

Universal Darwinism

SIR — G. A. Dover¹ dismisses Dawkins's claim for Universal Darwinism² by saying that "there is nothing rational or law-like about biological organization and the processes that gave rise to it, given that there are no predictable regularities of events on a par with physical phenomena". Biologists are indeed driven by the astonishing diversity of life forms and fascinated by "unpredictable organisms"¹. But this must not preclude biologists from finding general principles as physicists do. Trying to focus on (some) individual atom trajectories will not lead one to the laws describing the statistical behaviour of large sets of atoms when some ideal conditions are met. Drawing on the same analogy with the properties of gases, an early commentator, C. S. Peirce, noted that "Darwin, though unable to say what operation of variation and natural selection in any individual case may be, demonstrates that in the long run they will, or would, adapt animals to their circumstances". When a stone slides down a rugged slope, the law of gravity tells us that it will go down, not where it will end up. Science looks not for complete descriptions of facts but for abstracted, testable, universal laws. Biology has at least one such law, evolution by natural selection, which states that a trait distribution will inevitably change from generation to generation whenever some conditions are met: the trait affects reproductive success, is (at least partly) heritable and varies among individuals. Besides species, this law applies to test-tube RNA or computer programs. Einstein published his ideas years before they were actually tested. Biologists would gain from such an open attitude towards theoretical work³. The complexity of biological systems should not prevent us from making universal statements on how this complexity came about. One such statement is that factors other than selection (Lamarckism, mutationism, for example) have only secondary roles. Left alone, those nonselective factors could never produce evolution of organized complexity as we know it, as Dawkins has forcefully demonstrated in his writings, but natural selection alone probably could.

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SIR — "There is," avers Gabriel A. Dover¹, "nothing rational or law-like about biological organization and the process that gave rise to it, given that there are no predictable regularities of

events on a par with physical phenomena." Thus he refutes Richard Dawkins.

Dawkins had written that Darwinian natural selection must be a necessary feature of life anywhere in the Universe (*Nature* 360, 25; 1992); it has to be the case, *a priori*, and empirical evidence, when found, can only confirm this.

I cannot see how Dawkins can be faulted. Let us ignore the one case exemplar we have. If life exists, existed or ever will exist somewhere at some time in the Universe, carbon-based or otherwise, the forms most in harmony with their environment will be those that tend to prosper and survive. If there is any biologist alive, including Dover, who does not hold to this axiomatically, then his arguments against this proposition will be interesting to learn. (Something based on probability theory perhaps?)

Biological organization and processes are and must be as rational and law-like as any other physical phenomena, life being one form of such phenomena and not distinct from them in kind but only

Selling the future

SIR — Reading about the "government proposal to sell off research institutes" (*Nature* 360, 614; 1992), I quickly checked the date to see whether I was in possession of an advance copy of the 1 April issue. Having ascertained that the proposal, to sell off the Medical Research Council's Laboratory of Molecular Biology (LMB) in Cambridge and the National Institute for Medical Research at Mill Hill, was not an April fool's joke, I concluded that the designated fools were other than your readers.

The institutions in question have made great contributions to international science due, at least in part, to their ability to concentrate on long-term, important problems, rather than on the quarterly "bottom line". The proposal to trust them to the tender vagaries of the marketplace will surely astound those familiar with these institutions, as well as with the workings of science. The United States had to develop special legislation for industry to fund even life-saving research that is applied, but has only modest or no-profit potential. This, the case of the 'orphan drugs' used to treat rare diseases, is but one example of the futility of relying on the private sector for basic research. One can also point to the reduction in research and development associated with declines in the business cycle, as illustrated by the recent cutbacks of such paragons of private research as Bell Laboratories.

in degree. Life's complexity, variability, evolution and general unpredictability are not in themselves any evidence of any irrational or lawless quality. Individual forms will vary to suit individual circumstances but the fact that we are unable to predict "regularities of events" in any precise way has nothing to do with the nature of "Universal Darwinism", any more than the fact that we do not know the chemical constituents and other particulars of the farthest quasar — one indeed that we shall never see or even be aware of — has to do with the universality of the law of gravity in its case. Life may not be the same thing as gravity, but that does not mean it is not governed by universal law, one of these being the origin, evolution, and survival (or lack of it) by means of natural selection.

To hold otherwise is to abandon science.

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1. Dover, G. A. *Nature* 360, 505 (1992).

2. Dawkins, R. *Nature* 360, 25–26 (1992).

3. Huszagh, V. A. & Infante, J. P. *Nature* 338, 109 (1989).

Does the proposal to separate "curiosity-driven" from "mission-oriented" research imply that some scientists are not curious enough to seek cures for cancer, atherosclerosis or HIV infection? The very important mission-oriented results originating from research classified as "curiosity-driven" are surely too numerous to recount. It is also far from infrequent that those conducting basic investigations are aware of the important, albeit long term, clinical applications of their "curiosity-driven" research.

The separation of basic and clinical biomedical research and the sale of research institutions that have been responsible for so much basic research that also found major biomedical applications would hinder not only new biomedical discoveries, but also the transfer of such discoveries from the laboratory to the bedside. Nevertheless, should such a "sell off" of LMB and Mill Hill be seriously contemplated, I am certain that many institutions in the United States and elsewhere will happily "bid" to attract the scientists responsible for so much of the scientific excellence in the United Kingdom. This will naturally be followed by indignant cries of "brain drain", the loudest of them from the proponents of this intellectual fire sale.

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