

The utility of Popper's philosophy in biology

Sir,

Holliday has recently suggested that Popper's philosophy of science is incompatible with genetics and molecular biology.⁽¹⁾ Holliday illustrates his arguments by three examples in which he claims the process of falsification can play no role. However, we shall show that falsification is not only possible in principle for all three cases, but also that in two of Holliday's examples falsification has been applied in practice.

In Holliday's first example, he suggests that the presence of a circulation of the blood in vertebrates can in no way be falsified: "we can be sure that all vertebrates have such circulation without the need to examine each one".

Secondly, the demonstration of Mendelian inheritance for a few genes in a few species is considered by Holliday to prove the ubiquity of Mendelian inheritance: "We do not need to actually study the genetics of the elephant to be sure that it too has Mendelian inheritance". Finally, Holliday claims that the universal genetic code is unfalsifiable: "The code is true; it is universal, and scientists do not waste their time trying to refute or falsify it".

In all three cases Holliday seems to be taking an inductivist stance. There is no other justification for the move from specific observations to general laws. Holliday understands that induction has no basis in logic, so on what grounds does he make his claims to universal laws which are unfalsifiable?

A uniquely biological argument in favour of induction comes from the widespread belief that all life on earth has evolved from a single common ancestor. Since all organisms share common ancestry, so the argument might run, some biological features will be shared by all organisms. But this argument fails because it supposes that certain biological characters cannot evolve (leaving aside the possibility of multiple origins of life).

Consider Holliday's assumption that all vertebrates have a circulation of the blood. If vertebrates are defined by a suite of characters including the circulation of blood, then the statement is self-evident and indeed unfalsifiable. But if one defines vertebrates as a monophyletic group of species, then Holliday's assertion is that the secondary loss of the circulation is impossible in vertebrates. The assertion may seem reasonable in this case, but cannot possibly hold as a general principle, as becomes clear if one replaces "circulation of the blood" with "vision".

In the cases of Mendelian inheritance and the genetic code, it is simple to show that falsification is possible by pointing out exceptions to Holliday's proposed laws. Selfish genes are inherited in a non-Mendelian fashion, and as Holliday himself admits, there is no such thing as a truly universal genetic code.

References

1. Holliday R. The incompatibility of Popper's philosophy of science with genetics and molecular biology. *BioEssays* 1999;21:890-891.

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