

## Ethical dilemmas

SIR—David G. Potter (*Nature* 340, 180; 1989) says "inescapable ethical dilemmas" exist in animal research and that "*Nature* can no more escape the moral responsibility when it publishes research involving animals than can be investigated".

It is interesting that Potter does not discuss the ethical dilemma of scientists being able to cure human disease, including mental disorders, by animal research, but being unable to do so because animal research has been outlawed. Is it not cruel for humans to suffer pain from diseases that could be curable by animal research? Nor does he discuss his moral responsibility to deny himself all medical care from previous animal research because he wishes to deny future generations the benefits of longer lifespans by future animal research, which Potter wishes to end.

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## DNA fingerprinting

SIR—Do science and the law "differ in temperament"<sup>1,2</sup> to such an extent that evidence recognized as "true" by one would not be recognized as such by the other? Surely any difference is rather that a greater degree of certainty is required when individual freedom, and perhaps in some cases life, is at stake, than when clues for further experimentation are being sought. If Eric Lander's advice that expert guidelines should be established for DNA fingerprinting<sup>3</sup> is taken, it is to be hoped that science and the law can achieve a consensus on what constitutes acceptable evidence.

There are two major uncertainties in any 'DNA fingerprinting' test — the reliability of the probe data with respect to the sample population and the reproducibility of data from a particular laboratory. The first problem could perhaps be addressed in a similar way to the identity parade, that is, suspects and 'controls' from a similar genetic background could be analysed in parallel. The problem of laboratory quality control is not unique to the forensic service and can be dealt with by having samples coded before analysis and by the inclusion of known samples (also coded) in each test. Statistical analysis of any laboratory's output would then be possible, enabling a continuous assessment to be made of the quality of its results.

On a practical note, variation of mobility of DNA fragments in gels is generally

less of a problem in polyacrylamide gels, and the recent description of CA repeat-length polymorphisms<sup>4,5</sup> offers a new set of markers that could be used for fingerprinting<sup>6</sup>. Direct sequencing of amplified CA repeats would provide a very rigorous internal control for repeat-length polymorphisms.

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## Misquoted

SIR—Commenting on the article "The case of the peripatetic fossil" (*Nature* 338, 613; 1989), K. S. Jayaraman (*Nature* 338, 694; 1989) said: "Gupta's colleagues at the Centre for Advanced Study in Geology, including its director, Dr A. K. Prasad, described Talent's allegations as 'a conspiracy to denigrate a top Indian scientist'". This statement is misleading: Jayaraman did not consult us or other colleagues on this issue. As geoscientists working in the same institution, we are directly and deeply concerned with all aspects of the controversy and are alive to the need to find the truth.

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## Raman's prize

SIR—The question of whether Raman deserved an undivided Nobel prize for his 1928 discovery of the light-scattering effect and whether Mandelstam's achievements in this area have been ignored by the Nobel committee still provokes some controversy<sup>1</sup>. But although it is true that some landmark discoveries made by Soviet scientists in this century have failed to receive adequate Nobel recognition, the selection of Raman over the claims of Mandelstam for the 1930 Nobel prize in physics is not a tainted one.

After attending the Sixth Congress of Russian Physicists, C. G. Darwin reported in *Nature* that Mandelstam and Landsberg "had independently discovered Raman's phenomenon, the scattering of light with changed frequency"<sup>2</sup>. Raman refuted this claim emphatically, by writing: "The Russian physicists, to whose observation on the effect in quartz Professor Darwin

refers, made their first communication on the subject after the publication of the notes in *Nature* of 31 March and 21 April. Their paper appeared in print after sixteen other printed papers on the effects, by various authors, had appeared in recognised scientific journals<sup>3</sup>." This has not been repudiated by Raman's competitors.

According to the published census of Nobel nominees and nominators<sup>4</sup>, for the 1929 Nobel prize, Raman received two nominations from N. Bohr and C. Fabry, while Mandelstam received none. In 1930, Raman received ten nominations, which included those of N. Bohr, E. Rutherford, C. T. R. Wilson and L. de Broglie (all previous Nobelists). In the same year, Mandelstam received two nominations and Landsberg one.

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## Time-reversal

SIR—Would not one possible solution to the dilemma posed by Huw Price in "A point on the arrow of time" (*Nature* 340, 181; 1989) be found in Guth's inflationary period? According to that, the Universe does begin in a highly disordered state at Time 0 but at a very early stage inflation sets in and establishes a condition of low entropy, at that point. We thereby have a disorder-disorder type of universe and Hawking has no need to find means of excluding it.

To speak of "temporality" or "atemporality" becomes a problem in semantics and not in physics, and time's "asymmetry" is no longer consequent on initial conditions but only on a subsequent inflation.

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SIR—Huw Price's philosophical discussion of time-reversal in a contracting Universe echoes the discussion put forward by physicist Thomas Gold at least 25 years ago, at a Cornell conference. A more 'popular' account later appeared in *The Runaway Universe*, by Paul Davies (Dent, 1978). Philosophers, it seems, still underestimate physicists as much as the latter underestimate the former. Or does time run more slowly in Australia, so that news of these developments has not yet reached Sydney?

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