Australian Government

Chief Scientist

Australian Society of Parasitology 50th Anniversary Conference

20-MINUTE KEYNOTE ADDRESS

The Next 50 Years: Too Important To Leave To Chance

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AUSTRALIAN NATIONAL UNIVERSITY

I would like to start by congratulating the Australian Society of Parasitology for its 50th anniversary.

I think that it is important that we mark these milestones. They represent significant achievements. And it is through the commitment of our scientists in this and other fields that we are able to celebrate what has happened in our past, what is happening as we build on that foundation, and what we might hope will happen as we think of the future.

I will try to do a little of each this morning. In particular, though, I want to enlist your help in supporting the need for us to build a more strategic and forward looking approach to how we support science in this country.

We rarely get the opportunity to talk about intestinal worms and liver fluke in social situations – even in these liberated times.

The fact is that parasitology has a unique place in the history of Australian science – and more broadly, the prosperity of this nation.

On farms, on battlefields and in hospitals, we have seen its impact in the most immediate and practical way.

We even put a parasitologist on the fifty dollar note: Sir Ian Clunies Ross, giant of Australian science and one of the fathers of the CSIRO.

I don't think this is a coincidence. I think it tells us something about the people who are attracted to this discipline, and the way they have set about their work.

We may not remember Clunies Ross for the great classic of Australian literature he published in 1936, *The Internal Parasites and Parasitic Diseases of Sheep*.

We do remember that his research, and later his work at the helm of the CSIRO, transformed the way agriculture was practised in this country. We see science working hand in hand with industry to change Australia for the better.

The Australian Dictionary of Biography sums up the genius of Clunies Ross in these terms:

> *His early work involved an understanding of the relationship between host and parasite. He soon broadened his interest to the links between science and society*.[1]

I would not necessarily define the relationship between science and society as a matter of host and parasite. I would agree that the two are mutually dependent.

Which brings me back to the subject of intestinal worms.

If we in Australia have the luxury of not discussing these things today, it is because we are some of the first human beings who have ever had the wherewithal to face them down.

For the overwhelming bulk of human history, we have been suffering the consequences of ignorance.

[1] "Sir Ian Clunies Ross', *Australian Dictionary of Biography (*http://adb.anu.edu.au/biography/clunies-ross-sir-william-ian-9770).

There are descriptions of guinea worm on papyrus scrolls from Ancient Egypt, dating back to 1500 BC.[2] It was not until 1913 that the whole life cycle of the worm was elaborated in full.

And so a condition described in the Bible as the curse of 'fiery serpents'[3] became something we could understand, treat, and with political will, eradicate. The World Health Organisation believes it can be achieved by 2020.[4]

That is a remarkable testament to the capacity of human beings.

It is also a sobering reminder of the way the world works – like so much of parasitology in practice.

In 1986, there were an estimated 3.5 million cases of guinea worm in 40 endemic countries in Asia and Africa.

By 2013, only 148 cases were reported – amongst the poorest of the poor in South Sudan.[5]

It is not ignorance that prevents us from eradicating this disease – it is poverty, poor sanitation, and indifference.

We are often asked of late to think about the future, at least in so far as the Budget papers allow us to do so. I am sure our children would be pleased to be free of debt.

I am equally confident that they would choose to live in a world where people do not die of easily preventable disease; where

[2] F.E. Box, 'History of Human Parasitology' *Clinical Microbiology Review* (2002) 15(4): 596 - 612 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC126866/.
[3] Numbers 21:6 (King James translation).
[4] World Health Organisation, 'London Declaration on Neglected Tropical Diseases' (2012) http://www.who.int/neglected_diseases/London_Declaration_NTDs.pdf.
[5] *World Health Organization*. *Dracunculiasis (guinea-worm disease) Fact sheet N°359 (*March 2014).

they have water that is fit to drink and air that is fit to breathe; where science has a chance to change our lives for the better.

They would want the benefits of the knowledge that has taken our species so many thousands of years of failure and frustration to acquire.

They would want the skills to harness that knowledge in practice.

Above all, I believe they would want the capability to take up whatever legacy of progress we leave behind – so that they will know more about the world than we do today; and learn to shape it in ways that we cannot.

Of course that is a mission far broader than a single science portfolio.

Nonetheless, whether it is our climate, our health, our ageing population, our food supply, our economy or our security, it will be scientific discovery and the use of scientific knowledge that forms the core of our ability to respond.

This is why I argue that we need to think seriously about the capabilities we nurture today.

If we, like the overwhelming majority of the OECD, were to look to the future, we too might see that the opportunities for jobs and economic growth will come from science and research.

We too might recognise that the supporting human skills and infrastructure take decades, if not generations, to build.

And we too might consider doing some about it.

