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Fleas have organ-saving antifreeze

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THE ARTICLE

Fleas have organ-saving antifreeze

The latest of nature's secrets to be unraveled comes from the tiny snow flea, which has been found to contain a protein that could have huge implications for the future of transplant surgery and agriculture. Researchers from Queen's University in Ontario, Canada have published a study* detailing their discovery of a type of flea that can survive even when buried under snow because of antifreeze properties. The researchers said their findings could help protect plants or animals from frost or allow donated transplant organs to be stored and transported at lower temperatures. The microscopic, six-legged snow fleas survive by lowering the freezing point of fluids in their bodies by 11 degrees.

Scientists are expounding many potential practical applications for the new protein. One is the possibility of storing transplant organs at cooler temperatures to preserve them for longer. Lead researcher Dr. Laurie Graham said flooding an organ with the antifreeze might allow it to be stored at lower temperatures and prevent it from freezing. She added: "You would have longer to do tissue matching to get the organ to the patient and just increase the shelf life of organs." Another possible application could be to allow crops to survive a cold snap. Dr. Graham explained: "If you were able to genetically modify any crop that was susceptible to frost you may be able to generate a crop that's not so sensitive." The snow flea is wingless and is not related to the much-detested biting flea.

*http://qnc.queensu.ca/story_loader.php?id=435803469f4c0

WARM-UPS

1. I AM A FLEA: You are now a flea. Walk around the class and talk to the other "fleas" about your everyday life. Where do you like to spend your days? What do you think of the giant sized life around you? What are your biggest joys and worries?

2. ANTIFREEZE ADVANTAGES: One day, humans and plants could be genetically modified to survive in freezing temperatures. What do you think of this? With your partner(s), talk about the following advantages:

- Transplant organs would last longer in storage.
- Farmers in Finland could grow bananas.
- People could start living on Antarctica.
- We would use less heating fuel and save money.
- More people could successfully climb Mt. Everest.
- Frozen food would last much longer.
- We wouldn't need to wear gloves any more.
- Your idea _____.

3. CHAT: In pairs / groups, decide which of these topics or words are most interesting and which are most boring.

> *Nature's secrets / snow / fleas / transplant surgery / antifreeze / frost / organ donation / freezing point / scientists / cold snaps / genetically modified crops*

Have a chat about the topics you liked. For more conversation, change topics and partners frequently.

4. FLEA: Spend one minute writing down all of the different words you associate with fleas. Share your words with your partner(s) and talk about them. Together, put the words into different categories.

5. TWO-MINUTE DEBATES: Debate each of the arguments below with a partner for just two minutes, before moving on to the next partner and debate. Student A agrees with the first argument, Student B, the second.

a. Fleas are very useful. vs. Fleas are not useful.
b. Freezing cold weather is best. vs. Boiling hot weather is best.
c. Organ transplantation is wrong. vs. Organ transplantation is essential.
d. Crops should not be genetically modified. vs. GM crops are totally safe.
e. Humans should be genetically modified to survive the cold better. vs. No way!
f. Scientists often go too far. vs. Scientists must explore everything.
g. Fleas are more useful than ants. vs. Ants are more useful than fleas.
h. Having antifreeze in our blood would be useful. vs. I like the way I am now.

6. FLEA USES: In pairs / groups, brainstorm all the possible uses of fleas. Change partners and add to the uses on your list. Talk about the uses with your partner(s). Rank them in order of most useful. Change partners again and compare your ranked lists.

BEFORE READING / LISTENING

1. TRUE / FALSE: Look at the article's headline and guess whether these sentences are true (T) or false (F):

a. Scientists have injected fleas with antifreeze to survive in the cold. T / F
b. Scientists have discovered a protein that may help organ transplants. T / F
c. A protein from a snow flea may help protect plants against frost. T / F
d. The snow flea can live in temperatures of minus 111 degrees. T / F
e. Scientists are expounding potential applications for the new protein. T / F
f. A researcher said transplant organs could last longer in special tissue. T / F
g. The researcher said organs could easily be stored on shelves. T / F
h. Snow fleas are known for flying huge distances across Antarctica. T / F

2. SYNONYM MATCH: Match the following synonyms from the article:

a.	unraveled	use
b.	implications	cold
c.	detailing	prolong
d.	frost	talking about
e.	fluids	prone
f.	expounding	figured out
g.	increase	liquids
h.	application	specifying
i.	susceptible	hated
j.	detested	ramifications

3. PHRASE MATCH: Match the following phrases from the article (sometimes more than one combination is possible):

a.	The latest of nature's secrets	life of organs
b.	huge	point of fluids in their bodies
c.	published a study	from frost
d.	help protect plants or animals	a cold snap
e.	lowering the freezing	detailing their discovery
f.	tissue	crop that was susceptible to frost
g.	increase the shelf	to be unraveled
h.	allow crops to survive	much-detested biting flea
i.	able to genetically modify any	matching
j.	not related to the	implications for the future

WHILE READING / LISTENING

GAP FILL: Put the words in the column on the right into the gaps in the text.

