

Philosophy of science

with Dr Ross Stein

Talking points

Knowledge

1. What is an enzyme?

Comprehension

2. From a scientific perspective, how do chemical reactions occur?
3. Why is it important to understand chemical reactions in order to develop new medicines?
4. What are the differences in how substance metaphysics and process metaphysics explain why chemical reactions occur?
5. Why does Ross argue that process metaphysics is more consistent with modern chemistry than substance metaphysics?

Application

6. Modern chemistry describes molecules as constantly moving and interacting. How might this understanding influence the way scientists investigate enzymes or design medicines?
7. How has studying philosophy influenced Ross's approach to scientific research?

Evaluation

8. To what extent do you agree that philosophy can contribute to scientific progress, even though philosophers do not carry out experiments? Why?
9. Scientific discoveries often answer how something happens, while philosophy asks why it happens. To what extent do you agree that both types of questions are equally important? Why?

Activity

Philosophy and science have always been closely connected. While science investigates how the world works through observation, experiments and evidence, philosophy asks deeper questions about why things happen and what scientific explanations really mean. Many important scientific ideas have developed because researchers questioned existing assumptions and explored new ways of understanding the world.

Ross argues that philosophy can strengthen scientific thinking by encouraging researchers to examine the concepts behind their work. His interest in process metaphysics, for example, has influenced how he thinks about enzymes and chemical reactions, leading him to view molecules as dynamic, constantly changing systems rather than fixed entities. Although philosophy does not replace scientific experiments, it can help scientists interpret evidence, develop theories and ask better research questions.

Discussion

Work with a partner or in small groups to explore the role of philosophy in modern science by discussing the following questions:

- Why is it important for scientists to question assumptions rather than simply accepting existing ideas?
- How can philosophy encourage critical and creative thinking in scientific research?
- Can philosophical thinking contribute to scientific discoveries and technological innovation? Find real-world examples.
- How might philosophy improve communication between scientists and the wider public?
- Should philosophy be included as part of science education for all students? Why, or why not?

Case study

Choose a scientific discovery or theory (e.g. evolution, quantum mechanics, climate science) and investigate how scientific understanding of this topic has developed over time. Identify the assumptions that were challenged, the evidence that changed scientists' thinking, and how considering alternative explanations contributed to progress.

Reflection

Write a short essay (~500 words) answering the following question: "Can science continue to advance without philosophy, or does philosophical thinking play an essential role in scientific discovery?" Use examples from Ross's article and your own research to support your answer.

More resources

- The Philosophy Foundation provides educational resources about philosophy: philosophy-foundation.org/philosophy-for-children