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# Martian Subsurface Reveals Thriving Ocean: Life-Giving Water Found

## Description

A groundbreaking study released on Monday, utilizing data collected by NASA's Mars InSight lander, has revealed compelling evidence of liquid water existing deep below the surface of the fourth planet. This significant discovery not only advances the quest for life on Mars but also sheds light on the possible fate of the planet's ancient oceans.

Since its arrival on the Red Planet in 2018, the InSight lander has been diligently collecting seismic data for over four years, analyzing the impact of Marsquakes on the planet's crust and unveiling the composition of subterranean materials.

An image of InSight's seismometer on the Martian surface, captured in one of the final snapshots taken by NASA's InSight Mars lander on December 11, 2022. via REUTERS

The researchers have found compelling evidence suggesting the presence of liquid water deep beneath the lander. Water, a key component for sustaining life, is believed to have existed on Mars' surface in the form of lakes, rivers, and oceans over three billion years ago.

According to Vashan Wright from the University of California San Diego's Scripps Institution of Oceanography, "The ingredients required for life as we know it exist in Mars' subsurface, if our interpretations hold true." The study points to substantial reservoirs of liquid water situated between 11.5 to 20 kilometers beneath the Martian surface as the most plausible explanation for the InSight data.

Moreover, the study suggests that the predicted volume of liquid water below Mars' surface exceeds the estimated water levels of the hypothesized ancient Martian oceans. This finding underscores the importance of understanding Mars' water cycle, investigating past surface water, searching for signs of past or existing life, and evaluating potential resources for future missions.

Mars InSight's first full selfie, showcasing the lander's solar panels and deck. NASA/JPL-Caltech / SWNS

The study, authored by Vashan Wright, Matthias Morzfeld, and Michael Manga, emphasizes the transformative impact of collaborative human efforts in exploring and unraveling the mysteries of distant planets. This significant research was published in the Proceedings of the National Academy of Sciences during the week of Aug. 12.

Reflecting on this monumental achievement, Wright expressed hope that both the scientific community and the general public would find inspiration in the collective endeavor to unravel the secrets of Mars and expand the horizons of human understanding.

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## Vocabulary List:

1. **Groundbreaking** /'graʊnd,breɪkɪŋ/ (adjective): Innovative and pioneering; introducing new ideas or methods.
2. **Compelling** /kəm'peliŋ/ (adjective): Evoking interest attention or admiration in a powerfully irresistible way.
3. **Subterranean** /ˌsʌb.tə'reɪ.ni.ən/ (adjective): Existing occurring or done under the earth's surface.
4. **Reserves** /rɪ'zɜrvz/ (noun): Supplies or stocks of resources held for future use.
5. **Hypothesized** /haɪ'pɒθəsaɪzd/ (verb): Formulated a hypothesis; proposed an explanation based on limited evidence.
6. **Transformative** /træns'fɔ:rmətɪv/ (adjective): Causing a marked change in someone or something.

## Comprehension Questions

### Multiple Choice

1. What is the primary focus of the groundbreaking study utilizing data collected by NASA's Mars InSight lander?  
Option: Weather patterns on Mars  
Option: Existence of liquid water below Mars' surface  
Option: Composition of Mars' atmosphere  
Option: Impact of solar radiation on Mars
2. Where is the liquid water believed to exist according to the study findings?  
Option: Just below the Martian surface  
Option: Several kilometers above the Martian surface  
Option: Between 50 to 100 kilometers beneath the Martian surface  
Option: At the polar ice caps of Mars
3. Who is mentioned as one of the authors of the significant research published in the Proceedings of the National Academy of Sciences?  
Option: Elon Musk  
Option: Jeff Bezos  
Option: Vashan Wright  
Option: Mark Zuckerberg
4. What role has the InSight lander played since its arrival on Mars in 2018?



- Option: Collecting samples of Martian rocks
- Option: Analyzing the atmosphere of Mars
- Option: Monitoring seismic activity and subterranean composition
- Option: Searching for signs of alien life on Mars

5. What is the most plausible explanation for the InSight data according to the study?

- Option: Presence of ancient civilizations on Mars
- Option: Existence of underground volcanic activity
- Option: Substantial reservoirs of liquid water below Mars' surface
- Option: High concentrations of methane in Mars' atmosphere

6. What did the study suggest about the predicted volume of liquid water below Mars' surface compared to the ancient Martian oceans?

