

GROSSOLOGY

Second Grade



OBJECTIVES: (Lab Time 35 to 40 Minutes)

Students will:

1. Understand that our bodies use many methods to protect us
2. Understand that these methods often involve what we consider to be gross substances
3. Understand why eye gunk forms and how it protects us
4. Understand how ear wax protects us
5. Understand why scabs are critical to our lives
6. Understand the formation and protective functions of snot and boogers
7. Understand the formation and protective functions of drool and spit
8. Understand why burps and farts occur
9. Understand how vomiting occurs and why it serves a useful purpose
10. Understand why we sweat

MATERIALS:

This is based on 5 groups of 5-6 students per class and 5 classes, and thus a total of 25 groups (125-130 students)

- 1 sandwich size baggie per group
- 5 16oz bottles of corn syrup
- 5 16 oz boxes of corn starch
- 5 green and 5 yellow food coloring bottles
- 5 bottles lemon juice (or something the kids can smell that triggers saliva production)
- 5 quart size vessels filled with water
- 25 balloons
- 5 buckets
- 5 16oz bottles vinegar
- 5 boxes of baking soda
- 5 funnels
- 5 spoons
- 150 small bathroom paper cups (3oz cups)
- 1 alcohol prep swab per child
- 1 cotton ball per child

PROCEDURE:

I. Introduction: (Full Group) – 8 Minutes

The human body can be gross. But what is the purpose of all that oozy, gushy, mushy and crusty stuff our bodies produce?

Even though things like mucus, vomit and scabs can seem gross, there's a reason why our body makes them! Mucus helps protect our bodies by trapping foreign things like dust and bacteria that might enter our noses or throats. Vomiting is a quick way to get rid of something in our digestive systems that might be harmful. Scabs prevent germs from entering a wound in our bodies and prevent too much blood loss.

Although they are helpful, we often have a natural disgust of things that may prove harmful to us. For example, we don't like the sight of someone's vomit because it is likely that it contains something that could also make us sick! It's important to know that we should treat all bodily fluids as potentially harmful, but remember that they often serve a very important purpose in keeping us healthy.

Some examples of gross body substances are eye gunk, ear wax and scabs.

Gross Fact #1: Eye Gunk

Most of us find it slightly gross to wake up in the morning only to discover gunk in the inner corners of our eyes, but did you know that this is part of an amazing system that helps to keep us healthy? No the "sandman" did not visit and the "sleepy bugs" are not bugs at all. This pasty material is actually a goopy mixture which is composed mostly of tears, but includes sweat and oils as well. When we are awake our eyelashes function like windshield wipers to remove the tears that continually wash down across our eyes from tear ducts located above our eyes. Tears serve to keep our eyes clean and moist, and contain water, salts, sugar, ammonia, urea, albumin (al- bu- min), citric acid, and bacteria-killing chemicals. When we are asleep our eyelashes no longer act as windshield wipers, and so the tears, along with sweat and oils, accumulate. Gradually a pasty gunk forms near our eyes' caruncles, which are the fleshy bumps in the inner corners of our eyes.

Gross Facts #2: Ear Wax

Ear wax, or cerumen, is part of another amazing system that helps to keep us healthy! The outer part of the ear, called the ear lobe, collects sound waves and guides them along a narrow passage, called the ear canal, into the ear. These sound waves then encounter the eardrum causing it to vibrate, and this vibration pattern is then transmitted to your brain. This is how we hear. Ear wax coats the entire ear canal all the way to the eardrum, and serves to protect our ears from harmful particles. Ear wax,

which even contains bacteria-killing chemicals, traps these harmful particles. The ear wax is produced in our ear canals in nearly 2000 special glands which make and release the sticky ear wax. Each day's newly produced ear wax pushes the older ear wax toward the outer ear. As the older ear wax moves along it dries up and forms small clumps or flakes which eventually fall out of our ears.

It is generally a bad idea to use a cotton swab to clean your ear. The risk of puncturing your eardrum or pushing the ear wax in further to create a wax plug is simply not a risk worth taking. Remember what the doctor says: "Don't put anything in your ear smaller than your elbow."

