container. Look for the presence of red food coloring in the water.

Table 1. Appearance of Water in the Container

Container	Observations
Sausage Casing	
Latex Balloon	

Questions

1. Construct an explanation for the results of this investigation.
2. Describe if and how the results of this investigation would have changed if hot water was used in the water containers instead of tap water.

Diffusion Through a Membrane

A Shortened Intestine?

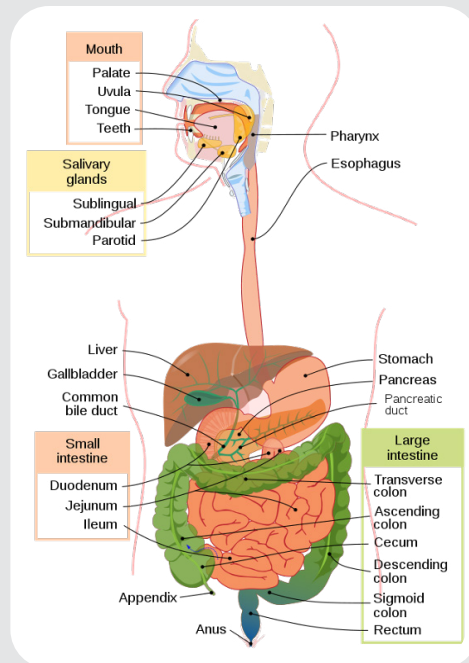
Crohn's disease causes inflammation of the digestive tract. This can lead to pain, severe diarrhea, weight loss, fatigue, and a host of other issues. For some people, medications can effectively slow down the progress of the disease. However, the disease currently has no cures. In some cases, surgery is required to remove the inflamed portion of the digestive tract to ease the pain, discomfort, and other issues experienced by the person.

The lower portion of the human digestive system consists of the following organs: liver, gall bladder, stomach, pancreas, small intestine, and the colon. The image below shows the major parts of the system. Crohn's disease most commonly affects the final part of the small intestine called the ileum and parts of the colon.

The main function of the small intestine is to absorb nutrients digested by the stomach. The first section of the small intestine takes in semi-digested food from the stomach and combines this with chemicals from the gall bladder, liver, and pancreas to further break down the food. The final section of the small intestine absorbs most of the nutrients removed from the food through the semipermeable membrane that make up the impressive 250 square meters of surface area present in the organ. By the time the digestive juices reach the colon, most all the nutrients have been absorbed.

The colon takes the remaining water and salts left over from the digestive process and absorbs these substances before passing the waste materials out of the body. The colon also is home to a variety of beneficial bacteria that feed on the juices and produce vitamins needed by the body. These vitamins are also absorbed by the colon.

The need to find a cure or more effective treatments of Crohn's disease remains at the top of many researcher's list of critical needs. The first step is to find the actual cause of the disease. For many years diet and stress were suspected, but currently these factors are associated with the disease, but are not seen as being causal. More research is needed to fight this immune system disorder.



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Answers: Page 2 Answers: 1) c, 2) a, 3) b, 4) a, 5) d. Page 3 Answers: Pass on Through 1) The sausage casing is semipermeable, while the latex balloon is impermeable to the red food coloring. 2) Answers will vary. Might include the food coloring would diffuse faster using the hot water system since the particles are moving faster in the hot water than in the tap water.

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