



**Australian Government**

**AUSTRALIA'S CHIEF SCIENTIST**

**UNIVERSITY OF SYDNEY ASSOCIATION OF PROFESSORS ANNUAL  
DINNER**

**10-15 MINUTE SPEECH**

**5-15 MINUTE Q&A SESSION**

**WOMEN'S COLLEGE AT THE UNIVERSITY OF SYDNEY**

**6 SEPTEMBER 2012**

**CHECK AGAINST DELIVERY**

Good evening, and thank you for the invitation to speak here tonight. I am sorry that I couldn't make it last year – when I was fresh and bright-eyed. These days I am a little less fresh, and probably a little less bright eyed. I am closing in on my 100<sup>th</sup> speech since I became Chief Scientist a just over 15 months ago. And it does get a bit dulled – both speeches and the eyes.

The agenda before me has changed quite a bit over that time, as well. We have seen what has happened to climate science; to science and mathematics education; to food and food security, to health. And to the now even more pronounced need for real science, proper science, acceptable science than just a few years ago.

But I wanted tonight to touch briefly on an issue that will be close to top of mind in the coming weeks. And that is, how well we perform and what we might do about our performance.

Let me say at the outset that my focus is on science – naturally. That is what I am paid to do. But let me also say

that I recognise the importance of the humanities and the social sciences and their role in the building of what I hope will be an advanced, enlightened, prosperous and secure community. I could add that, of course, there will be lessons for the humanities and the social sciences to learn from where science has been, what has been done and to learn what might be the likely consequences if we dull our intellectual life.

I spoke recently in Melbourne where I was born and where I grew up. I reminded the audience that it was a city where you are often measured by that most complex of instruments - the football team you follow.

I told them, for the record, that my team moved to Sydney. I found that hard to swallow at the time; especially since, from not long after I could walk, I learnt how to kick, and I represented South Melbourne as it was then in every match he and I played in backyard of the farm on which we lived. He lost every one.

But when you think about it, the only point in winning a football match against my dog was for me to know that I had beaten my dog at football. Were he the best footballer going around, it would have had some meaning – but just between us, he couldn't kick at all. And I was the umpire. So he

couldn't win, ever; and I guess I began to see even then that it wasn't a really useful way to assess my prowess at football – to set the bar low and to feel good because you get over it.

Of course, as I said in Melbourne, life could be like that; we could always set a low bar when we think about how we do things. We could do that as an individual – beating my dog at football and presuming that it meant I was good at football, for example; or we could do that as a nation – selecting a group of comparator countries whose average performance is low enough for us to be above it.

In some respects, that is what we do. We compare ourselves with world averages – and of course as a developed and wealthy country, we do all right using that yardstick.

You often hear that we punch above our weight: that we are 0.3% of the world's population but we produce 3% of the world's research output. The figures are broadly correct. But what do they mean?

If you look carefully we should say that along with many others, we punch above our weight.

In science, our output is 2.15% of the world's outputs (over 1995-2010) which gives us a ratio that places us at number 9 in the world: just ahead of Belgium and just behind the UK and Canada. We are well ahead of the developing economies – China is at 19, Malaysia at 18, India at 21 and Indonesia at 22 – with almost all of them improving rapidly.

If we look at citations per scientific paper, we do well against the world, but only because the world average is low enough for us to be above it. If we compare with countries that we would like to be like, we are below them all but well above the developing countries.

Australia has 5 fields of research with citations above the average of a selection of developed economies (leaving out the US because it massively distorts the 'average' the other way), 13 between it and the world average and 3 below world average.

Sweden has 19 above, 0 between and 1 below; Denmark has 20 above and 1 between; the UK has 19 above and 2 between; Switzerland, 19 above and 2 below; Canada has 14 above and 7 between. The US is 19 and 2 between.

Australia comes in at number 12 of 13 European countries plus the US – but well ahead of the others: Japan has 1 above, South Korea none, China none.

So we could continue to say that we ‘punch above our weight, with the implication that we are uniquely positioned – and we are not; and that we are above world average in many fields (which is true in 18 of 21 fields).

And what do we make of that? Maybe we think that we don’t need to do anything except more of the same – or improve at the margins so that we are above world average in 21 fields of 21. But is that good enough?

I would argue that it is not. We need science – and we have no room for second rate science.

We must aim to be up there amongst the best. To compare what we do, and how, with countries that we would like to be like – socially, culturally, economically; or compare ourselves with individuals who set high standards in whatever they choose to do.

And to achieve that we must begin to work differently.

I would suggest that there are several actions we need to take:

- Benchmark selectively – there is little value in world averages;
- International collaboration – must be actively encouraged. There is no doubt we benefit from an increased quantity, increased citations and increased standing of journals when we do. And we need some selectivity – choose where we need to collaborate and where we each get benefits. Not collaborate just because we can;
- Set priorities for funding – we are not big enough to do everything well, so we must ensure that we allocate funding to encourage work in particular areas - say, national interest. It is notable that nearly all the countries that perform better than us set research priorities. We have begun the discussion in Australia. We have to.
- Examine our education system – it is reasonable to ask whether we prepare people the right way for the unpredictabilities of the future. I suspect that we pigeon-hole people early in Australia. We have some 70% of our researchers in higher education – unlike the countries I used earlier to illustrate our relative

Now, the list is doubtless much longer. But taking action on those that I have identified will do for a start.

Because we have to.

We have our own problems to solve: Australian problems confronting Australians. And science will be at the heart of many of the solutions. On top of that, we are a member of the global community, and we have a responsibility as a developed country to make a contribution to the resolution of the problems that confront human kind.

So our science, our talents and our skills will make a difference to our own well-being as well as to improving the lot of humankind.

When you think about our recent Olympians, these athletes obviously have natural ability, but they are so disciplined and



train so hard to be the best in their field, or to be the best they can.

And like many athletes, scientists start early. Recently, Australia selected 13 secondary students from around the country to compete in the International Science Olympiads after a gruelling regime of testing and training. They competed in Chemistry, Biology and Physics against 1000 students from around the world. They sat a five hour theory exam and undertook five hours of practical laboratory tests.

And there was no guaranteed medal at the end of the road – although the odds were a bit better than the other Olympics since there were more than three medals per category.

In the event, our 13 students won 4 Silver medals, 8 Bronze and one received an Honorable mention. In the mathematics Olympiad, our students came back with 2 Silver and 5 Bronze.

But I wonder how many of you knew about this. It didn't get much of a run in the mainstream media – if any run at all.

However, I live in hope that one day we'll see Australia's scientific achievements greeted with something approaching the euphoria that sport manages to generate.

I live in hope that the Swannies will win a premiership or two in the coming small number of years as well as this one.

And I thank my dog for helping me to understand that it is important not to draw grand conclusions from low benchmarks.