Gross Facts #3: Scabs

Most people agree that scabs are pretty gross. They are helpful though, because without them, germs could enter our bodies through cuts and scrapes and make us ill. A scab is a special cover created by our bodies to prevent germs from getting inside us while our skin reforms underneath. Also, a scab helps stop blood from continuously oozing out of our wound, so that we don't lose as much blood. So scabs actually help to keep us healthy at the site of a wound in two ways:

- They form a barrier to keep out germs
- They limit blood loss

**WE ARE NOW GOING TO WORK IN SMALL GROUPS
TO LEARN MORE ABOUT OTHER GROSS BODY SUBSTANCES**

II. Gross Facts and Activities: (Small Groups)

Gross Fact #4: Snot and Boogers – 10 Minutes

Nearly everyone would agree that snot and boogers are gross, but did you know that they are actually part of still another amazing system that helps to keep us healthy? Most of the time we breathe in air through our noses - which are designed to clean, warm, and moisten the air before it reaches our lungs. The nose cleans the air using its nasal hairs, called vibrissae, which trap harmful particles such as dirt, sand, dust, smoke, pollen, germs, and fungi. Snot, which is a combination of mucus and bacteria-killing chemicals, coats our nasal hairs and traps the harmful particles on them. Gradually, the snot is moved to the back of our throats where it is then swallowed and destroyed in our stomachs. We make a new batch of snot about every 20 minutes, and swallow about a quart of snot each day! When snot dries out before it can leave our nasal hairs for the throat, then boogers are formed. These are crusty globs of dried snot containing all of the harmful particles that were trapped by the nasal hairs. Boogers are removed when we blow our noses or sneeze (which can propel air and snot at speeds of up to 100mph!). And by the way, 70% of us admit to removing boogers by picking our noses - just throw those boogers away, wash your hands afterwards, and you're good to go!

Activity #1: Making Fake Snot (parent facilitated)

(From: <http://www.flmnh.ufl.edu/education/guides/Grossology-guide.pdf>)

Students will make pseudo snot:

1. Measure out $\frac{1}{2}$ of a 3oz paper cup of corn syrup and pour it into a baggie.
2. Measure out $\frac{1}{4}$ of a 3oz paper cup of corn starch and place it into the baggie.
3. Add 4 drops of green food coloring and 2 drops of yellow food coloring.
4. Seal the bag and knead.

Tell students that the baggies represent their noses.

What does the corn syrup represent? (*mucus/snot*)

What does the corn starch represent? (*dirt, pollen, etc*)

What does the green food coloring represent? (*bacteria and bacterial waste*)

Gross Facts #5: Spit and Drool – 5 Minutes

Spit is also known as saliva, and it is produced in three pairs of salivary glands called the parotid, the submandibular and the sublingual glands (see diagram). We produce nearly a quart of saliva each day! Saliva is mostly water (98%) with electrolytes, some antibacterial compounds such as lysozyme, mucus to make it slimy, and enzymes such as amylase which help to break down food. Saliva helps us:

- to eat by moistening each bite of food and allowing this now mushy food to be easily swallowed

- to begin digesting starches (bread, crackers, spaghetti, rice, potatoes, etc.) using the enzyme amylase
- to taste, since our taste buds (sweet, sour, salty, and bitter) sense best when the food is dissolved in saliva
- to stay healthy by using bacteria-killing chemicals to kill bacteria that may enter our mouths

Activity #2: Our Sense Of Smell's Affect On Our Salivary Glands (parent facilitated)

(From: <http://www.flmnh.ufl.edu/education/guides/Grossology-guide.pdf>; Page 102)

Students will learn how the sense of smell and the salivary glands are connected:

Set out two cups, one with a small amount of water in it and one with a small amount of lemon juice. (Make sure that you do not pour the lemon juice too far in advance; the smell should be very strong for this experiment.)

1. Have the students place their noses just above the top of the cup with water in it. (They should keep their mouths closed for best results.)
2. Have the students observe what happens within their mouths.
3. Repeat steps 1 and 2 with the cup of lemon juice.

Discuss what the students noticed about their saliva production when smelling the water and when smelling the lemon juice.

(Students will probably notice an increase in saliva production. Some students may not notice an increase.)

Did the students choose to produce more saliva (voluntarily), or did the saliva production occur beyond their control (involuntarily)?

(The students do not have control over saliva production.)

What does an increase in saliva production triggered by a smell possibly indicate?

(This possibly indicates a link between the sense of smell and the body preparing itself to eat.)

Discuss the differences between each students' experience with saliva excretion. Do the students believe everyone's body reacts the same way?

Why is saliva production important? Why do the students think that the body produces saliva when it smells food, rather than when it tastes food? Have the students ever salivated when they were not preparing to eat or smelling food?

(Saliva is the first digestive juice that food comes in contact with. In order to begin digesting as soon as possible and digest as efficiently as possible, the body prepares by triggering saliva production so that digestion can begin as soon as food enters the mouth. Some people salivate when they get very hungry.)

