



**CAREERS IN PRIMARY INDUSTRIES**

# SYNTHETIC

# BIOLOGY



**HUGH GOOLD**  
**RESEARCH SCIENTIST**



Department of  
Primary Industries



## WHAT IS SYNTHETIC BIOLOGY?

Synthetic biology is a field of science that involves redesigning organisms for useful purposes by engineering them to have new abilities. Synthetic biology researchers and companies around the world are harnessing the power of nature to solve problems in medicine, manufacturing and agriculture.

Source: <https://www.genome.gov/about-genomics/policy-issues/Synthetic-Biology>



## PURPOSE OF THE ROLE

Synthetic Biologists and researchers in DPI work on different projects that span different industries from fisheries and forestry to agriculture. The projects have the potential to give industries in New South Wales agility and security that they don't currently have. Hugh is working on the Yeast 2.0 project.

Yeast 2.0 is the world's first designed eukaryotic organism (it's more complex than the first designed organism, JCVI-syn1.0). Ten laboratories around the world are working together to come up with an entire DNA sequence for a whole organism and to put them together inside a living cell.

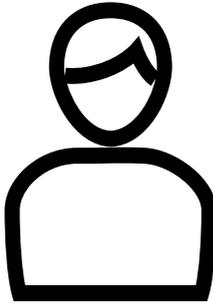
## How does that help build stronger primary industries?

DNA is relevant to any living organism from plants and trees to people to small microbes like e-coli and yeast. A lot of the work completed on different organisms is transferrable, so, for example the work in the immune system of mice and humans has relevance to work on algae to make biofuels and work putting together large pieces of DNA inside a cell.



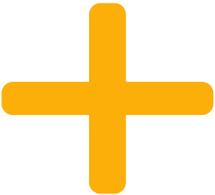
TRAINING / EDUCATION

# Bachelor degree and a PhD



## PERSONAL ATTRIBUTES

- You need to be able to deal with a lot of unexpected problems
- Patience
- To be able to work in a team in difficult situations which last quite a long time.



It's a very fulfilling role when your trial works and you know that you are the first person to achieve something that's going to have global impact it's very, very rewarding.



The biggest problem in the job which I think we just have accept is repeating things over and over again. I wish that it worked perfectly the first time every time.

## Quote

*"Australia is going to be a global leader in agriculture, especially considering global food insecurity so there is a lot of opportunity for young people in agriculture. "*

# Staff Profile

## Background

Hugh grew up and went to high school in Newcastle. At school he enjoyed the beach and computer games, he was also in the school orchestra. After completing the Higher School Certificate, he went to university in Sydney where he completed a Bachelor in Biochemistry and Biology. Hugh moved on to a Masters degree at Macquarie University on fungal cell factories (a kind of fungal biotechnology).

With that study under his belt Hugh spent three years in London working in a research hospital.

Hugh's PhD was completed on algal biofuels partly in Sydney and partly in the south of France with the French Nuclear Energy Agency who are interested in renewable energy.



## Do you have any advice for young people interested in scientific research?

'I'd say persistence is what really pays off, if you are absolutely passionate and dedicated those are two of the main qualities you need to succeed and you need to find a way of following your dreams and be very open to chasing opportunities and making opportunities and you'll get there.'