We might, for example, consider having a strategy for science, technology, engineering and mathematics – a radical idea that 30 from 33 nations have been reported by the OECD to have adopted.

But in the meantime, as we know, we trundle on. She'll be right, we think. It has been so why not into the future? The consequence?

Our policies are too often on again, off again; too often reliant on terminating programmes; too often limited in scope; and too often disconnected from the communities they seek to serve.

We have spread all the jigsaw pieces on the table – but we seem to have thrown away the top of the box.

We can't be sure that we have all the pieces we need. We don't know how the pieces we do have might fit together. We forget that it all adds up to a bigger picture.

Our current data sets do a very poor job of explaining the links from school to higher education to work. That is one of many gaps that my office is seeking to fill.

Nonetheless, we have more than enough evidence to confirm that our approach is damaging because it is a distributed approach which takes little account of the connections that must be made to ensure that Australia has the science capability (and capacity) that it needs. Our R&D spend covers something like 12+ portfolios and more than 70 budget lines If they fit, we are more lucky than strategic

For example:

A) IN AGRICULTURE:

In the last budget, the Commonwealth's contribution to the cost of an Agriculture degree was reduced. If the universities are even to keep the same *per capita* income as before, the cost to the student would need to rise by some 37%. (reference) And that ignores what I heard from any former colleague Vice-Chancellors that they didn't get enough money for (amongst other things) Agricultural Science.

But Australia has just this year signed trade agreements that include increased Agricultural exports to our partners. Enrolments in Agricultural Science have essentially flat-lined since 2001.

So from 2016 we will put up the price to the student when another part of the government makes arrangements that will require more of them.

B) IN BASIC SCIENCE LITERACY:

Around 40 per cent of our Year 7-10 maths classes are now taught by teacher unqualified in mathematics – roughly three times the international average.

Australian schools also show a decline in the rates of participation in 'science' subjects to the lowest level in 20 years.

We are not alone. But I do notice some movement in many other countries. Most recently, the Royal Society released a report last week in which there is a call for a particular focus on science at school.

The Chair of the Committee said *Science and mathematics are at the absolute heart of modern life. They are essential to our understanding of the world, whether that is knowing where the energy that powers our homes comes from or making sense of the public debate on the latest evidence on climate change. Science and mathematics also provide the foundations for the UK's future economic prosperity.*

The Vice-Chair of the Committee commented *"Our Vision takes the long view but recognises that there is both urgency and great opportunity for Government to act now. Estimates suggest that one million new science, technology and engineering professionals will be required in the UK by 2020 and yet there is a persistent dearth of young people taking these qualifications after the age of 16. If the UK is to remain globally competitive and if we are to develop a more equitable and informed society, Government and the wider education community must take the Royal Society's recommendations seriously."*

While the Head teacher member of the committee said *Teaching is a chronically undervalued profession in the UK. Our country's future prosperity rests in teachers' ability to inspire and guide our young people yet we don't currently adequately recognise or reward them. More must be done to enhance the appeal of the profession to prospective teachers and support the important work of those already teaching.*

Are we thinking in these terms? Are we getting ready for the future? Are we really equipping our students for that future? We should. We need to.

Analysis done by my office compared the citation rate of Australia's 91 STEM sub-fields – or more specialised areas – against the top group of European countries and the US.

In 16 sub-fields, we perform better than both the EU11 and the US. But I would argue that being best of the best in 16 out of 91 sub-fields is not good enough.

And our overall research performance is not strong either – we sit above the world average, but below the benchmark set by the EU11.

Our share of the top one per cent of cited papers has increased over the past few years – but 55 per cent of the total number of papers published in the core science disciplines we analysed had citation rates below the world average.

I am an advocate for Australian science – which is why I believe we should be aiming higher, and thinking about what it will take to achieve at that level.

Now we could continue trying to address each of these in piecemeal fashion – or we could find the jigsaw box and do the job properly.

And it is possible to do things differently. Not easily I might add, but possible. We can "shape the destiny of our nation" and achieve sustained economic growth, but to do that we need a plan

A plan to underpin our investment in science.

A plan to identify what our national needs are, what our research priorities are, and where we have advantages that we can use.

Other countries are doing it – they're investing strategically in science – for the long haul.

The United Kingdom, the EU, Canada, the United States, China, South Korea, and many, many other countries around the globe, have all prioritised science funding as an important foundation for future sustained growth.

They have identified national priorities and set out to fund them appropriately.

We too can help researchers build an Australia that would be worth inheriting.

That is how we can ensure that the next 50 years of parasitology in this country is equally, if not more distinguished, than the great record of the past.

I congratulate the Australian Society of Parasitology and its members on 50 years of service.

I look forward to the discoveries ahead.

Thank you.