

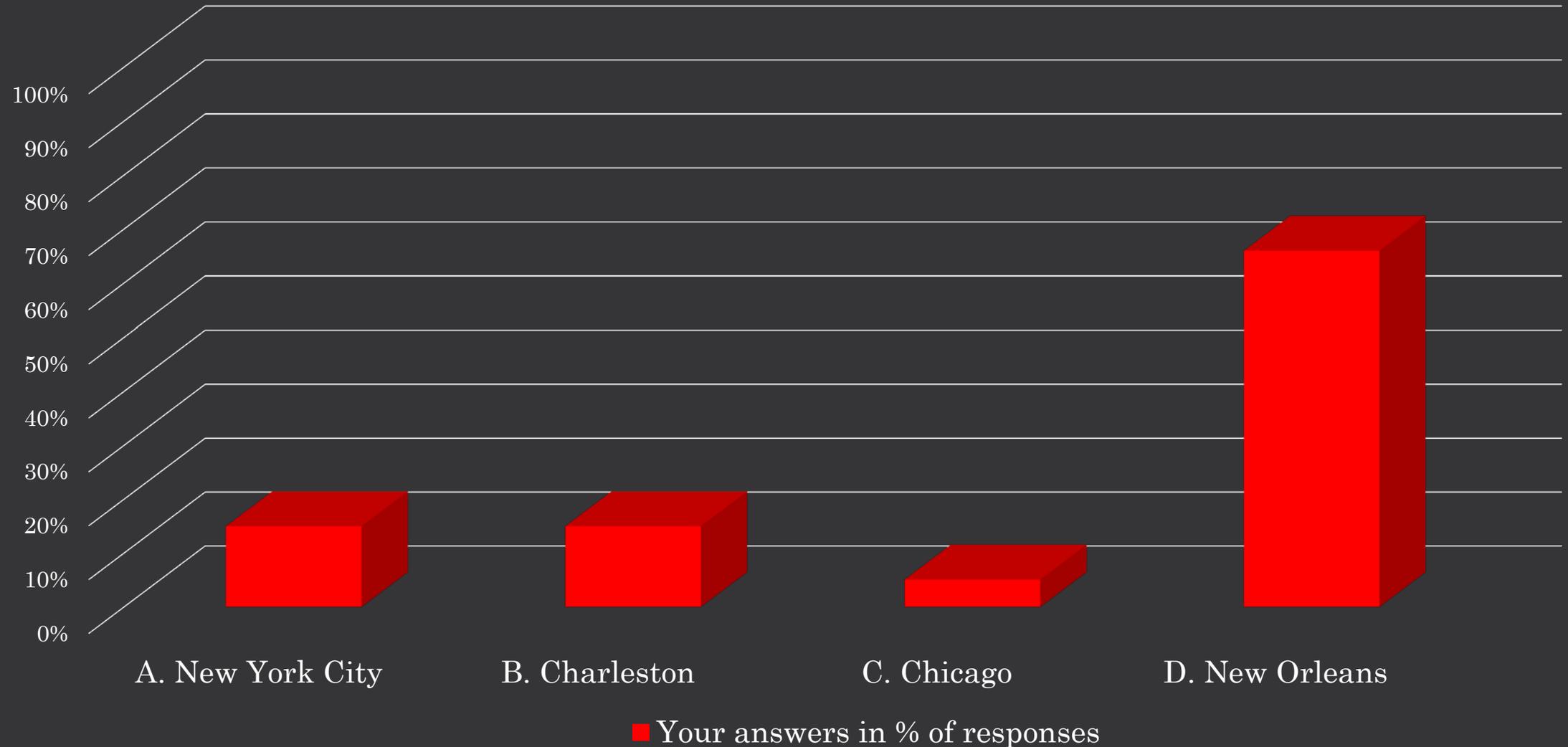
2018 Talking Science Trivia Poll

Let's See What the Buzz is About!

January 6, 2018

Poll Results:

The last American outbreak of yellow fever, a disease carried by mosquitoes, occurred in 1905 in what city?



Correct Answer: New Orleans

IN A NUT SHELL
WE ALL KNOW THE DANGER OF
YELLOW FEVER
but we become EARNEST ONLY
after it claims our own blood.
INFECTION BY MOSQUITOES
IS NO LONGER A THEORY
BUT A PROVEN FACT

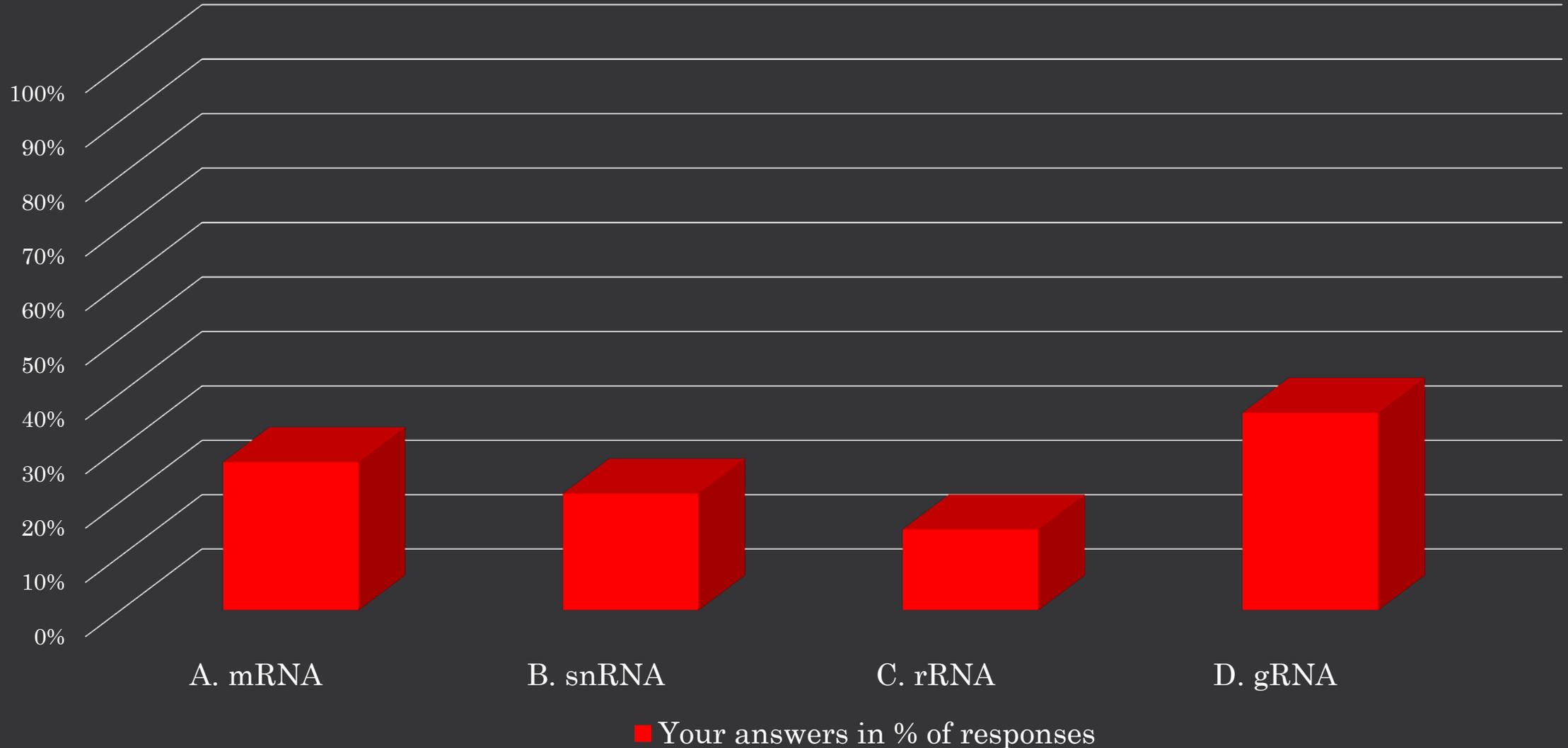
GET RID OF THE MOSQUITO
BY BURNING
SULPHUR FOR FUMIGATION
UNDER THE DIRECTION OF THE
MARINE HOSPITAL SERVICE