- Option: It is significantly lower
- Option: It is equal to the estimated water levels of ancient oceans
- Option: It exceeds the estimated water levels of ancient oceans
- Option: It is impossible to compare

## Answer

**Multiple Choice:** 1. Existence of liquid water below Mars' surface 2. Between 11.5 to 20 kilometers beneath the Martian surface 3. Vashan Wright 4. Monitoring seismic activity and unveiling subterranean composition 5. Substantial reservoirs of liquid water below Mars' surface 6. It exceeds the estimated water levels of ancient oceans

## Vocabulary quizzes

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

1. Which term describes something innovative and pioneering?

- Option: Reserves
- Option: Groundbreaking
- Option: Exclusivity
- Option: Opulent

2. Which word suggests a significant change or impact?

- Option: Compelling
- Option: Transformative
- Option: Prestigious



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Option: Seclusion

3. What term is associated with the sky or heavens?

Option: Scarcity

Option: Celestial

Option: Manifestation

Option: Intrigued

4. Which term refers to something complex and refined?

Option: Catastrophic

Option: Sophisticated

Option: Observation

Option: Complexity

5. Which term means the quality of being attractive or fascinating?

Option: Opulent

Option: Allure

Option: Seclusion

Option: Illumination

6. What term is used to describe something suggested or theorized?

Option: Significant

Option: Hypothesized

Option: Twilight

Option: Conjunction

7. Which word relates to the actions or conduct of individuals or organisms?

Option: Behavior

Option: Antisocial

Option: Illumination

Option: Twilight

8. What term signifies the action of supplying light or brightening something?

Option: Exclusivity

Option: Scarcity

Option: Illumination

Option: Intrigued

9. Which term refers to supplies or resources kept for future use or requirements?



- Option: Compelling
- Option: Reserves
- Option: Redefining
- Option: Opulent

10. What term indicates something involving or causing a disastrous event?

- Option: Catastrophic
- Option: Prestigious
- Option: Exclusivity
- Option: Seclusion

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

11. The luxury brand maintained an air of \_\_\_\_\_ limiting access to its products to a select few.
12. The creatures of the forest emerged at \_\_\_\_\_ as day turned into night.
13. The sudden storm was a clear \_\_\_\_\_ of the power of nature.
14. The \_\_\_\_\_ of the issue required a team of experts to unravel its intricacies.
15. The artist sought \_\_\_\_\_ in a remote cabin to find inspiration for their next masterpiece.
16. The scientist conducted careful \_\_\_\_\_ of the behavior of the birds in their natural habitat.
17. The Northern Lights are a natural \_\_\_\_\_ that captivates all who witness them.
18. The innovative technology was \_\_\_\_\_ the way people interacted with each other.
19. The discovery of the ancient ruins was a \_\_\_\_\_ moment in archaeological history.
20. The widow was still \_\_\_\_\_ the loss of her husband finding it hard to move on.

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



21. The palace was decorated in a grand and lavish style befitting its royal inhabitants.
22. During the drought there was a of fresh water causing hardship for the villagers.
23. The mysterious phone call left her wondering who could be on the other end.
24. The alignment of the planets in was a rare astronomical event.
25. The of the path with lanterns made the garden look magical at night.
26. The moon shone brightly in the clear night sky.
27. The of the political situation required careful analysis to understand.
28. Scientific of the stars led to groundbreaking discoveries in astronomy.
29. The new educational program had a impact on student performance.
30. Winning the award was a achievement for the young actress.

## Answer

**Multiple Choice:** 1. Groundbreaking 2. Transformative 3. Celestial 4. Sophisticated 5. Allure 6. Hypothesized 7. Behavior 8. Illumination 9. Reserves 10. Catastrophic

**Gap-Fill:** 11. exclusivity 12. twilight 13. manifestation 14. complexity 15. seclusion 16. observation 17. phenomenon 18. redefining 19. significant 20. grieving

**Matching sentence:** 1. opulent 2. scarcity 3. intrigued 4. conjunction 5. illumination 6. crescent 7. complexity 8. observation 9. transformative 10. prestigious

## CATEGORY

1. Sci/Tech - LEVEL5

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