

Experts Call for Action Against 'Mirror Life' to Protect Global Health

Description

A consortium of scientists is advocating for an urgent dialogue on the potential hazards posed by life forms composed of 'mirror-image molecules,' due to the considerable risks these entities may entail for global health.

While these extraordinary organisms have yet to be realized, the authors contend that we must scrutinize this emerging frontier with careful examination before proceeding further.

According to the 38 experts in a recent [Science commentary](#), "Driven by curiosity and promising applications, some researchers have embarked on endeavors to create life forms comprised entirely of mirror-image biological molecules."

The authors assert that "Such mirror organisms would represent a profound deviation from established life forms, thus necessitating meticulous contemplation."

All known life derives from 'right-handed' nucleotides in DNA and RNA, alongside 'left-handed' amino acids that construct proteins. This phenomenon is characterized as [homochirality](#). While the precise origins of this characteristic are still unclear, it remains an immutable aspect of our biosphere's chemical processes, leaving no room for alternatives.

Intriguingly, the existence of mirror-image counterparts to our nucleotides and amino acids has sparked speculation among researchers about the feasibility of developing a novel kind of life based on these reversed molecules.

The pursuit of such an endeavor would initially focus on creating simpler organisms, like bacteria. Researchers are drawn to these peculiar bacteria for several reasons. For pharmaceutical companies, the labor-intensive production of molecules from scratch is often outsourced to bacteria; however, to generate mirror-image molecules, they require mirror-image microbes.

In 2016, Harvard geneticist George Church and his team successfully produced a mirror version of DNA polymerase, an essential enzyme for DNA replication. At that time, Church hailed this advancement as a "[significant milestone](#)" toward the ultimate goal of constructing an entire mirror-image cell. Presently, however, Church finds himself among the 38 scientists expressing caution regarding this trajectory.

The potential incapacity of biological systems to decompose these mirror proteins was once seen as an advantage, yet this very incompatibility with conventional life is now alarming scientists.

Biochemist Michael Kay from the University of Utah articulates, "There is a plausible threat that mirror life could proliferate uncontrollably, as it would likely evade natural regulatory mechanisms that limit bacterial overgrowth." He further elaborates, "These mechanisms include bacterial predators, antibiotics, and the immune system, which are not expected to affect a mirror organism or its digestive enzymes."

This inverted life form might be compromised by its organic incompatibility. Our molecular chirality



facilitates compatibility with the molecular structures of the organisms we consume; consequently, it is likely that mirror bacteria would struggle to survive without sustenance that mirrors their own composition.

Nevertheless, the collective of scientists behind this paper remains firmly convinced that we cannot afford to engage in experimentation with such uncertainties, even if the risks are not imminent.

According to microbiologist Vaughn Cooper from the University of Pittsburgh, "Although creating such an organism would be immensely challenging, we must halt that progress and urgently engage in a thorough, collaborative dialogue on effective governance in this matter." He concludes, "There is an exciting potential for groundbreaking science within these technologies that we wish to nurture; however, the construction of a mirror bacterium is an unwarranted risk."

This critical discourse is documented in a recent issue of [Science](#), accompanied by a [technical report](#) released by Stanford University.

Vocabulary List:

1. **Consortium** /kən'sɔːr.ti.əm/ (noun): An association of two or more individuals or organizations for a common purpose.
2. **Hazards** /'hæz.əd/ (noun): Dangers or risks that could cause harm.
3. **Contend** /kən'tend/ (verb): To assert something as a position in an argument.
4. **Meticulous** /mə'tɪk.jə.ləs/ (adjective): Showing great attention to detail; very careful and precise.
5. **Proliferate** /prə'lif.ə.reɪt/ (verb): To increase rapidly in numbers; to multiply.
6. **Governance** /'gʌv.ən.əns/ (noun): The act or manner of governing or overseeing the control and direction of something.

Comprehension Questions

Multiple Choice

1. What are scientists advocating for regarding life forms composed of mirror-image molecules?

Option: Immediate creation

Option: Caution and dialogue

Option: Complete prohibition

Option: Outsourcing research

2. Why do researchers need mirror-image microbes to generate mirror-image molecules?



- Option: For regulatory purposes
- Option: To maintain homochirality
- Option: For pharmaceutical production
- Option: To increase complexity

3. What did George Church and his team produce in 2016 as a milestone?

- Option: Mirror-image polypeptides
- Option: Mirror bacteria
- Option: Mirror DNA polymerase
- Option: Mirror cell wall

4. Why are scientists concerned about the potential of mirror life forms to proliferate uncontrollably?

- Option: Due to antibiotic resistance
- Option: Presence of tailored enzymes
- Option: Evading natural regulatory mechanisms
- Option: Lack of sustenance

5. What is one factor contributing to the assumed struggle for mirror bacteria to survive?

- Option: Organic incompatibility
- Option: Molecular chirality
- Option: Regulatory mechanisms
- Option: Antibiotic resistance

6. According to microbiologist Vaughn Cooper, what should be immediately halted?

- Option: Research on bacterial overgrowth
- Option: Dialogue regarding mirror life
- Option: Pharmaceutical outsourcing
- Option: Creating mirror organisms

True-False

- 7. Mirror organisms based on reversed molecules have already been realized.
- 8. George Church supports the construction of a mirror bacterium without reservations.
- 9. Michael Kay expresses concerns about the potential uncontrollable proliferation of mirror life forms.
- 10. Regular biological systems are fully equipped to decompose mirror proteins.