Fleas have organ-saving antifreeze

The latest of nature's secrets to be _____ comes from the tiny snow flea, which has been found to contain a protein that could have _____ implications for the future of transplant surgery and agriculture. Researchers from Queen's University in Ontario, Canada have published a study _____ their discovery of a type of flea that can survive even when _____ under snow because of antifreeze _____. The researchers said their findings could help protect plants or animals from _____ or allow donated transplant organs to be _____ and transported at lower temperatures. The _____, six-legged snow fleas survive by lowering the freezing point of fluids in their bodies by 11 degrees.

detailing

properties

microscopic

buried

huge

frost

unraveled

stored

Scientists are expounding many _____ practical applications for the new protein. One is the possibility of storing transplant organs at cooler temperatures to _____ them for longer. Lead researcher Dr. Laurie Graham said _____ an organ with the antifreeze might allow it to be stored at lower temperatures and prevent it from _____. She added: "You would have longer to do _____ matching to get the organ to the patient and just increase the shelf _____ of organs." Another possible application could be to allow crops to survive a cold snap. Dr. Graham explained: "If you were able to genetically modify any crop that was _____ to frost you may be able to generate a crop that's not so sensitive." The snow flea is wingless and is not related to the much-_____ biting flea.

detested

preserve

tissue

susceptible

potential

freezing

life

flooding

LISTENING

Listen and fill in the spaces.

Fleas have organ-saving antifreeze

The latest of nature's secrets to be _____ comes from the tiny snow flea, which has been found to contain a protein that could have huge _____ for the future of transplant surgery and agriculture. Researchers from Queen's University in Ontario, Canada have published a study _____ their discovery of a type of flea that can survive even when buried under snow because of antifreeze _____. The researchers said their findings could help protect plants or animals from _____ or allow donated transplant organs to be stored and transported at lower temperatures. The microscopic, six-legged snow fleas survive by lowering the freezing point ___ _____ in their bodies by 11 degrees.

Scientists are _____ many potential practical applications for the new protein. One is the possibility of storing transplant organs at cooler temperatures to _____ them for longer. Lead researcher Dr. Laurie Graham said _____ an organ with the antifreeze might allow it to be stored at lower temperatures and prevent it from freezing. She added: "You would have longer to do tissue _____ to get the organ to the patient and just increase the _____ _____ of organs." Another possible application could be to allow crops to survive a _____ _____. Dr. Graham explained: "If you were able to genetically modify any crop that was susceptible to frost you may be able to generate a crop that's not so sensitive." The snow flea is _____ and is not related to the much-detested _____ flea.

AFTER READING / LISTENING

1. WORD SEARCH: Look in your dictionaries / computer to find collocates, other meanings, information, synonyms … for the words **'snow'** and **'flea'**.

- Share your findings with your partners.
- Make questions using the words you found.
- Ask your partner / group your questions.

2. ARTICLE QUESTIONS: Look back at the article and write down some questions you would like to ask the class about the text.

- Share your questions with other classmates / groups.
- Ask your partner / group your questions.

3. GAP FILL: In pairs / groups, compare your answers to this exercise. Check your answers. Talk about the words from the gap fill. Were they new, interesting, worth learning…?

4. VOCABULARY: Circle any words you do not understand. In groups, pool unknown words and use dictionaries to find their meanings.

5. STUDENT "FLEA" SURVEY: In pairs / groups, write down questions about fleas and other tiny bugs.

- Ask other classmates your questions and note down their answers.
- Go back to your original partner / group and compare your findings.
- Make mini-presentations to other groups on your findings.

6. TEST EACH OTHER: Look at the words below. With your partner, try to recall exactly how these were used in the text:

- secrets
- huge
- discovery
- properties
- frost
- fluids
- expounding
- flooding
- tissue
- shelf
- snap
- related

DISCUSSION

STUDENT A's QUESTIONS (Do not show these to student B)

a. Did the headline make you want to read the article?
b. What do you think of fleas?
c. Have you ever had any problems with fleas?
d. Would you like to know more about the microscopic world?
e. What do you think of this new scientific discovery?
f. Can you think of any other applications for the antifreeze protein?
g. Would you like to be injected with the antifreeze protein?
h. Would you eat vegetables that had been genetically modified by the new antifreeze protein?
i. Are you susceptible to the cold and frost?
j. What do you do to keep warm during a cold snap?