START IN ON
SUNDAY AT 10 A. M.
AND KEEP AT IT UNTIL NOON
OR LATER

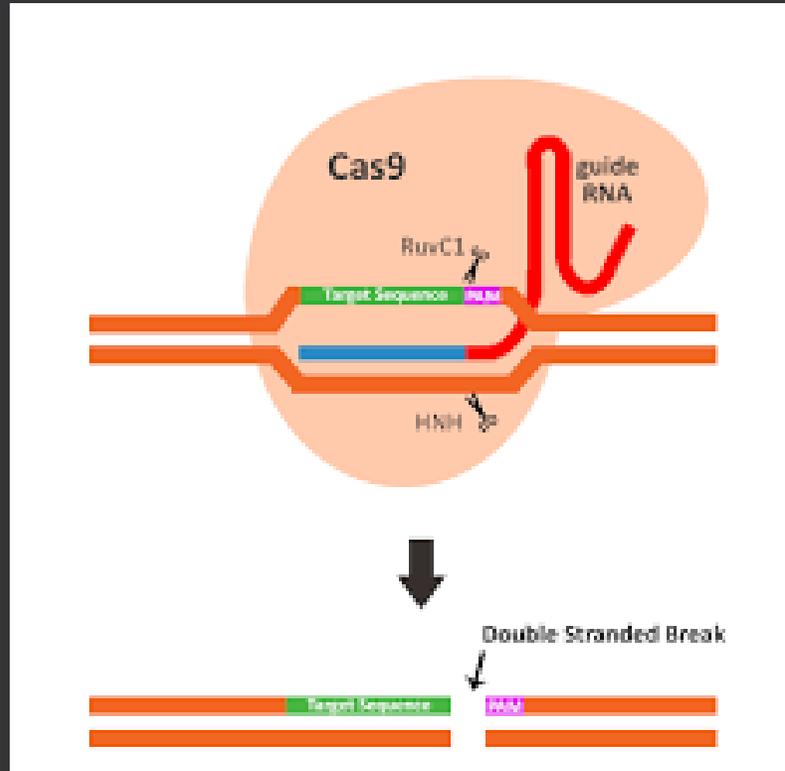
- Around 450 people died of yellow fever in New Orleans in the summer of 1905
- The city fought back through a public health campaign, including spraying pesticides and covering the cisterns holding the city's water supply, which kept mosquitos from breeding there
- The United States has not had an outbreak of yellow fever since 1905

Poll Results:

CRISPR-Cas9 is made up of two molecules: an enzyme called Cas9 and a type of RNA called _____



