Correspondence

Funding: practices risk promoting bias

Funding processes seem to us to be rewarding only particular types of scientist. This is leading to discriminatory practices in the very institutions that encourage scientists to overcome their implicit biases when making decisions and assessments.

Drawing examples from biomedicine, UK funding initiatives are increasingly calling for applications from investigators who feel they are potentially future leaders who can make a leap, tackle a grand challenge, be transformative and advance a unique, game-changing strategic vision. Such wording risks discouraging more-modest scientists and those patiently pursuing slowly unfolding advances.

Interviews that are designed to seek out such 'winning' qualities could select against those scientists who might be unnerved by a daunting committee. By extension, academic institutions must recruit scientists who fit these norms if they are to succeed in today's competitive funding climate.

Efforts to promote diversity in science will fail if the exemplar of a successful scientist is so narrowly defined. We need more-inclusive hallmarks of performance, as well as equality legislation and training.

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Funding: gamble on radical proposals

The competition to secure funding can deter applicants from submitting radical research proposals, despite their potential for dramatic advance. At University College London (UCL), we have been running a programme for ten years that bypasses conventional funding mechanisms, using our own resources to open up new and unpredictable lines of enquiry.

A grant-application system such as that used today would probably have denied support to many of the twentieth-century scientists who fundamentally changed the ways we think. For example, molecular biologist Oswald Avery and his colleagues disproved the widely held belief that the genetic molecule was a protein (O. T. Avery *et al. J. Exp. Med.* **79**, 137–158; 1944).

UCL took its lead from British Petroleum's Venture Research Unit (1980–93), which awarded funding to a handful of applicants with radical ideas — simply on the basis of face-to-face discussion.

Despite vetoes by peer reviewers, the unit supported academics such as Ken Seddon, who became the United Kingdom's most cited chemist for his work on ionic liquids, and Steve Davies, who set up a company to further his research into molecular architecture and chiral selection. The company sold in 2000 for £316 million (then about US$200 million) — some 15 times the unit's total outlay on venture research.

Universities should follow UCL's lead and use their own resources to set up similar initiatives.

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Keep groundwater clear of pesticides

Pesticide residues from Denmark's intensive-farming industry are contaminating the country's groundwater, which is used exclusively as its source of tap water (see, for example, go.nature.com/2iumpdx). This is despite the governments's raft of protection measures that have been in place since 1994 (see go.nature.com/2xhinf7).

Pesticide residues in drinking water are a threat to public health. They can compromise neuroendocrine development in unborn and newborn children and can lead to chronic kidney diseases in later life (X. Xu *et al. Nature Rev. Nephrol.* **14**, 313–324; 2018), as well as to other, unforeseeable effects.

Pesticides therefore need to be removed at the waterworks before consumption — a process that is economically and environmentally costly. And it is uncertain whether current technology can remove all such residues (P. J. J. Alvarez *et al. Nature Nanotech.* **13**, 634–641; 2018).

We call for greater political accountability and better management of the country's groundwater. In our view, areas where groundwater is abstracted should be protected against pesticide use and farmers should receive economic compensation.

Without such measures, Denmark could end up losing its role in setting the agenda for sustainable use of pesticides through European Union directives, the United Nations Environment Programme and the Stockholm Convention on Persistent Organic Pollutants.

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Mouse avatars guide immunotherapy

We think your discussion on the use of mice with human tumours as cancer models is too pessimistic (*Nature* **560**, 156–157; 2018). These mouse 'avatars' can now be armed with human immune cells and are already providing promising insights into immunotherapies (Y. Choi *et al. Exp. Mol. Med.* **50**, 99; 2018).

One example is a personalized mouse model we developed for melanoma. Here, the tumour and immune cells come from the same individual and the response of the mouse to immunotherapy matches that of the patient (see H. Jespersen *et al. Nature Commun.* **8**, 707; 2017).

Difficulties in getting some human grafts to grow successfully in mice could hinder the widespread application of avatar techniques in routine cancer care. Melanoma xenografts are unusual in that they engraft and grow fast enough to support the initiation of immunotherapy in patients. For ethics reasons, however, avatars are better suited to clinical research, for example, to screen patients' suitability for trials.

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Antibiotic resistance pre-dates penicillin

Clinical antimicrobial resistance was first reported four years before Alexander Fleming's discovery of penicillin in 1928. The antimicrobial in question was known as Salvarsan (S. Silberstein *Arch. Derm. Syph.* **147**, 116–130; 1924).

An antibiotic was originally defined as an agent that microorganisms produce to kill competing bacteria (S. A. Waksman *Mycologia* **39**, 565–569; 1947). This has been extended to include synthetic drugs, including sulfonamides and quinolones. Salvarsan was one such drug, from a group of compounds known as arsphenamines. It was used to treat syphilis from 1910 until the 1940s, when penicillin took over because it was more readily available, safer and more effective.

Bacterial resistance to Salvarsan started to emerge about halfway through that period, despite the drug's limited use by comparison with modern antibiotics. The 1924 paper was cited by several groups during the 1930s (see, for example, W. Beckh and G. V. Kulchar *Arch. Derm. Syphilol.* **40**, 1–12; 1939), but has long since been forgotten.

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