STUDENT B's QUESTIONS (Do not show these to student A)

a. Did you like reading this article?
b. What do you think about what you read?
c. How great do you think this discovery is?
d. Do you think tiny bugs have more secrets that can be unraveled?
e. Would you like to work as a scientist and conduct research on fleas and other forms of microscopic life?
f. What implications do you think this discovery has for global agriculture?
g. Do you think this new discovery might allow people to live in colder climates?
h. Do you think this discovery might have applications in cryogenics and freezing people's bodies to be later brought back to life?
i. Would you prefer to live in a cold or hot country?
j. Did you like this discussion?

AFTER DISCUSSION: Join another partner / group and tell them what you talked about.

a. What question would you like to ask about this topic?
b. What was the most interesting thing you heard?
c. Was there a question you didn't like?
d. Was there something you totally disagreed with?
e. What did you like talking about?
f. Do you want to know how anyone else answered the questions?
g. Which was the most difficult question?

SPEAKING

BUG RESEARCH: You are a scientist. You must choose a bug to research that you think has the potential to greatly help mankind. In pairs/groups, discuss which of these bugs might have secrets that you could unravel. In the middle column brainstorm all of the powers and abilities each bug has. In the right hand column write the potential practical applications these powers and abilities might have for humans.

BUG	POWERS AND ABILITIES	POTENTIAL PRACTICAL APPLICATIONS
Flea		
Ant		
Worm		
Cockroach		
Housefly		
Spider		

Change partners and discuss what you talked about earlier. Compare your ideas.

Decide which bug has the greatest potential to help mankind.

Give a presentation on your thoughts to the rest of the class. Vote on which is the best bug.

HOMEWORK

1. VOCABULARY EXTENSION: Choose several of the words from the text. Use a dictionary or Google's search field (or another search engine) to build up more associations / collocations of each word.

2. INTERNET: Search the Internet and find more information on fleas. Share your findings with your class in the next lesson.

3. PROS AND CONS: Make a poster outlining the pros and cons of genetically modified food. Show your posters to your classmates in your next lesson. Did you all write similar things?

4. DIARY/JOURNAL: You are a flea. Write your diary/journal entry for one day in your life. Show what you wrote to your classmates in the next lesson. Did you all write about similar things?

ANSWERS

TRUE / FALSE:

a. F b. T c. T d. F e. T f. F g. F h. F

SYNONYM MATCH:

a.	unraveled	figured out
b.	implications	ramifications
c.	detailing	specifying
d.	frost	cold
e.	fluids	liquids
f.	expounding	talking about
g.	increase	prolong
h.	application	use
i.	susceptible	prone
j.	detested	hated

PHRASE MATCH:

a.	The latest of nature's secrets	to be unraveled
b.	huge	implications for the future
c.	published a study	detailing their discovery
d.	help protect plants or animals	from frost
e.	lowering the freezing	point of fluids in their bodies
f.	tissue	matching
g.	increase the shelf	life of organs
h.	allow crops to survive	a cold snap
i.	able to genetically modify any	crop that was susceptible to frost
j.	not related to the	much-detested biting flea

GAP FILL:

Fleas have organ-saving antifreeze

The latest of nature's secrets to be **unraveled** comes from the tiny snow flea, which has been found to contain a protein that could have **huge** implications for the future of transplant surgery and agriculture. Researchers from Queen's University in Ontario, Canada have published a study **detailing** their discovery of a type of flea that can survive even when **buried** under snow because of antifreeze **properties**. The researchers said their findings could help protect plants or animals from **frost** or allow donated transplant organs to be **stored** and transported at lower temperatures. The **microscopic**, six-legged snow fleas survive by lowering the freezing point of fluids in their bodies by 11 degrees.

Scientists are expounding many **potential** practical applications for the new protein. One is the possibility of storing transplant organs at cooler temperatures to **preserve** them for longer. Lead researcher Dr. Laurie Graham said **flooding** an organ with the antifreeze might allow it to be stored at lower temperatures and prevent it from **freezing**. She added: "You would have longer to do **tissue** matching to get the organ to the patient and just increase the shelf **life** of organs." Another possible application could be to allow crops to survive a cold snap. Dr. Graham explained: "If you were able to genetically modify any crop that was **susceptible** to frost you may be able to generate a crop that's not so sensitive." The snow flea is wingless and is not related to the much-**detested** biting flea.