Gross Facts #6: Burps and Farts – 8 Minutes

What are burps and farts? Both are caused by escaping gases, but they're different kinds of gases that escape from different places.

So where do these gases come from? Some gases we swallow and some our bodies make. There is air we swallow (like when we eat or speak), gas that seeps into our intestines from our blood, gas produced by chemical reactions in our guts, and gas produced by bacteria living in our guts. All these gases have to go somewhere.

What makes a burp? Our stomach is like a balloon. When we eat or drink, we swallow air, which adds gas to our stomachs. When our stomachs digest, the digestion process creates gas as well. If the gas pressure gets too high, the air comes up our esophagi and out our mouths as a burp.

Farts, however, are the extra gases escaping through our large intestines and out through our anuses.

Did you know that most of us pass about a quart of gas a day (point out the quart container of water). We don't pass it all at once though, we actually burp or fart at least 10 to 15 times a day. Some times we don't even know we have burped or farted - it is usually when they are loud or smelly that we really notice them.

So what makes a fart smell? The smell of farts comes from gas and mercaptans (other gases) in the mixture. These compounds contain sulfur. The more sulfur-rich foods we eat, the more sulfides and mercaptans will be made by the bacteria in our guts, and the more our farts will stink. Foods like cauliflower, eggs and meat are really bad for making stinky farts. Beans, on the other hand, may make you fart a lot but they aren't usually the too smelly.

Did you know that cows burp a lot? It was only a while ago when researchers started taking an interest in this. Every year the cows in the US burp about 50 million tons of valuable gases into the atmosphere. If these gases could be caught and directed, the burps of ten average cows could keep a small house heated for a year. Those are some pretty powerful burps!

Activity#3: Making a burp (parent facilitated)

Students will simulate a burp by producing gas that is then released:

What you need (per group):

Bucket, large balloon, funnel, spoon, small paper bathroom cup, baking soda (sodium bicarbonate), vinegar

1. Hold a balloon over a bucket. The balloon represents your stomach.
2. Attach the funnel to the balloon and add about $\frac{3}{4}$ of a 3oz cup of baking soda to the balloon. This represents the food in your stomach.
3. With the funnel still in place, put $\frac{1}{2}$ of a 3oz cup of white vinegar into the balloon to represent your stomach acid. The reaction represents what happens when your stomach acids react with food to produce gas.
4. Quickly pinch the balloon neck closed with your fingers—this represents a sphincter in your esophagus. Remove the funnel quickly. The balloon stomach will fill with gas.
5. Release the sphincter to let the gas go in a belch!
(Optional extra: if the “burp” did not make a god sound, blow up the wet balloon and stretch the neck out sideways while you release the air, it makes a great screeching sound)

Gross Facts #7: Vomit – 3 Minutes

Puking is useful because it gets rid of material that our bodies think could be dangerous to us. In fact, throwing up is so potentially helpful that there is actually a part of the brain called the vomit centre or emetic center that causes it!

So why do we puke? There are several things that can cause us to puke. Food poisoning, illness, nervousness and eating too much are some reasons we may throw up. Our stomachs hold less than two ounces when they're empty but they can expand to hold a quart (point out the quart container of water) or more. If we try to fill them with more than that, our stomachs will send the food back up. Drinking too much fluid can also cause vomiting, as can the opposite, drinking too little - known as dehydration.

Vomit is half-digested, soggy food from our stomachs, slimy stomach mucus, saliva, stomach acids and other chemicals that help us digest food. The green color associated with vomit is from a chemical called bile. It's not in our stomachs - it comes from further down in our digestive systems. When we puke, mashed up food in our intestines comes up, past the stomach and out again - and it can bring bile along with it. That nasty smell can also be blamed on bile and stomach acids.

Basically what happens is when we overeat or there's something upsetting our stomach (like funky food), our body knows we have to get rid of it right away. The vomit or emetic center in our brain is triggered, which reverses the way our food goes down. The food from our stomach shoots up and out of our mouths and we vomit.

Did you know that cows barf up their last meal of grass and chew on it again? It's called chewing its cud.

Gross Facts #8: Sweat – 5 Minutes

Sweat is a great natural air conditioning system for our bodies. It contains water, salts, urea, ammonia, sugar and other chemicals and is released all over our bodies from the pores of our skin. When sweat is released it spreads across our skin. As it evaporates it causes our skin to cool and leaves salts and urea behind. This is why our bodies taste salty (salts) and feel sticky (urea) after sweating. The body odor associated with sweat is not due to the sweat itself but to the waste products of the bacteria that feed on the sweat.