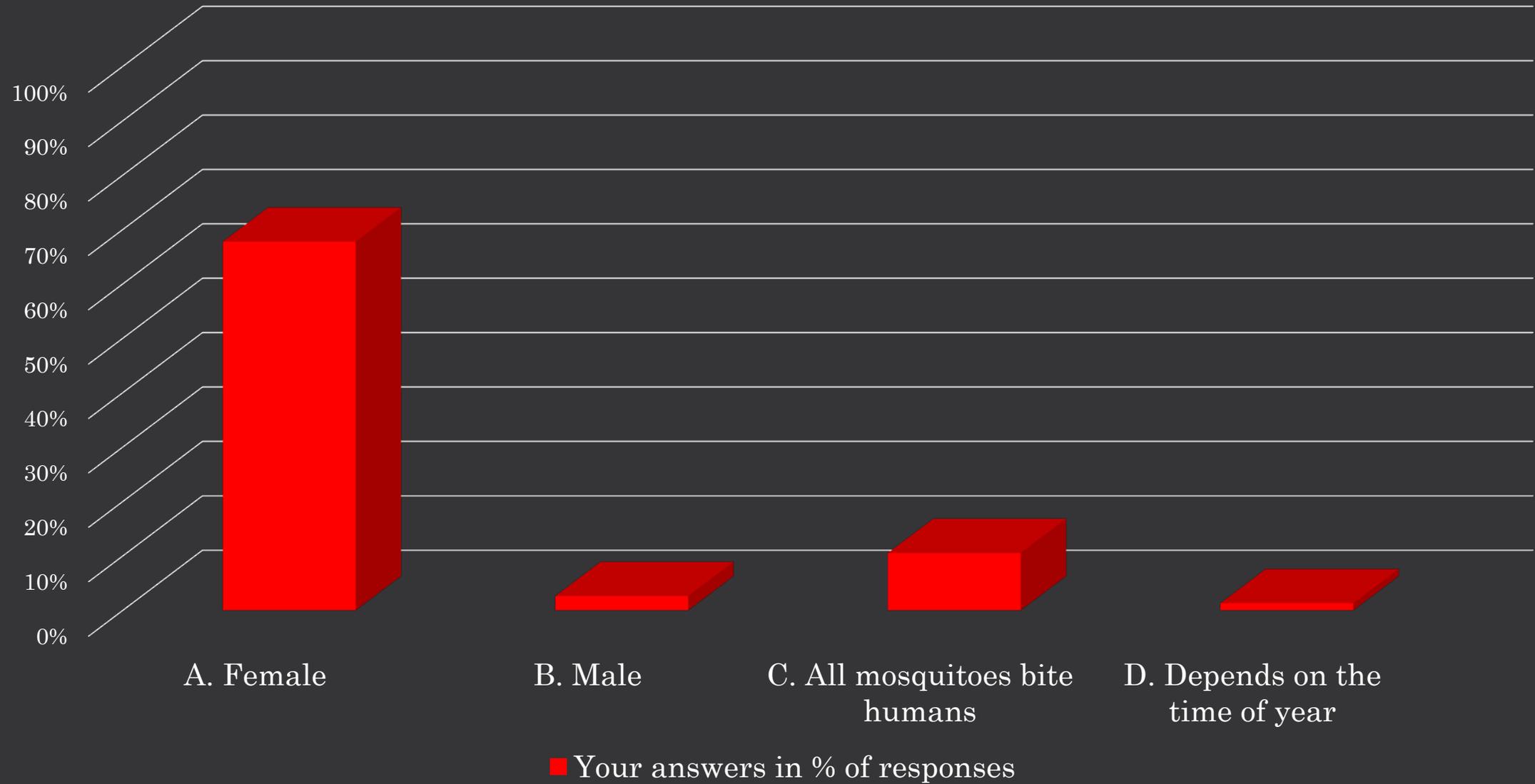
Correct Answer: gRNA



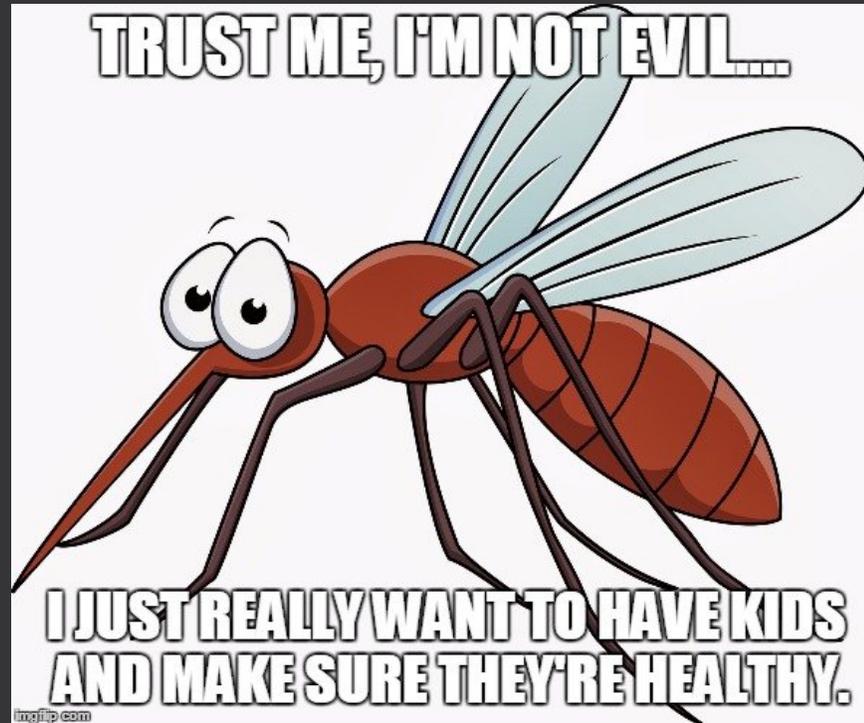
- The “g” in gRNA stands for “Guide”
- The gRNA recruits the Cas9 enzyme to the targeted gene
- By making changes to the gRNA, scientists can change the targeted gene, allowing them to more precisely make changes to DNA without affecting untargeted genes in the process

Poll Results:

Which biological sex of mosquito bites humans?



