PLAN "M": MOSQUITOES AND VECTOR DISEASES

The World's Deadliest Animal –

- All about mosquitoes and the misery they cause!
- Vector-borne diseases
- Why mosquitoes bite
- How diseases are transmitted
- Focus on malaria

Name: _____ Date:_____

WORLD'S DEADLIEST ANIMAL

For the purpose of this article, a "deadly animal" refers to an animal that causes human deaths. Below is a list of six animals that can be considered deadly. As a warm up, try to put them in order from most deadly to least deadly:
Elephant, lion, mosquito, crocodile, snake, dog

MY GUESS: MOST DEADLY ANIMALS					
Most deadly:	2nd most deadly:	3rd most deadly:	4th most deadly:	5th most deadly:	Least deadly:

The second most deadly animal in the world is not on the list above. The second most deadly animals in the world are humans, causing an estimated 475,000 of their own deaths through accidents, violence, and war. But the *most* deadly animal in the world nearly doubles the deaths caused by humans. An estimated average of 725,000 deaths per year is caused by this most deadly animal, an insect capable of carrying a series of deadly diseases. The most deadly animals in the world are mosquitoes.

How can they kill so many? Maybe you think it's allergic reactions? Or perhaps it's giant vampire mosquitoes that can drain the blood with one bite that are causing all these deaths? No, there are rarely any deadly allergic reactions, and there are certainly no such things as giant vampire mosquitoes. There is, however, such a thing as vector-borne diseases.

Mosquitoes carry viruses and bacteria with them, such as malaria, the West Nile virus, yellow fever, Rift Valley fever virus, and they are even responsible for heartworm in dogs. The mosquitoes are unaffected by these pathogens, and the pathogens thrive inside the mosquitoes using them as a host. In vector-borne diseases, the host can spread the virus or bacteria from one animal to another. Other animals that carry vector-borne diseases are ticks and fleas. A vector-borne disease is any disease involving a pathogen that is carried from one animal to another through means of a traveling host.

Mosquitoes are not hatched from the egg with these diseases. They actually receive the diseases from infected animals when they feed upon them. Then, as they feed on more animals, they can transmit the disease into the blood of their next meal. Only female mosquitoes bite; most male mosquitoes only live about one week. Females need a blood meal in order to lay eggs. There are a few species of mosquitoes that do not require blood to lay eggs; they instead use the nectar and juices of plants. Most mosquitoes attack birds and mammals though some feed on the blood of reptiles and amphibians.

Various clues enable mosquitoes to zero in on people and other animals they seek to bite. They can detect carbon dioxide exhaled by their hosts many feet away. Mosquitoes also sense body chemicals, such as the lactic acid in perspiration and body odor, as well as heat. Some people are more attractive to mosquitoes than others. A person sleeping in a mosquito-infested room may wake up with dozens of mosquito bites while the person sleeping next to them has none. Similarly, people react differently to mosquito bites, some showing very little sign of being bitten, while others exhibit substantial redness, swelling and itching. This is an allergic reaction to the mosquito's saliva, the severity of which varies among individuals.

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1. What is a vector-borne disease and what are four diseases that mosquitoes can carry and transmit?
_____
_____
_____.

2. How do mosquitoes transmit diseases? _____
_____
_____.

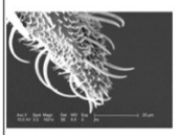
3. Why do mosquitoes need a blood meal? _____.

4. How do mosquitoes detect their prey? _____
_____
_____.

Mosquito eggs are laid in the water; they need water to reproduce for this reason. The eggs hatch into larvae, which grow into pupae and finally into adults. The entire process depends on the temperature and conditions but takes an average of two weeks. The Mosquitoes can fly long distances; some more than 20 miles from the water source that produced them. But they don't fly fast, only about 4 miles an hour. And because they typically fly into the wind to help detect host odors, fewer mosquitoes are around on windy days.



As a mosquito flies closer to its target, it looks for the movement of dark objects. Once it finds you, it lands, inserts its proboscis and probes for blood vessels beneath the skin. When it finds one, it injects saliva into the wound. The saliva contains an anticoagulant that ensures a steady, smooth flow of blood.