Activity #4 : The cooling effect of evaporation (parent facilitated)

(From: <http://www.flmnh.ufl.edu/education/guides/Grossology-exhibit-handouts.pdf>;
Page 12)

Students will investigate the cooling effect due to the evaporation of two different fluids:

What you need (per student):

Alcohol prep pad, cotton ball, water

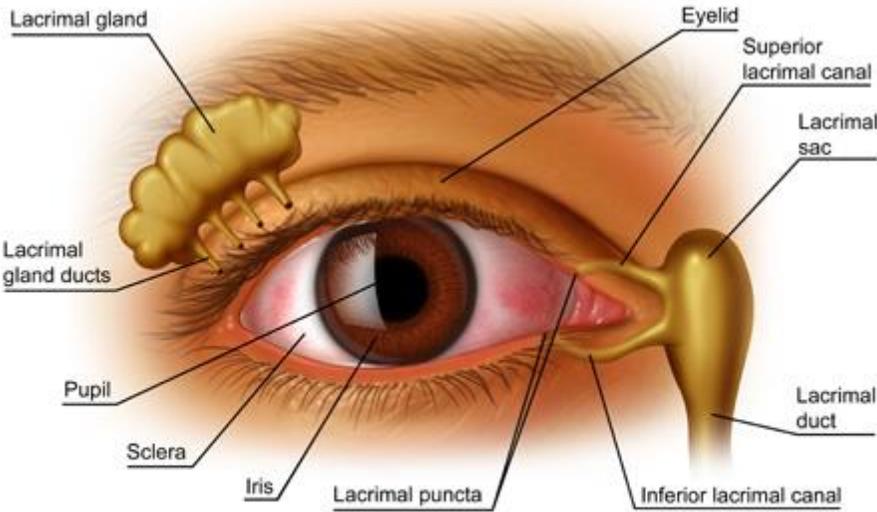
1. Students swipe their forearm with a cotton ball soaked with water to get it a bit wet.
2. They then blow on this wet area of their forearms. *What did they feel?*
3. Repeat steps 1 and 2 on other forearm using an alcohol prep pad to get them wet with alcohol. *Which felt cooler when they blew on it?*

Explain what is going on. *When alcohol or water evaporates from our arms, it takes heat from our arms. Rubbing alcohol evaporates faster than water, so it takes away heat more quickly, and thus feels cooler to our arms. Sweat works the same way - as it evaporates, you feel cooler.*

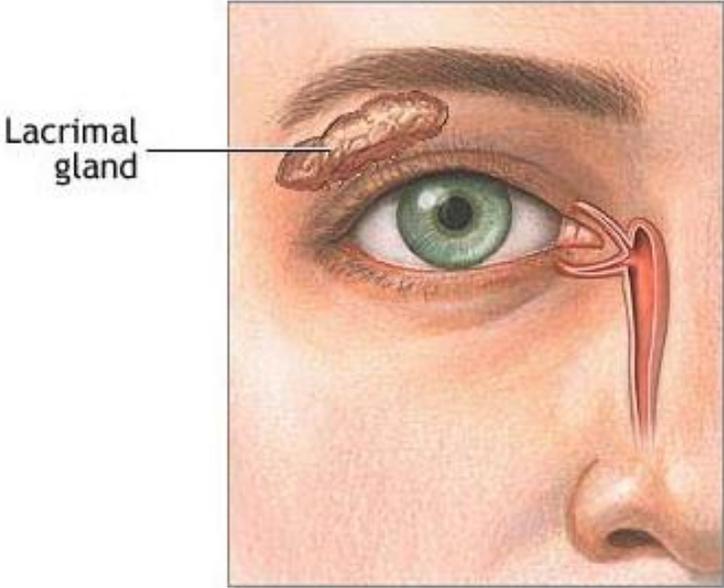
NOW THAT WE HAVE EXPLORED VARIOUS METHODS THAT OUR BODIES USE TO KEEP US HEALTHY, MAYBE THEY WILL SEEM A LITTLE LESS GROSS. JUST REMEMBER THAT OUR BODIES ARE SUPPOSED TO PERFORM THIS WAY, IT IS NATURAL AND CERTAINLY NOTHING TO REALLY FEEL GROSSED OUT ABOUT!

If you have time, ask each student to tell you one thing they learned. They each have to tell something different.