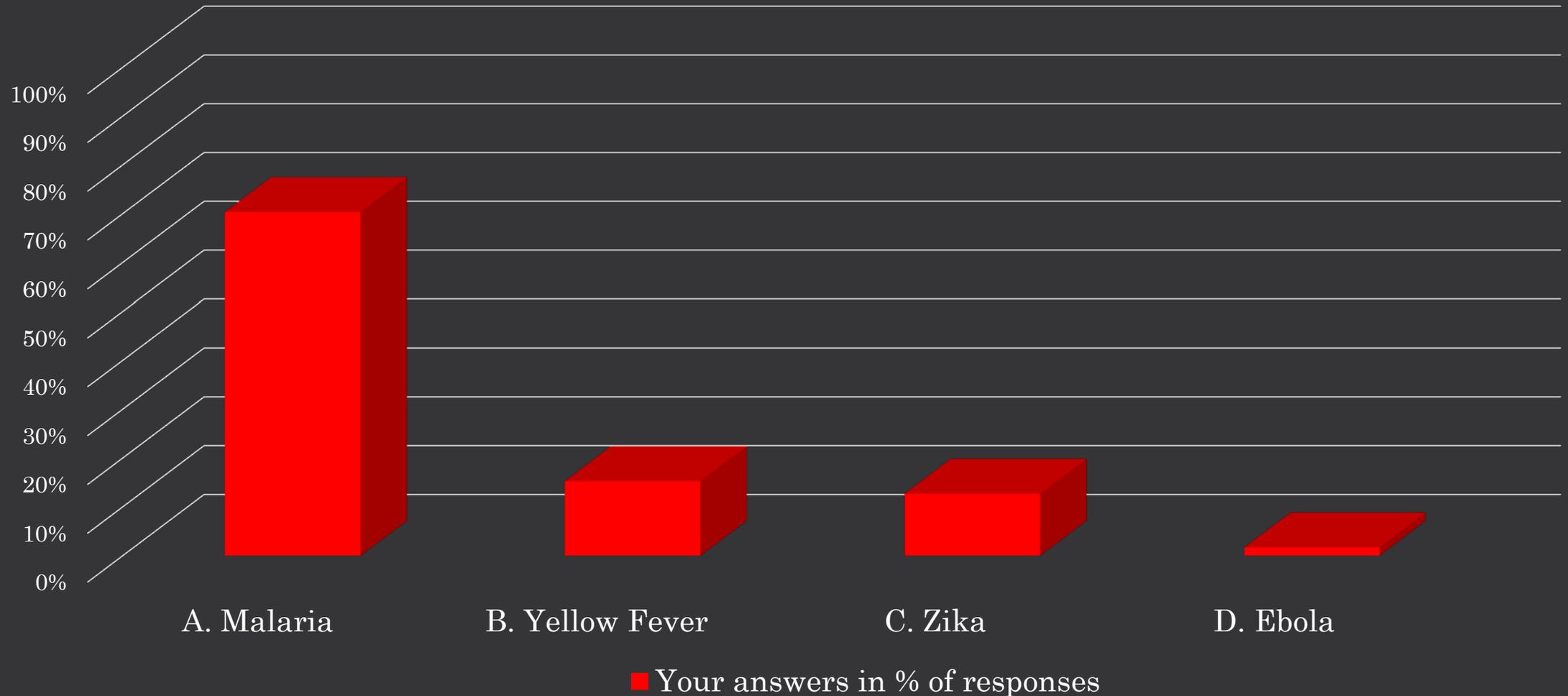
Correct Answer: Female



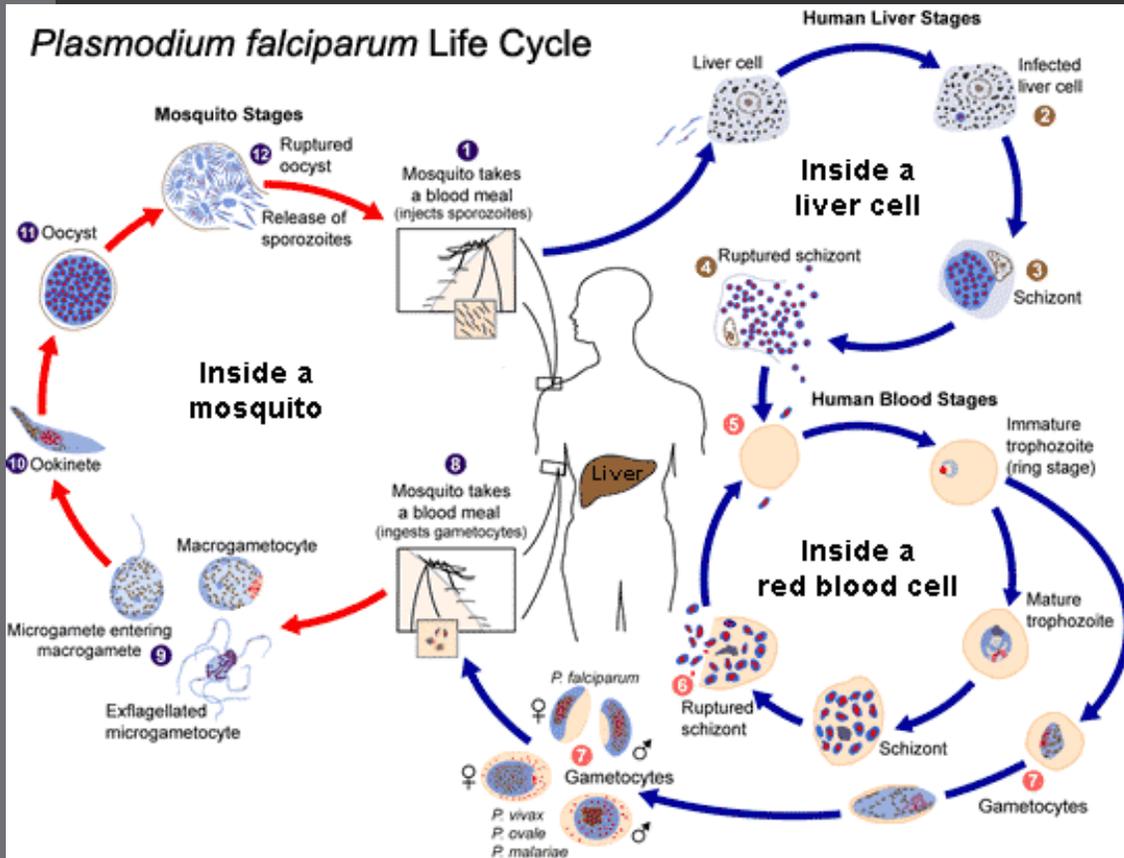
- Only female mosquitoes bite humans, as they need the blood to produce eggs
- Human blood serves as a source of protein for the eggs
- Males and females both eat plant nectar and other plant sugars

Poll Results:

Researchers have used CRISPR-Cas9 to make mosquitoes resistant to *Plasmodium falciparum*, a parasite that causes what disease?