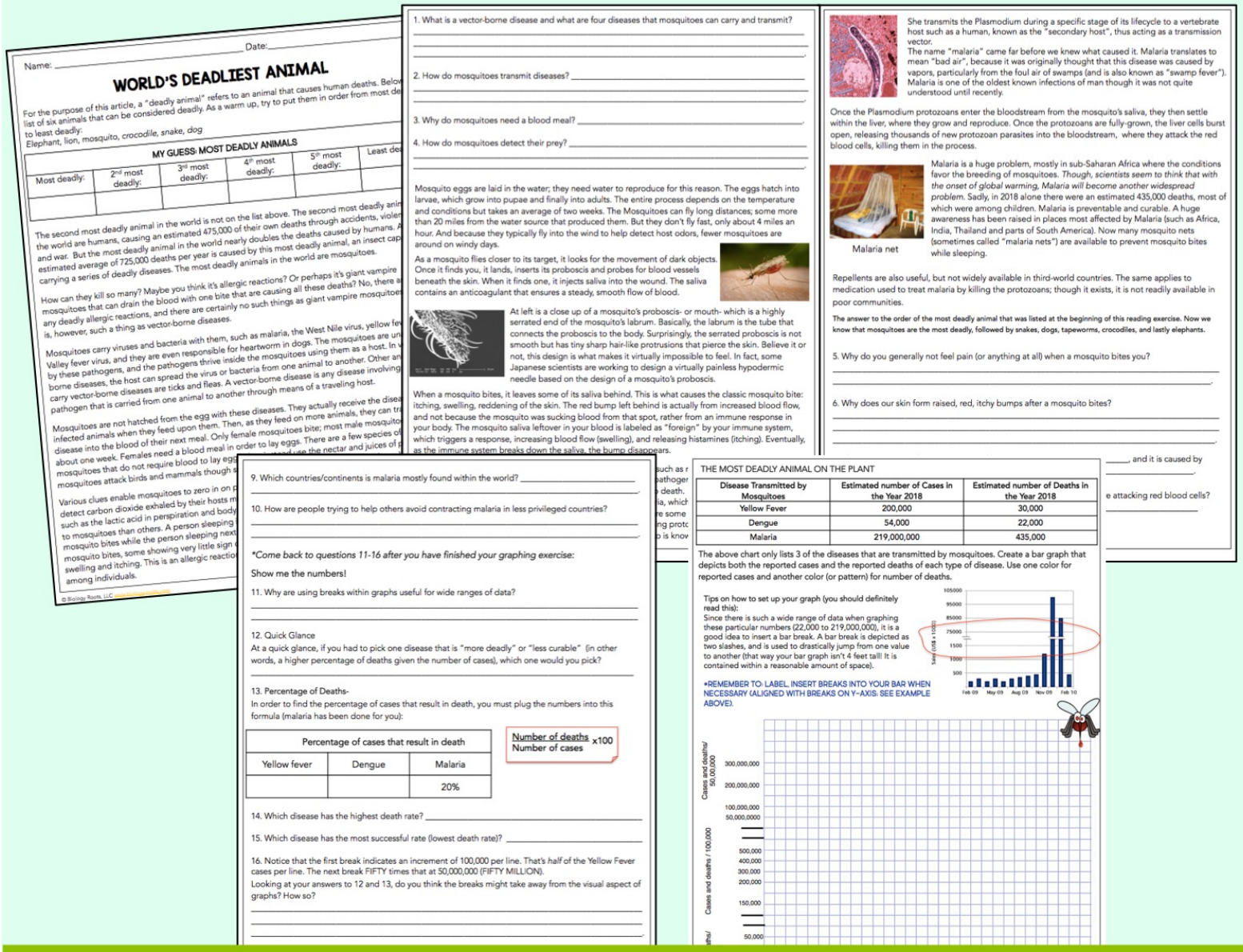


At left is a close up of a mosquito's proboscis- or mouth- which is a highly serrated end of the mosquito's labrum. Basically, the labrum is the tube that connects the proboscis to the body. Surprisingly, the serrated proboscis is not smooth but has tiny sharp hair-like protrusions that pierce the skin. Believe it or not, this design is what makes it virtually impossible to feel. In fact, some Japanese scientists are working to design a virtually painless hypodermic needle based on the design of a mosquito's proboscis.

When a mosquito bites, it leaves some of its saliva behind. This is what causes the classic mosquito bite: itching, swelling, reddening of the skin. The red bump left behind is actually from increased blood flow, and not because the mosquito was sucking blood from that spot, rather from an immune response in your body. The mosquito saliva leftover in your blood is labeled as "foreign" by your immune system, which triggers a response, increasing blood flow (swelling), and releasing histamines (itching). Eventually, as the immune system breaks down the saliva, the bump disappears.

Unfortunately, the mosquito's saliva also may contain pathogens such as malaria parasites or the encephalitis virus. This is how mosquitoes transmit disease. The pathogens are released straight into your bloodstream and can wreak havoc on your body, and may lead to death.
The most common pathogen transmitted by mosquitoes is malaria, which is caused by parasitic Protozoans in the Plasmodium family (four species total). There are some terms that are used to describe the relationship between mosquitoes, humans, and malaria-causing protozoans (Plasmodium) in this vector disease. In the life cycle of Plasmodium, a female mosquito is known as the "definitive host."

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The World's Deadliest Animal

2 versions:

Version with graphing- 5 pages

Version without graphing- 3 pages

Students learn a little about mosquitoes- why they feed, how they feed, and how they transmit disease. Most of the focus is primarily on malaria. The graphing version includes cases of malaria each year. The graph deals with large numbers, so a graph-free version is also included.

ANSWER KEY AND CLASS PACKET VERSION INCLUDED

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