HUMAN TEAR PRODUCTION AND DRAINAGE

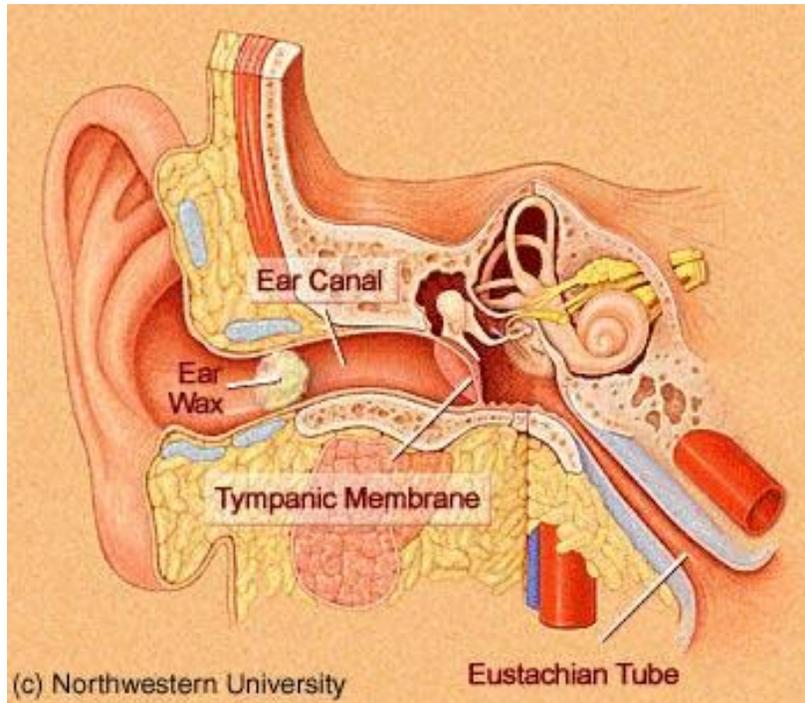


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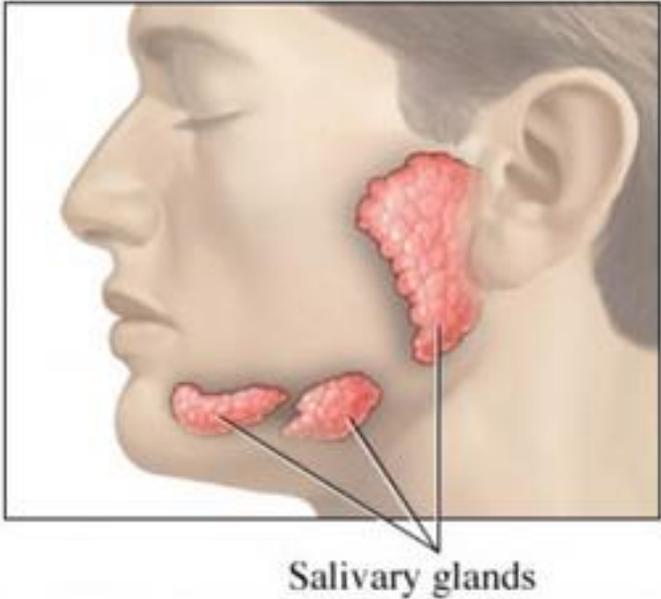
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HUMAN EAR WAX (CERUMEN)

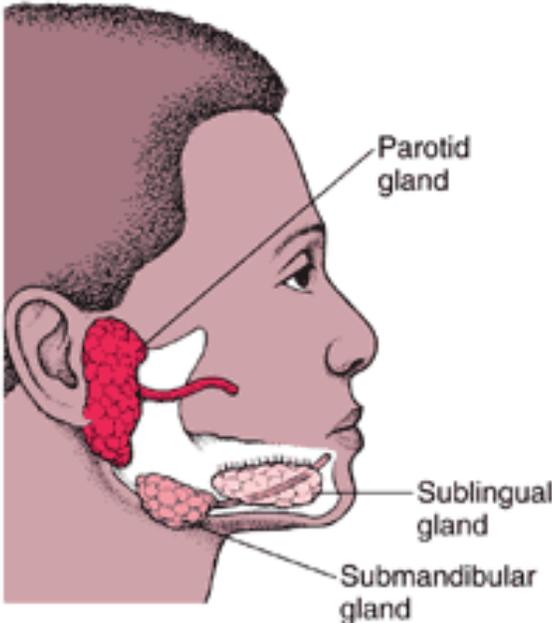


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