NATIONAL ACADEMIES *Sciences Engineering Medicine*

Transdisciplinary Biotechnology at the National Academies

Mirror Image Biology: Pushing the Envelope in Designing Biological Systems

September 29-30, 2025

Kavita Berger, Director, Board on Life Sciences

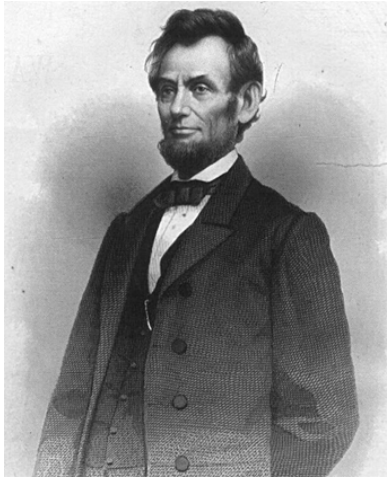
Sarah Juckett, Project Director

Who are We?

National Academy of Sciences

Established to honor the nation's top scientists and advise the government on issues of science and technology.

Independent, Objective, Accurate, Transparent Scientific Input



"…The Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science…"

1863 Congressional Charter of the National Academy of Sciences

Standing Committee on Advances and National Security Implications of Transdisciplinary Biotechnologies

Unlock biotechnology's potential for national security and defense, including helping to maintain strategic advantage in this field and promote US values in responsible innovation

- Anticipate and examine biotechnologies
- Inform the biotechnology innovation ecosystem from basic through application
- Foster partnership among scientists and national security experts
- Identify actions to leverage promising biotechnology developments

Standing Committee Members

Rocco Casagrande, Co-Chair
Deloitte Consulting

Diane DiEuliis, Co-Chair
National Defense University

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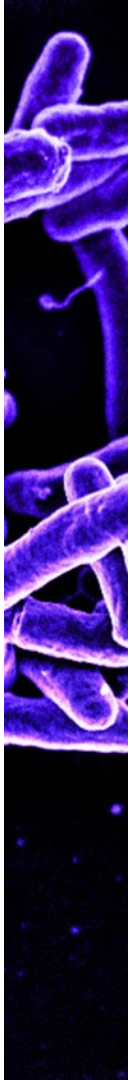
Mirror Image Biology: Pushing the Envelope in Designing Biological Systems

A WORKSHOP

NATIONAL ACADEMIES Sciences Engineering Medicine

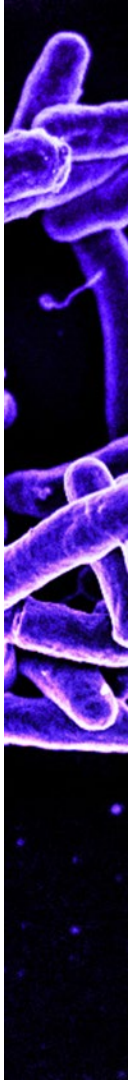
Statement of Task

Under the auspices of the *Standing Committee on Advances and National Security Implications of Transdisciplinary Biotechnology*, The National Academies of Sciences, Engineering, and Medicine will convene an ad hoc planning committee to plan and facilitate a workshop on mirror biology, focusing on the state of the science, trends in research and development, risks and benefits of this research, and considerations relating for future governance of relevant enabling technologies. The committee will engage scientists, technologists, policymakers, journalists, biosecurity experts, and ethicists who work in fields associated with the design and development of living systems to discuss the following questions during the workshop:



Statement of Task | Specific Agenda Questions

- What is mirror biology and why is it being studied?
- What is the state of the science in mirror biology and recent milestones in mirror biology?
- What are the scientific and technological hurdles associated with mirror biology? What research is ongoing to overcome these challenges?
- What are the proposed applications for research involving mirror biology and what sectors are anticipated to benefit from such advances?
- What are the risks associated with mirror biology? Which risk assessment methodologies are suitable to assess those risks?
- In what ways can the risks be minimized and benefits be maintained and/or maximized? Are these approaches similar for all relevant sectors (e.g., health, bioeconomy, agriculture, other)?
- What can be done both domestically and internationally to enable responsible innovation in mirror biology and its application to various sectors?



Workshop Committee

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Kavita Berger
Board on Life Sciences Director

Layla Garyk
Senior Program Assistant

Jessica De Mouy
Research Associate

The Role of National Academies Workshops

- Bring together stakeholders for discussion on and exploration of the latest scientific advancements and issues areas.
- Encourage objective, open, and transparent communications.
- No recommendations are produced, but published proceedings chronicle the presentations and discussions.
- Comments made at the workshop should be attributed to speakers and not their organization unless otherwise stated. Thoughts shared at the workshop should not be interpreted as the opinion of the National Academies.

*Please be aware that by participating in this meeting, you consent to your comments being recorded and used in any media now known or hereafter devised in perpetuity, and you release The National Academies of Sciences, Engineering, and Medicine from any liability due to such usages. If you prefer not to, we encourage you to watch and listen to the workshop speakers only.

To Join the Discussion….

We request that **all participants**, in person and virtual, **use Slido to ask questions**

In-person participants: use either your phone, personal computer, or the computer in the back of the room to submit Slido questions

Zoom participants: the link to the Slido will be shared now in the chat

Livestream participants: the Slido box is found under the video box