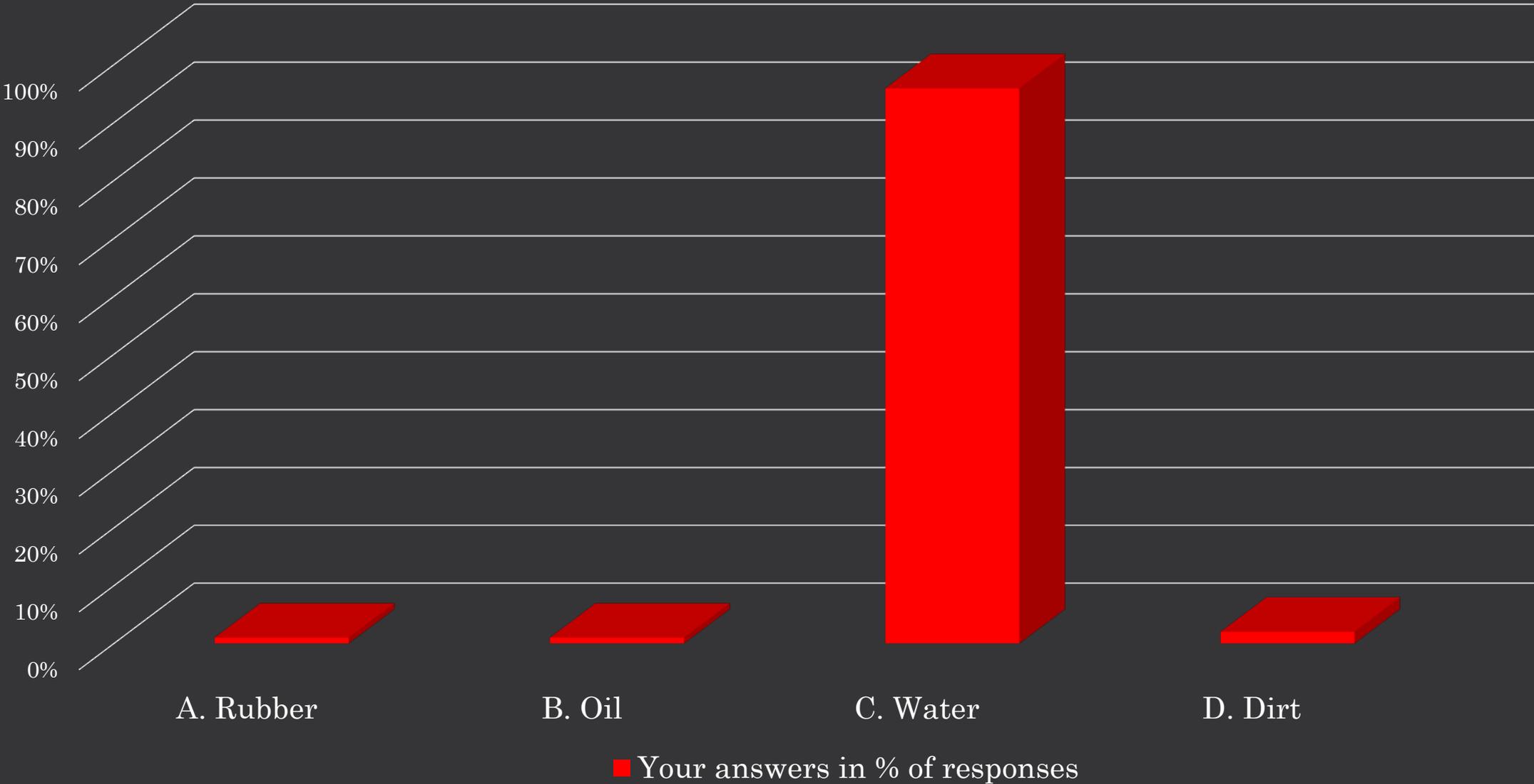
Correct Answer: Malaria



- Malaria is a sometimes fatal disease that infects the liver and red blood cells, causing high fever, chills, and flu-like illness
- *Plasmodium falciparum* is the parasite that is responsible for the most malaria-related deaths globally
- In 2015, World Health Organization estimates there were 212 million cases of malaria and 429,000 deaths

Poll Results:

Mosquitoes require _____ to hatch.



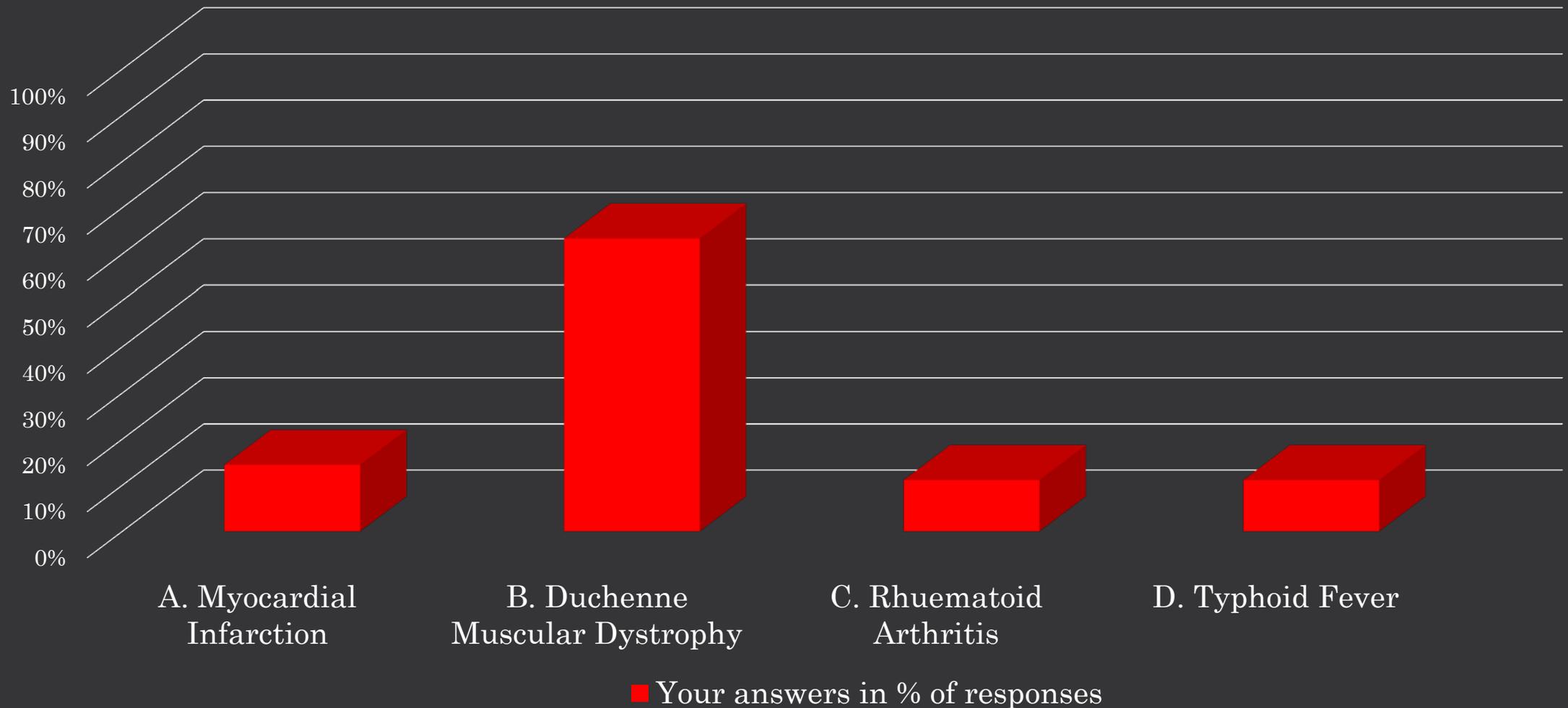
Correct Answer: Water

- Mosquitoes lay their eggs on or near the surface of standing water
- After the eggs hatch, they remain in water for the next two stages of their life (larva and pupa)
- Once they emerge from the cocoon as adult mosquitoes, they need to wait until their wings dry off and bodies harden before taking flight



