

Philosophy 1103: Introduction to Philosophy of Science

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Practice Quiz 4

Total: 40 marks

1. (i) According to Thomas Kuhn, how does a scientific community restrict the scientific ideas that a researcher can investigate? (You may refer the duck-rabbit story that I told near the start of the course.) [3 marks]

- (ii) Journal editors and peer reviewers are said to act as ‘gatekeepers’, in keeping some papers from getting published. What is one way in which such gatekeeping can be *beneficial* to science? [3 marks]

- (iii) What is one strategy that scientists can use to increase the chance that one of their papers will pass peer review? [3 marks]

- (iv) According to Sydney Brenner, how can a scientific orthodoxy, operating through the bureaucracies that award research grants, harm scientific progress? [3 marks]

2. Health Canada’s website has the following information about asbestos. [N.B. “serpentine” means flexible and curly, like a snake. Amphibole fibres are straight and stiff, like needles.] [Note also that Health Canada is not necessarily a reliable source of information on health matters.]

“**Asbestos** is the generic name for a variety of fibrous minerals found naturally in rock formations around the world. Because asbestos fibres are strong, durable and non-combustible, they were widely used by industry, mainly in construction and friction materials. Commercial asbestos fibres belong in two broad mineralogical groups: serpentine (chrysotile) and amphibole (tremolite, actinolite and others).

- **Amphibole** asbestos often contains more iron and resists acid and extremely high temperatures. Because of this, it has been heavily used in industrial furnaces and heating systems. However when inhaled, amphibole fibres stay much longer in the lungs than chrysotile fibres and they are more likely to inflict damage and cause disease, including cancer. Accordingly, amphibole asbestos has been drastically controlled and largely replaced.
- **Chrysotile** is the only serpentine asbestos that is found in almost all asbestos-based products available today and is the main form of asbestos still mined. Chrysotile is different from the amphiboles both structurally and chemically. It is generally accepted that chrysotile asbestos is less potent and does less damage to the lungs than the amphiboles.”

- (i) From the information above identify any statement(s) that support the view that asbestos is a natural kind. [3 marks]

- (ii) From the information above, identify any statements that support the view that asbestos is not a natural kind, but merely a pragmatic one. (Also say what pragmatic value the category of asbestos might have.) [3 marks]

- (iii) After considering your answers to parts (i) and (ii), would you say that asbestos is a natural kind or a pragmatic one? Briefly justify your answer. [2 marks]

3. In August 2004 an article by Steve Meyer appeared in the prestigious journal *Proceedings of the Biological Society of Washington*, edited by Richard Sternberg. The article reviewed various unsuccessful attempts to explain the origin of new information during evolutionary history, and then argued that an ‘intelligent designer’ could overcome these difficulties. Meyer concluded that,

“An experience-based analysis of the causal powers of various explanatory hypotheses suggests purposive or intelligent design as a causally adequate—and perhaps the most causally adequate—explanation for the origin of the complex specified information required to build the Cambrian animals and the novel forms they represent.”

Reaction to the article being published was near-instantaneous and furious. A senior Smithsonian scientist wrote in an e-mail: “We are evolutionary biologists and I am sorry to see us made into the laughing stock of the world, even if this kind of rubbish sells well in backwoods USA.” Meyer’s article was withdrawn by the publisher, and Sternberg alleges that he was then “targeted for retaliation and harassment” at the Smithsonian Museum, where he worked.

- (i) Given that Meyer’s ideas had previously been published in various forms, what explains the furious reaction to this paper appearing in this journal? [3 marks]

- (ii) Suppose Meyer had kept the bulk of his paper exactly the same (his criticism of standard theories of evolution) but left out any mention of intelligent design, and altered the conclusion of his paper to something like, “The mechanism by which evolution creates information remains mysterious. More research is needed.” Would that have changed the reception of his paper? Explain your answer. [3 marks]

4. Thomas Kuhn says that, during a ‘scientific revolution’, or ‘paradigm shift’, the meanings of scientific terms can change. The term ‘planet’ seem to be an example of this, as its meaning changed after the Copernican revolution.

(i) Which celestial bodies were considered planets, in Ptolemy’s cosmology? [2]

(ii) What was the common feature of these bodies, that made them ‘planets’? [2]

(iii) What celestial bodies were considered planets, by Copernicans? [2]

(iv) What was the meaning of ‘planet’ for the Copernicans? [2]

(v) Kepler (a Copernican) introduced a new category of ‘satellite’, which included the newly discovered bodies orbiting Jupiter, as well as our moon. Why did Kepler think that this new category was needed? [3]

5. Galileo wrote that, “In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual.” There is evidence, however, that Darwin disagreed. What was that evidence? [3 marks]
