



## “Capturing the value of the genetics revolution for Australia”

The **Australian Genome Alliance** is lobbying the Federal Government to establish a new genomics research fund (\$150 million over five years) to ensure that Australia's unique genetic heritage is harvested by Australia and not by other nations.

### The Proposition

The genome, the complete DNA sequence for an organism, provides the detailed instruction manual of how that organism is made and how it functions. We need *the manual* to effectively deal with diseases that kill humans and the pests that limit our agricultural productivity. We need *the manual* to protect our natural heritage in a changing climate. We need *the manual* to discover the valuable natural products that are synthesized by our native flora and fauna.

Genomics will allow us to address major problems and to seize opportunities in agriculture, the environment and health. Genomics will provide a powerful stimulus to the growth of our vibrant biotechnology industry.

The existing Australian research funding agencies do not have the capacity to fund whole genome sequencing projects. Therefore we advocate the establishment of a specialist genomics research fund, *Genome Australia*. *Genome Canada* and the *Netherlands Genomics Initiative* offer two models of Government engagement in the direct funding of genomics.

### The Australian Genome Alliance

The Australian Genome Alliance was convened by Dr Phil Batterham, Director of CESAR (Centre for Environmental Stress and Adaptation Research) and Dr Susan Forrest, Director of the Australian Genome Research Facility and is endorsed by the Genetics Society of AustralAsia. Alliance supporters include Lyle Palmer, German Spangenberg and John Mattick. The Alliance currently exists to highlight the need for the *Genome Australia* funding scheme. If *Genome Australia* became a reality the Alliance could be used to coordinate the network of genome projects and scientists, maximizing the benefits of collaboration for Australia.

### How would the money be spent?

DNA sequencing is no longer a science, it is a business and a production line process. Money invested is not venture capital; there are no experimental risks. Sequencing centres quote on projects, delivering on time and on budget. Data will flow at a rate that is directly proportional to the cash invested. In days gone by a proposal like this would have been seeking Government investment in hard infrastructures such as buildings and sequencing machines. While there may be some need for an initial investment in tooling up, the vast majority of the funding should be devoted to specific projects – the sequencing of DNA and the decoding of the valuable information contained in the sequences by bioinformatics. With the high work volumes generated by



Genome Australia over a five year period, sequencing centres will be able to sensibly use project funds to buy or lease equipment and optimize their staffing models. The rate at which funding would flow into *Genome Australia* needs careful consideration. There are two factors that would influence the shape of the optimal funding curve, the time for sequencing centre tool up and the good news that sequencing costs are declining.

### Which genomes?

The Alliance aims to raise the awareness of a number of potential projects that could be considered for immediate funding if *Genome Australia* existed. No status or priority is given to these projects by the Alliance. These projects include major pests such as the cane toad and the cotton bollworm (the number one insect pest of global agriculture – [www.fightthemoth.org](http://www.fightthemoth.org)), gut parasites of agricultural animals and humans, microbes including a pathogen that kills humans with immune deficiency (e.g. AIDS sufferers), crop plants and key components of our biological heritage – coral, eucalypts and the wallaby. There is also the potential to use genetic variation within the Australian population to understand human disease leading to more cost effective treatments.

*Genome Australia* would issue an open call for project submissions. In assessing these submissions national interest would come to the fore. *Genome Australia* would need to be convinced that Australian scientists were in a dominant position in terms of their capacity to make use of the sequence data flowing from a funded project. *Genome Australia* would need to be convinced that the project would produce major, measurable benefits for Australia. Applicants for funding would be called upon to provide a map identifying all of the Australians that would make use of the data and for what purpose (including any expected commercial outcomes).

### Soft infrastructures, solid outcomes

The DNA sequence data produced through the *Genome Australia* initiative would provide a *soft infrastructure*, a research platform that can be exploited forever without any significant maintenance costs, transforming research and industry. Rather than depreciating in value, this infrastructure would compound in value as ongoing research would make the sequences easier to interpret. This infrastructure would promote collaboration between a range of researchers that might include geneticists, bioinformaticists, chemists, protein biochemists, structural biologists, physiologists, pharmacologists and ecologists. Most importantly it would provide a foundation solving real world problems and commercialising their solutions, stimulating growth of the biotechnology sector.

Understanding the genome of many plants, animals and microbes will:

1. help us decode the human genome and develop a new generation of medicines to fight infections and illnesses including cancer, heart disease and mental illness;
2. allow us to dramatically improve agricultural production - creating breeds and strains suited to their environment - with disease resistance, requiring less chemicals, making better use of water, creating healthier products;
3. improve the understanding of our unique flora and fauna, so that Australians can more intelligently preserve and manage our biological heritage and reap benefits from it.

Australia is at the crossroads in genomics. With judicious investment we can take advantage of our natural resources and the remarkable skills that exist in our R&D sector. The genome sequence infrastructure will feed a prolific pipeline of innovation and commercialisation. Australia needs to decide whether it will control this pipeline or surrender control to other nations that will not miss such opportunities.

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