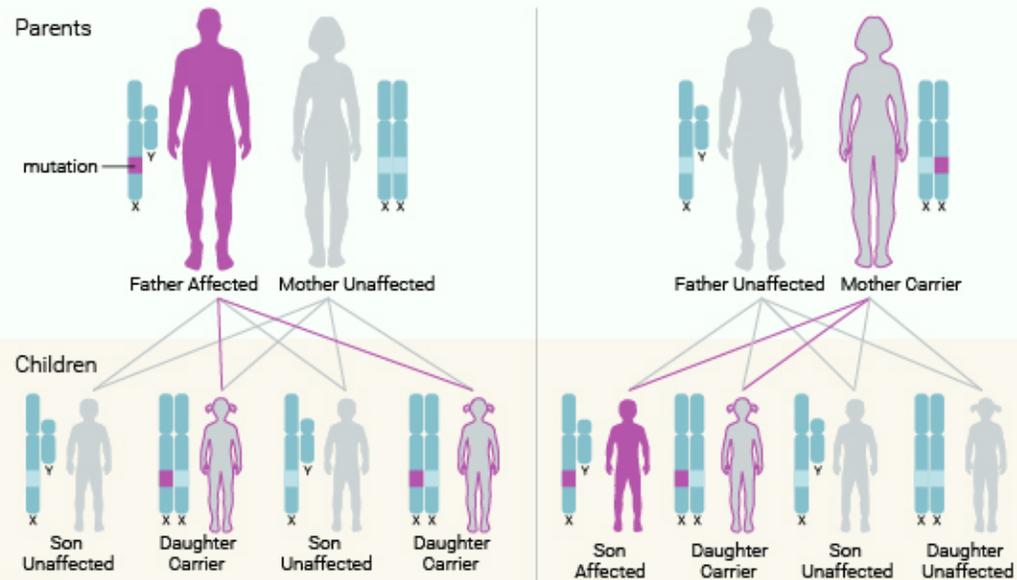
Poll Results:

CRISPR-Cas9 could be effective at treating single gene disorders as changing only one gene would be required to cure. Which of these is a single gene disorder?



Correct Answer: Duchenne Muscular Dystrophy

X-Linked Recessive

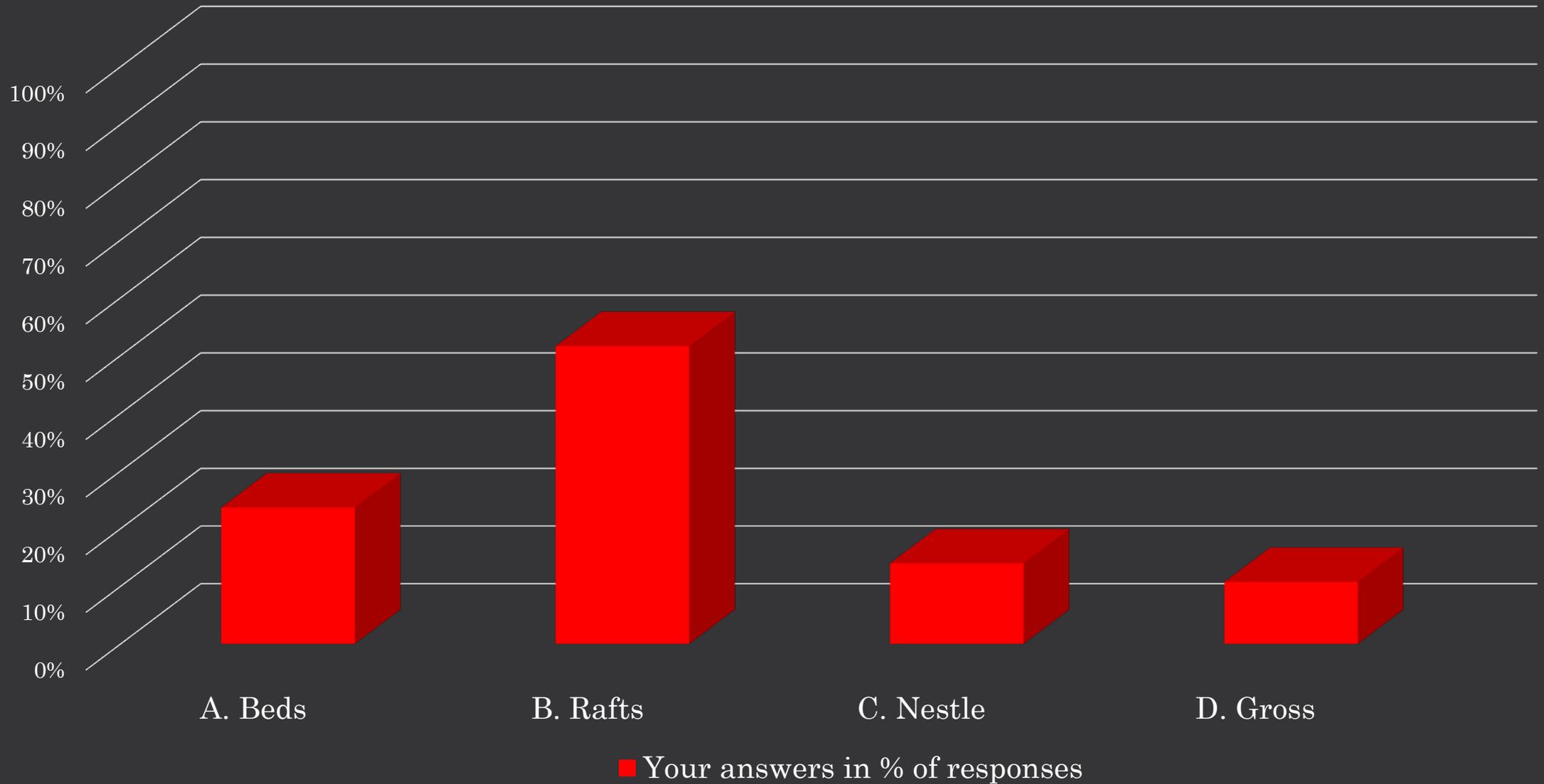


NIH U.S. National Library of Medicine

- Duchenne Muscular Dystrophy is a recessive single gene disorder, caused by a mutation on the X chromosome
- It mostly affects males, as they have only one X chromosome. Females have two X chromosomes, so the non-mutated X chromosome is usually dominant.
- Because CRISPR-Cas9 can specifically target and alter genes, it could potentially be used to fix the mutated X chromosome and cure Duchenne Muscular Dystrophy

Poll Results:

Which is a common name for a cluster of mosquito eggs?



