Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_

**AoW #1-2 Don’t Discount Slugs…**

* **Read** and **thoroughly connect to the entire** article by generating connections, questions, inferences, and visuals in the margin.
* **Answer** the **4 questions**.
* **Complete the GIST activity.**
* **Write** a **two paragraph reflection** following the following guidelines:

**First paragraph** – Objective summary

**Second paragraph** – Connect the article to our unit

 ***Check for spelling and grammar!***

|  |  |  |  |
| --- | --- | --- | --- |
| **Requirement** | **Points** | **Student Evaluation** | **Teacher Evaluation** |
| I have provided a **variety of thoughtful annotations** for the entire article. | 20 |  |  |
| I have answered the **4 comprehension questions** using textual evidence if applicable. | 20 |  |  |
| My **first paragraph is an objective summary**. It is evident that I followed the 6 steps for writing an objective summary. | 25 |  |  |
| My **second paragraph connects the article to our EitO unit**. I cited specific evidence from the text that I feel relates to our unit. | 25 |  |  |
| I have **minimal grammatical and spelling mistakes**. | 5 |  |  |
| **Gist** of article | **5** |  |  |
| Total |  |  |  |

Don't discount slugs: They ooze glue that may aid in medical procedures

By Washington Post, adapted by Newsela staff

Grade Level **7**

08/08/2017

Word Count **638**

Slime from slugs has inspired scientists to invent a new glue that can be used in surgery.

This stretchy adhesive, or glue, can be attached to a beating, bleeding heart, according to a new study. Scientists hope it could someday replace stitches.

Other glues are either strong and inflexible or stretchy and weak. The slug-inspired glue sticks tightly, and it is held together by a stretchy web. This gives it the unique quality of being stretchy, yet strong.

Its sticking power is probably about "10 times better than what's currently on the market," said Phillip Messersmith. He is a professor of bioengineering at the University of California at Berkeley and was not involved with the study.

## **Heartening News**

In addition to gluing things together, it could be used to slowly release medications in the body. Most intriguingly, it is so flexible that it could potentially be used in the hearts of growing children with heart disease, said Nikolay Vasilyev of Boston Children's Hospital in Massachusetts, one of the authors of the study. It was published Thursday in the journal Science.

In experiments with pig organs, the material stuck strongly to skin, cartilage, arteries, livers and hearts, even when they were wet with blood. In one experiment, it was used to patch a hole in a pig heart. When the heart was inflated to mimic beating, the adhesive stretched along with the heart. The hole stayed plugged even after being inflated more than 10,000 times.

In living rats, the adhesive sealed a liver wound. It also created less scarring than a surgical tool, which surgeons commonly use to close blood vessels.

"This is really what we dreamed of," said Andy Smith, who studies slug slime at Ithaca College in New York state.

## **The Slug's Defense Mechanism**

The scientists were inspired by a bright orange slug that oozes sticky slime to defend itself from predators. It is smaller than a pinkie, but it can churn out 5 percent of its weight in slime. Within seconds, it hardens in a rubber cement that will stretch between your fingers and is tough to remove.

"Anything that tried to eat this slug would get a mouthful of glue," Smith said.

Smith says positively charged proteins and calcium ions may help explain how the slug slime sticks. The positive charges in the glue are attracted to the surface of tissues like skin and muscle. Many body parts have negative charges, he said.

He said the new glue works like a chemical hook-and-loop fastener. It also binds quickly but not immediately. The new glue will be much easier for doctors to work with than surgical glues now, which stick almost instantly.

## **Possible Option To Surgery**

The main ingredient in the adhesive is water, so it can be injected into the human body. In some cases, it may be used instead of surgery. The glue is a type of hydrogel, which is a stretchy web of chains of molecules that is 90 percent water. For people with heart disease, Vasilyev said the adhesive could mean more time between heart surgeries. Because the material is stretchy, it will move with a bending joint or expand with a growing heart. It can also stay in the body for a longer time, even in children.

Jianyu Li is a researcher at Harvard in Massachusetts and one of the lead researchers of the study. He hopes the team might be able to design adhesives that dissolve over time. Doctors could use them instead of stitches.

Xuanhe Zhao studies hydrogels at the Massachusetts Institute of Technology in Cambridge but was not involved with the study. He called the glue "very innovative." Hydrogels are tough and have been tested in devices, like robots. Thanks to slugs, this is the first time hydrogels have been used to hold human tissue together, Zhao said.

**QUESTIONS**

**1. Which two of the following sentences from the article include CENTRAL ideas of the article?**

1. *This stretchy adhesive, or glue, can be attached to a beating, bleeding heart, according to a new study.*
2. *It also created less scarring than a surgical tool, which surgeons commonly use to close blood vessels.*
3. *The scientists were inspired by a bright orange slug that oozes sticky slime to defend itself from predators.*
4. *He hopes the team might be able to design adhesives that dissolve over time*.

**A** 1 and 2

**B** 1 and 3**rrect Choice**

**C** 2 and 3

**D** 2 and 4

**2. Which statement would be MOST important to include in a summary of the article?**

**A** Glues used in the past have had many faults such as lack of strength and stretchiness, but the new glue is made of a chemical bond.

**B** The main advantage of the newly developed adhesive is that it is made mostly from water, making it safe to use in the human body for surgery.

**C** After studying an orange slug that produces a glue-like slime, scientists have decided that the slime could be used to repair wounds instead of glue.

**D** Scientists have developed a new surgical glue, inspired by slug slime, that is both stronger and more stretchy than the ones being currently used.

**3. Read the paragraph from the introduction [paragraphs 1-4].**

 *Other glues are either strong and inflexible or stretchy and weak. The slug-inspired glue sticks tightly, and it is held together by a stretchy web. This gives it the unique quality of being stretchy, yet strong.*

**Which answer choice is the BEST definition of the word "inflexible" as used in the paragraph?**

**A** stubborn

**B** mobile

**C** unbending**rect Choice**

**D** changeable

**4. Read the selection from section "Heartening News.**"

*In addition to gluing things together, it could be used to slowly release medications in the body. Most intriguingly, it is so flexible that it could potentially be used in the hearts of growing children with heart disease, said Nikolay Vasilyev of Boston Children's Hospital in Massachusetts, one of the authors of the study.*

**Which two words would BEST replace "intriguingly" and "potentially" in the selection above?**

**A** usually, probably

**B** amazingly, doubtfully

**C** unusually, improbably

**D** interestingly, possibly

**Get the GIST**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Title \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Source \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Read the article or section of text.
2. Fill in the 5 Ws and H.

Who:

What:

When:

Where:

Why:

How:

3. Write a 20-word GIST summary.

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