Don't belittle Popper. Refutation cannot be refuted in biology, either.

Sir,

Karl Popper's epistemology is more than meets the eye. We feel that Robin Holliday's letter (BioEssays 21.10) constitutes an unsuccessful attempt to deny its validity in the biological sciences.

Popper has never stated that there are no scientific truths or that basic scientific facts can be refuted by using his design. He had a great reverence towards science, and he was a scientist himself. He only postulated that no scientific theory could ever be relied on to be the final truth in all its details. One well known example: Newtonian mechanics dominated physics for hundreds of years until the dawn of the relativity theory. **Einstein, initiating one of the greatest ''paradigm shifts'' in the history of science, was not out to prove that the Newtonian apple does not plunge to the ground.** He was out to interpret the Michelson-Morley experiment whose results were inconsistent with the Newtonian world view. In essence, he used the Michelson-Morley experiment as Popperian refutation. Notwithstanding Einstein, basic facts remain: apples still fall, and they will do it as long as earth, gravity, and pomology exist.

To demonstrate that refutation plays a large role in biology, consider the example of the p53 gene: its product, the p53 protein was originally isolated from tumor cells and was shown to be oncogenic. It was later found that the oncogenic properties were due to a mutation in the original isolate. Once the true wild-type protein was separated, it became obvious that p53 actually acted as a tumor suppressor gene, having a function exactly the opposite than originally thought.[1] Thus, a Popperian refutation advanced our knowledge towards the truth.

Concerning Dr. Holliday's examples: Who would deny that since Harvey's recognition of the mammalian circulation, cardiovascular physiology has added substantial insights into the machinery of fluid movements in multicellular organisms? But it is obvious that further ''refutations'' are needed in this area, too.

Another example of Dr. Holliday is the genetic DNA code. With its variations, it seems to be universal. But can we be certain that no other genetic code is possible? Or what about the statement: ''The phenomenon of life is carbon based?'' Is it true? Currently, we believe, every biologist would agree. However, in the future, astronauts might detect a silicon-based ''living'' environment on a planet in another solar system, which, then, would constitute a Popperian refutation of the statement above. And one could ''prove'' millions of times, in an inductive way, that life is carbon based, and still this would not provide the final evidence that silicon-based ''life'' forms do not and cannot exist. Simply stated, absence of evidence does not constitute evidence of absence.

Scientists, including biologists, are usually not preoccupied with philosophical and metaphysical problems. Great scientific discoveries have been made by individuals who have never heard Popper's name or the names of other epistemologists. One can play piano without ever having read about ''das wohltemperierte Klavier''. But those biologists who are equipped with a deeper understanding of the epistemologic underpinnings of science will not be disadvantaged.

References

1. Michalovitz D, Halevy O, Oren M. p53 mutations: gains or losses? J Cell Biochem 1991;45:22–29.

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