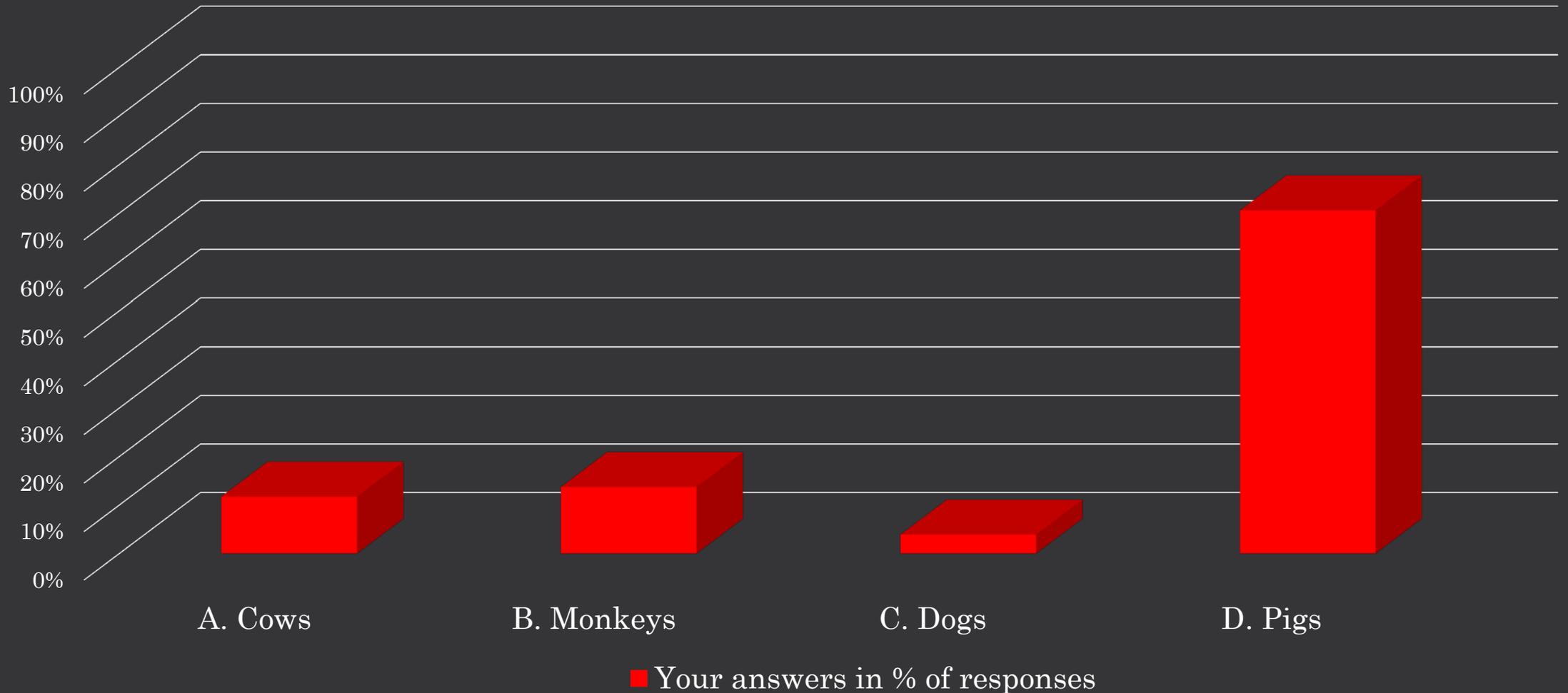
Correct Answer: Rafts



- An adult female mosquito will lay hundreds of eggs together one-by-one
- The eggs stick together and can float on standing water
- The rafts are about a $\frac{1}{4}$ inch long and an $\frac{1}{8}$ of an inch wide, resembling a speck of soot on the water

Poll Results:

George Church and Luhan Yang of Harvard Medical School recently used CRISPR-Cas9 to attempt to make organs from what animal suitable for transplant into humans?



