



How Volcanoes Shaped Earth's Early Nitrogen Cycle and Life's Origins

Description

What did volcanism on early Earth teach us about life? A [new study](#) in *Nature Communications* explores this question. Scientists looked at how volcanoes long ago might have affected the nitrogen cycle, which is important for marine life. This study helps us understand life in early Earth's oceans.

The researchers studied 2.5-billion-year-old stromatolites in Zimbabwe. Stromatolites are unique rock formations made by tiny microorganisms. They wanted to find out how nitrogen isotope patterns connected to the Great Oxidation Event. This event, which happened about 2.5 billion years ago, was a key moment in the history of life on Earth. Back then, much of the land was underwater, and volcanoes were active in the oceans.

Dr. Ashley Martin, the study's lead author, said, "Nitrogen and phosphorus are important nutrients for ocean life. We saw high nitrogen levels in shallow water stromatolites and lower levels in deep ocean sediments. This means ammonium moved from deep to shallow waters."

What new findings about early Earth will scientists discover in the future? We will have to wait and see!

Keep doing science and keep looking up!

Vocabulary List:

1. **Volcanism** /vɒl'keɪ.nɪ.zəm/ (noun): The geological processes associated with the movement of molten rock from within the Earth.
2. **Stromatolites** /strə'mæt.ə.laɪts/ (noun): Layered sedimentary formations created by the activities of microbial communities.
3. **Isotope** /'aɪ.sə.təʊp/ (noun): Variants of a particular chemical element that have the same number of protons but different numbers of neutrons.
4. **Nutrients** /'nju:.tri.ənts/ (noun): Substances that provide nourishment essential for the maintenance of life and for growth.
5. **Oxidation** /'ɒk.sɪ'deɪ.ʃən/ (noun): A chemical reaction in which a substance combines with oxygen or loses electrons.
6. **Sediments** /'sed.ɪ.mənts/ (noun): Particulate matter that is carried by water or air and eventually settles down.

Comprehension Questions



Multiple Choice

1. What was the focus of the new study in Nature Communications?

- Option: Impact of volcanoes on early Earth's climate
- Option: Effect of volcanoes on the nitrogen cycle
- Option: Formation of stromatolites in Zimbabwe
- Option: Discovery of new marine species

2. What are stromatolites?

- Option: Rock formations from volcanic eruptions
- Option: Created by ancient civilizations
- Option: Made by tiny microorganisms
- Option: Artificial structures built by researchers

3. According to Dr. Ashley Martin, what did high nitrogen levels in shallow water stromatolites indicate?

- Option: Ammonium movement from shallow to deep waters
- Option: No connection to the nitrogen cycle
- Option: CO2 levels in the atmosphere
- Option: Ammonium movement from deep to shallow waters

4. What was a key moment in the history of life on Earth around 2.5 billion years ago?

- Option: Industrial Revolution
- Option: Great Oxidation Event
- Option: Dinosaur extinction
- Option: First human civilization

5. During the events 2.5 billion years ago, where were the volcanoes active?

- Option: On land
- Option: Underwater
- Option: In the atmosphere
- Option: On other planets

6. What do high nitrogen levels in shallow water stromatolites and lower levels in deep ocean sediments suggest?

- Option: Ammonium stayed in deep ocean sediments
- Option: Hard Marine Life Conditions
- Option: Ammonium moved from shallow to deep waters
- Option: Volcanoes affected marine life



True-False

7. The new study in Nature Communications focused on the impact of ancient civilizations on volcanic activity.
8. Stromatolites are rock formations made by microscopic organisms.
9. The Great Oxidation Event occurred about 2.5 billion years ago.
10. Dr. Ashley Martin discovered the link between ammonium movement and deep ocean sediments.
11. The study helps us understand life only on modern Earth's oceans.
12. The rise in nitrogen levels in stromatolites was uniform across all water levels.

Gap-Fill

13. The researchers studied _____ -billion-year-old stromatolites in Zimbabwe.
14. Dr. Ashley Martin mentioned that nitrogen and phosphorus are important nutrients for ocean _____.
15. The Great Oxidation Event was a key moment in the history of life on Earth around _____ billion years ago.
16. Dr. Ashley Martin stated that high nitrogen levels in shallow water stromatolites indicated ammonium movement from deep to _____ waters.
17. During the key moment in Earth's history, much of the land was _____.
18. Volcanoes were active in the _____ during the events 2.5 billion years ago.