11. Vaughn Cooper advocates for a thorough dialogue on governance regarding the creation of mirror organisms.
12. Creating mirror bacteria is considered by experts as a potential groundbreaking science development.

Gap-Fill

13. Harvard geneticist George Church successfully produced a mirror version of DNA polymerase in _____.
14. All known life derives from "right-handed" nucleotides in DNA and RNA, alongside "left-handed" amino acids that construct proteins. This phenomenon is characterized as _____.
15. Researchers are drawn to mirror-image bacteria for pharmaceutical production due to the _____ involved.
16. According to biochemist Michael Kay, mirror life could evade natural regulatory mechanisms that limit _____.
17. The pursuit of mirror organisms necessitates careful contemplation due to their deviation from established life forms in our _____.
18. Microbiologist Vaughn Cooper believes that the construction of a mirror bacterium poses an unwarranted _____.

Answer

Multiple Choice: 1. Caution and dialogue 2. For pharmaceutical production 3. Mirror DNA polymerase 4. Evading natural regulatory mechanisms 5. Organic incompatibility 6. Creating mirror organisms

True-False: 7. False 8. False 9. True 10. False 11. True 12. False

Gap-Fill: 13. 2016 14. homochirality 15. labor-intensive 16. bacterial overgrowth 17. biosphere 18. risk



Vocabulary quizzes

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

1. Which term relates to the atmosphere or mood of a place?
Option: Regrowth
Option: Ambiance
Option: Hazards
Option: Coping
2. Which term describes the value of food in providing nourishment?
Option: Biodegradable
Option: Mitigate
Option: Nutritional
Option: Exacerbate
3. Which term refers to traits or conditions passed down from ancestors?
Option: Sulforaphane
Option: Hereditary
Option: Proliferation
Option: Compelling
4. Which term is used to describe the ability to produce a desired effect?
Option: Efficacy
Option: Governance
Option: Augment
Option: Cognitive
5. Which term means to have a mutual relationship or connection?
Option: Correlate
Option: Proliferate
Option: Indulgence
Option: Prominent
6. Which term is an enzyme responsible for the breakdown of glucosinolates into bioactive compounds?
Option: Adverse
Option: Myrosinase
Option: Diminish
Option: Meticulous
7. Which term describes the act of enjoying pleasure or luxury?



- Option: Mitigate
- Option: Indulgence
- Option: Compelling
- Option: Hazards

8. Which term means important famous or noticeable?

- Option: Prominent
- Option: Contend
- Option: Regrowth
- Option: Hazards

9. Which term means to make less severe serious or painful?

- Option: Mitigate
- Option: Biodegradable
- Option: Coping
- Option: Compelling

10. Which term refers to dangers or risks?

- Option: Hereditary
- Option: Hazards
- Option: Sulforaphane
- Option: Correlate

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

- 11. _____ of misinformation on social media is a growing concern.
- 12. The speaker made a _____ argument for implementing the new policy.
- 13. Proper care and nutrition can help promote the _____ of damaged hair.
- 14. Regular exercise has been shown to improve _____ functions.
- 15. Using _____ materials can reduce environmental impact.
- 16. Broccoli contains _____ a compound with potential health benefits.
- 17. Effective _____ is crucial for maintaining organizational structure.
- 18. The effects of the medication are expected to _____ over time.



19. Adding fresh herbs can _____ the flavor of the dish.
20. Businesses need to _____ with challenges to stay competitive.

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

21. Ignoring the issue could potentially worsen the situation.
22. Finding healthy ways to deal with stress is essential for mental well-being.
23. The medication may cause unintended negative effects.
24. She approached the task with great attention to detail.
25. The species began to rapidly increase in number.
26. The evidence presented was convincing and engaging.
27. A group of companies collaborated to fund the research project.
28. The disease is widespread in the region.
29. The study aimed to measure the effectiveness of the new treatment.
30. Workers were trained to identify and avoid potential dangers.

Answer

Multiple Choice: 1. Ambiance 2. Nutritional 3. Hereditary 4. Efficacy 5. Correlate 6. Myrosinase 7. Indulgence 8. Prominent 9. Mitigate 10. Hazards

Gap-Fill: 11. Proliferation 12. Compelling 13. Regrowth 14. Cognitive 15. Biodegradable 16. Sulforaphane 17. Governance 18. Diminish 19. Augment 20. Contend

Matching sentence: 1. Exacerbate 2. Coping 3. Adverse 4. Meticulous 5. Proliferate 6. Compelling 7. Consortium 8. Prevalent 9. Efficacy 10. Hazards

CATEGORY

1. Sci/Tech - LEVEL5

Date Created

2024/12/14

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