International PhD standards

SIR — I recently watched from the sidelines as the university committee charged with administering PhD degrees resolved disagreement by external referees on the worth of a PhD thesis submitted by a student of mine.

One reviewer (from the United States) claimed the thesis provided insufficient advances in the field of study and declined support for the award of the degree, another (from the United Kingdom) judged the thesis excellent and requiring only minor amendments. The process required the judgement of a third external referee who returned a positive grading. The process prolonged the examination period, putting extra pressure on the candidate and raising the question of the nature of international standards for this type of degree.

The extremes were, I believe, symptomatic of different expectations by reviewers of acceptable thesis content — expectations that may reflect quite different perceptions of just what constitutes a PhD degree today. These may largely be related to the period expected for completion — in the United States often 5–6 years, in the United Kingdom up to 3 years. Some European countries expect up to 6 years. The trend in New Zealand is to require com-

pletion within 4 years.

As any biological scientist knows, the product of 6 years' work is vastly different in scale from what may be achieved in 3 years. There is also a greater likelihood of published products within the longer time — a requirement of our negative examiner to obviate his concerns but one that would have prolonged the examination process by many months. Different international expectations must affect the external reviewing process used by most universities to protect the integrity of their higher degrees.

Framing the PhD study to be conservative and guaranteed to yield desired results; directing the course of research to avoid difficult or more challenging areas as they arise; encouraging early publication of any completed work or even incomplete work and selecting external reviewers on the basis of certainty ('cronyism') rather than risk a result based on open expectation — these are all strategies available to supervisory panels to counter possible criticism of thesis content, but most of them are surely contrary to the spirit of investigative science.

Operating longer PhD programmes best suits the universal PhD prescription requirements which require evidence of

independent research and advance of knowledge, but is this the best way to encourage students into advanced science? A 6-year period may better suit the generation of results suitable for publication by the candidate (and grant-dependent supervisors), but it is surely too long as an apprenticeship for a science career. If the PhD degree is to be truly international as a qualification for postdoctoral, academic and industrial positions, reasonable boundaries are needed for the demonstration of both independence in research and advance of knowledge.

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Proving difficult

SIR — An intelligent observer, conscious of the guiding principle of science that the crucial means to distinguish truth from falsehood are those of experiment, but unfamiliar with the notion that paranormal phenomena are 'impossible', would raise his eyebrows on coming upon the following assertions, made recently by two supposedly reputable scientists:

(1) Crane, in reviewing Nicholas

So far, systems in the ÄKTA design family include:

- ÄKTAexplorer, for method development and scale up of every biomolecule
- the new ÄKTApurifier, for purification of peptides, oligonucleotides and other biomolecules