Answer

Multiple Choice: 1. Effect of volcanoes on the nitrogen cycle 2. Made by tiny microorganisms 3. Ammonium movement from deep to shallow waters 4. Great Oxidation Event 5. Underwater 6. Ammonium moved from deep to shallow waters



True-False: 7. False 8. True 9. True 10. False 11. False 12. False
Gap-Fill: 13. 2.5 14. life 16. shallow 17. underwater 18. oceans

Vocabulary quizzes

Multiple Choice (Select the Correct answer for each question.)

1. Which term refers to the stage of software development where a product is tested by a select group of users?

- Option: Beta
- Option: Emojis
- Option: Control Center
- Option: Lander

2. Who are individuals trained to travel and work in space?

- Option: Villain
- Option: Ambient
- Option: Astronauts
- Option: Notifications

3. Which term is related to geological activities involving volcanoes?

- Option: Control Center
- Option: Volcanic
- Option: Experiments
- Option: Connect

4. What do you call distinctive attributes or aspects of something?

- Option: Switch
- Option: Destroyed
- Option: Features
- Option: Special

5. Who is typically a parent of one's parent?

- Option: Surprising
- Option: Bond
- Option: Grandparents
- Option: Mission

6. Which term means causing astonishment or amazement?

- Option: Surprising



- Option: Announced
- Option: Lander
- Option: Experiments

7. What is a variant of a chemical element with the same number of protons but different neutrons?

- Option: Lander
- Option: Isotope
- Option: Memories
- Option: Switch

8. What is the chemical process involving the loss of electrons?

- Option: Notifications
- Option: Bond
- Option: Oxidation
- Option: Recipes

9. Who is the character often regarded as the antagonist in a story?

- Option: Stromatolites
- Option: Villain
- Option: Nutrients
- Option: Astronauts

10. What are substances that provide nourishment essential for the maintenance of life and growth?

- Option: Nutrients
- Option: Features
- Option: Switch
- Option: Memories

Gap-Fill (Fill in the blanks with the correct word from the vocabulary list.)

- 11. _____ play a significant role in how we perceive and interact with the world.
- 12. The astronauts were assigned a critical _____ to explore a distant planet.
- 13. The research team _____ that the new drug is effective in treating the disease.
- 14. Our _____ of childhood often shape our personality and outlook on life.
- 15. Please remember to turn off the lights before you _____ to the next room.
- 16. Receiving a handmade gift can make someone feel truly _____.



17. The villain sought to _____ the peaceful kingdom and claim the throne.
18. The latest smartphone model boasts advanced camera _____ for better photography.
19. There is a strong _____ between the twins that goes beyond mere sibling connection.
20. The new app allows users to easily _____ with friends and family through messaging.

Matching Sentences (Match each definition to the correct word from the vocabulary list.)

21. Timely alerts and updates are sent through the app to keep users informed.
22. The central hub for managing various settings and preferences on the device.
23. Scientific tests and trials conducted to validate hypotheses or discover new phenomena.
24. The spacecraft component designed to safely land on a planetary surface.
25. To establish a relationship or link between two or more entities.
26. Detailed instructions for preparing a variety of delicious dishes.
27. Refers to the surrounding environmental conditions or atmosphere.
28. Ancient structures formed by layering of microbial mats in shallow water.
29. A close connection or strong relationship between individuals or groups.
30. The antagonist or negative character often opposing the protagonist in stories.

Answer

Multiple Choice: 1. Beta 2. Astronauts 3. Volcanic 4. Features 5. Grandparents 6. Surprising 7. Isotope 8. Oxidation 9. Villain 10. Nutrients

Gap-Fill: 11. Emotions 12. Mission 13. Confirmed 14. Memories 15. Switch 16. Special 17. Destroy 18. Features 19. Bond 20. Connect

Matching sentence: 1. Notifications 2. Control Center 3. Experiments 4. Lander 5. Connect 6. Recipes 7. Ambient



8. Stromatolites 9. Bond 10. Villain

CATEGORY

1. Sci/Tech - LEVEL1

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