

Model Systems Warrant Support

BY PAUL FISHER

Australia has neglected research using non-mammalian model organisms even though they have had an enormous impact on biomedicine internationally.

Model organisms matter – more than most imagine. They are simple organisms studied in the laboratory to understand fundamental biological processes. In six of the past eight years, Nobel Prizes for Physiology or Medicine have been awarded to researchers working on model organisms and four of those six years featured non-mammalian models. This continues a pattern repeated throughout the Prize's history.

The reason is simple. The cells of simple creatures like yeast, slime moulds, worms, flies, fish or frogs work similarly to our own, but it is easier to conduct definitive experiments with them. In fact, most of what we know about how our cells work was not elucidated in our cells but by using a suitable model organism.

The number of model organisms that are widely used is limited. In addition to the mouse and rat – the two dominant mammalian models – the USA National Institutes of Health (NIH) recognises nine non-mammalian models for their importance in biomedical research. According to my analysis, compared with articles in all areas of science combined, papers on these nine organisms are four times more likely to be significant enough for publication in *Nature* or *Science*, the world's premier journals.

Indeed, the overall impact of a nation's science correlates tightly with its research activity using these organisms. Yet Australia devotes relatively little scientific effort to their study. Only 1.25% of Australian scientific papers mention any of them in their title, abstract or key words, ahead only of Italy and South Korea among the top 10 science nations. The two top science nations (the USA and UK) devote nearly twice as much of their scientific output as we do to non-mammalian biomedical models. Compared with our competitors and international best practice, we fall well short of the mark.

The Australian effort in this area of biomedical research is weak because of funding neglect. Over the past 6 years the National Health and Medical Research Council (NHMRC) and the Australian Research Council (ARC) have committed only 0.34% of their combined research project funds to any of the nine NIH-recognised models – not even one in 400 funded projects.

This relative neglect of non-mammalian model systems reflects



Professor Fisher delivers the 2007 Australasian Science Prize lecture at La Trobe University. Photo: Kalli Karcelas

intrinsic structural bias in our funding system. Model organism research addresses fundamental biomedical mechanisms yet is conducted in Australia by only a few research laboratories. These are often the only Australian repositories of expertise in their field.

Our funding system favours applied over basic science and large collaborative groups over individual researchers. It also relies more heavily on available local rather than international expertise in making decisions on funding, and compounds these disadvantages by confusing the scale of a research program with its quality.

What can be done? Nobody wants to demolish peer review systems for distributing research funds. However, some tweaking would make a difference.

First, there should be a separate funding category for biomedical research on non-mammalian models. Australian scientists in this area currently produce 1.25% of our scientific output from only 0.34% of research funding. We should reward this high productivity and efficient use of resources with a similar funding commitment and target 1% of the NHMRC and ARC budgets to non-mammalian model organisms.

Second, we should design the funding process so that the views of genuine experts in the field are relied upon more heavily.

Third, we should take more notice of a researcher's productivity per dollar when assessing applications.

Given the internationally recognised value of model organism research and the demonstrably high level of scientific originality and productivity it generates, Australia cannot afford to allow this type of research to languish.

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