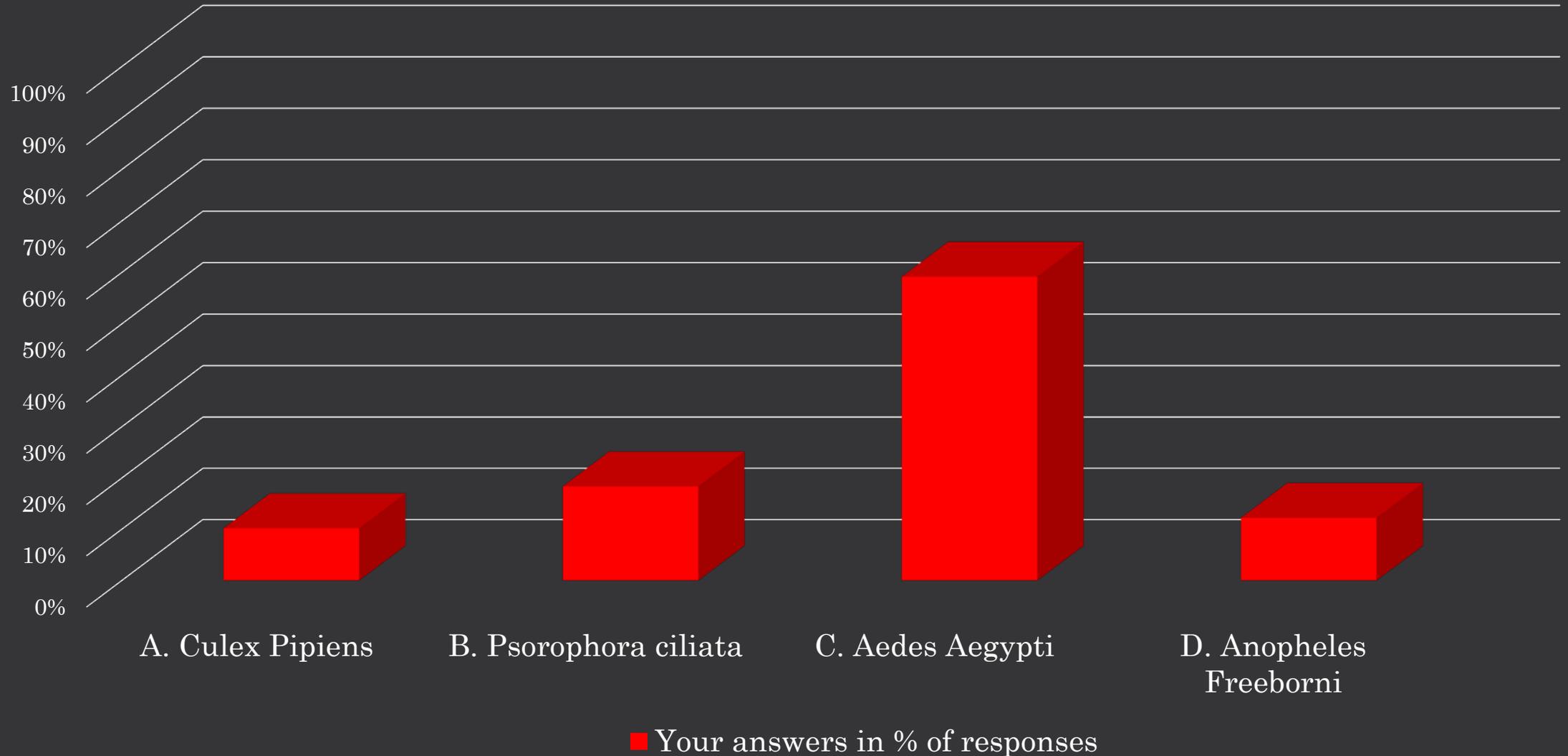
Correct Answer: Pigs



- There are remnants of ancient viral infections in a typical pig's genome that could infect a human who receives a pig organ transplant
- Church and Yang used CRISPR-Cas9 to rid the genes that held these viruses from the pig genome
- Though there are other aspects of a pig organ that would likely trigger a human immune reaction if transplanted, CRISPR-Cas9 has removed one major hurdle in the quest to transplant pig organs into humans

Poll Results:

Which of these types of mosquitoes is found in the United States and can carry the Zika virus?



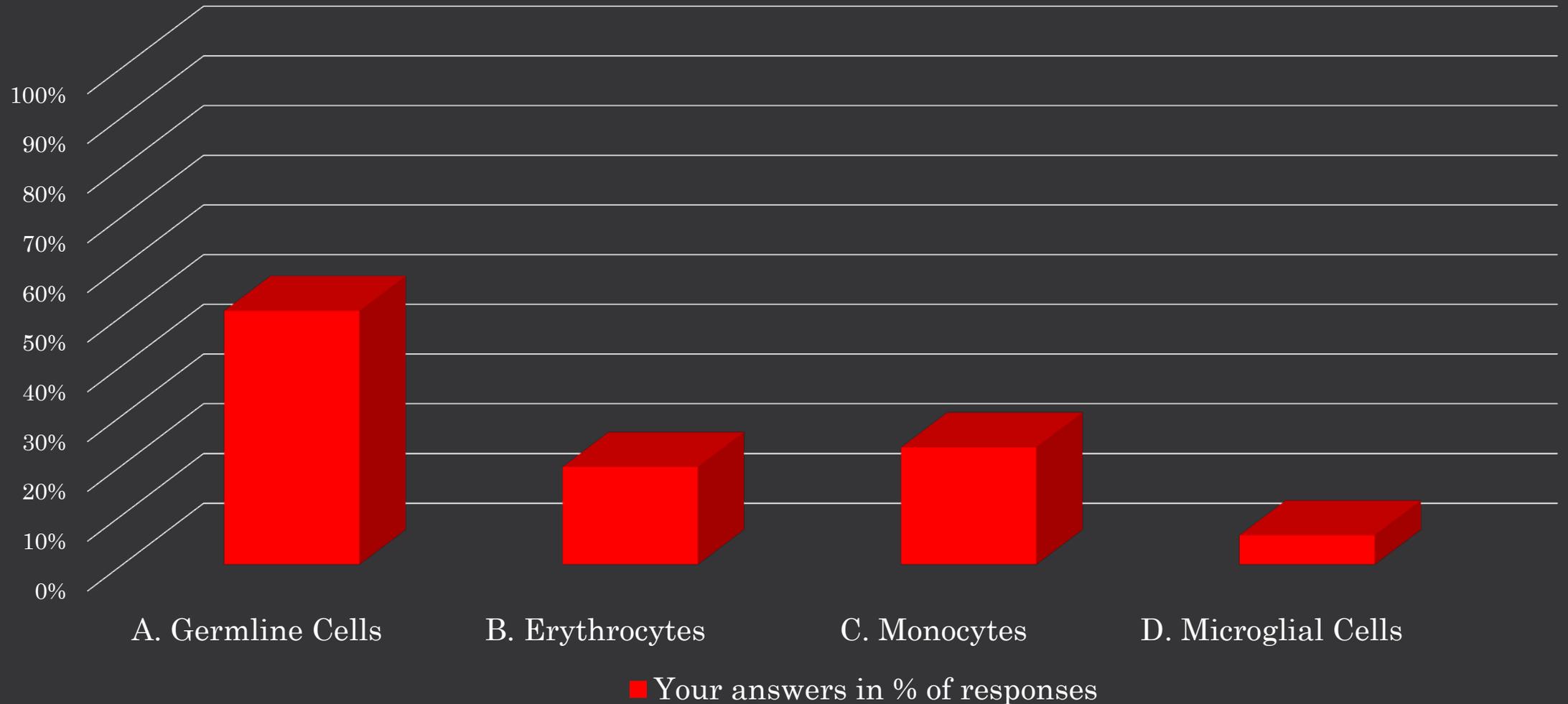
Correct Answer: *Aedes aegypti*



- The *Aedes aegypti* is the only species of mosquitoes in the U.S. known to carry the Zika virus
- *Aedes aegypti* is found frequently in the southern parts of the United States but can range as far north as parts of New England and the state of Washington

Poll Results:

Most proposed applications of CRISPR-Cas9 involve somatic cells (not part of reproduction). However, it can be used on _____, passing those edits down to offspring.



Correct Answer: Germline Cells



- In humans, CRISPR-Cas9 is mostly being used at present to make changes to genes that would not be passed down to offspring
- In limited situations, however, it has been used on germline cells, allowing the genes to be passed down
- This has raised fears about “designer babies” where parents could use CRISPR-Cas9 to pick and choose which traits their children will have