Introduction to molecular biology: Overview

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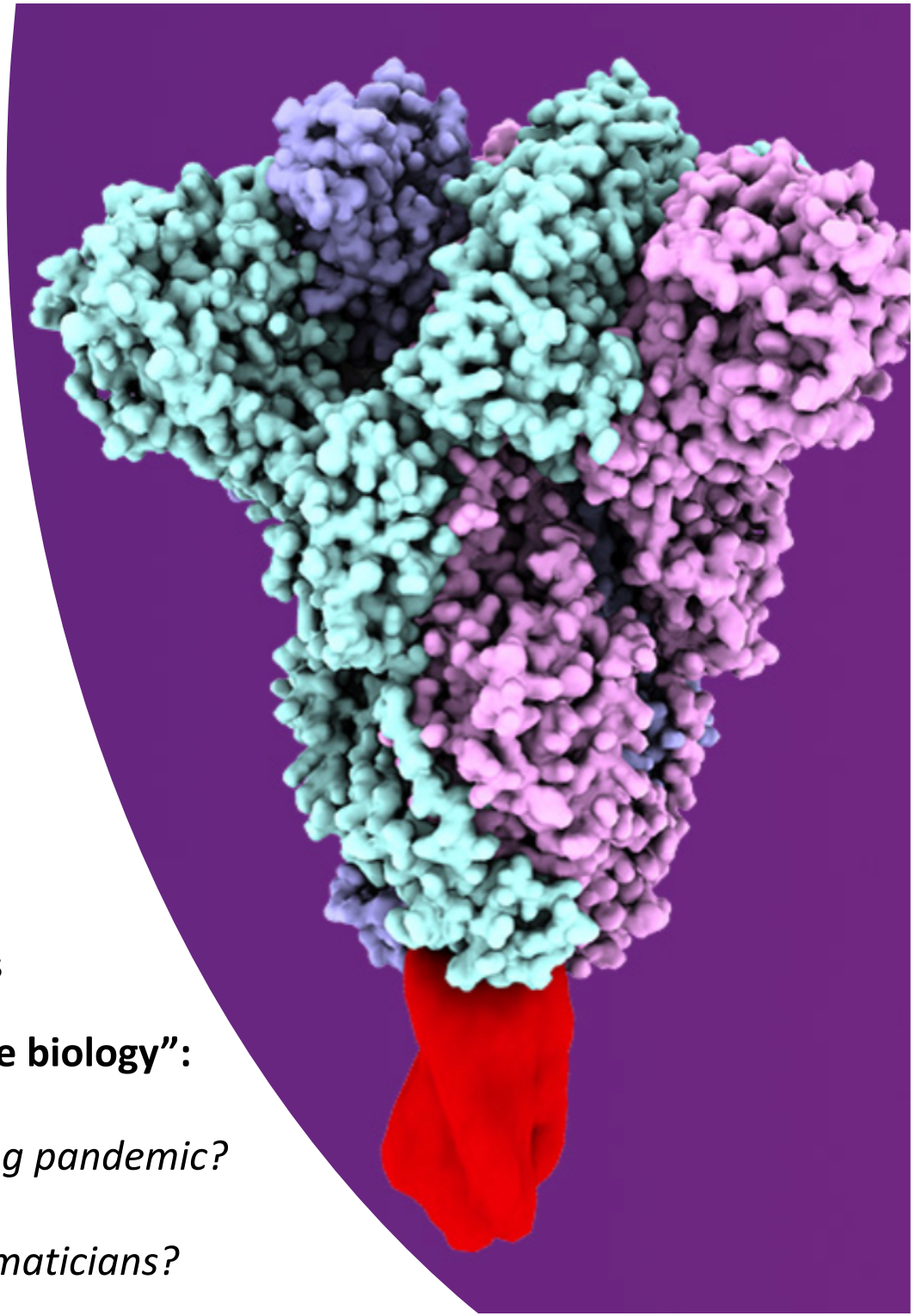
BINF6000/SCIE2100

Introduction to Molecular biology



- **Part 1: DNA**

  nucleic acids (sequence, structure, biological role...)

- **Part 2 : Gene structure and control**
  - Transcription and gene expression

- **Part 3: Proteins**
  - Translation, amino acids and proteins

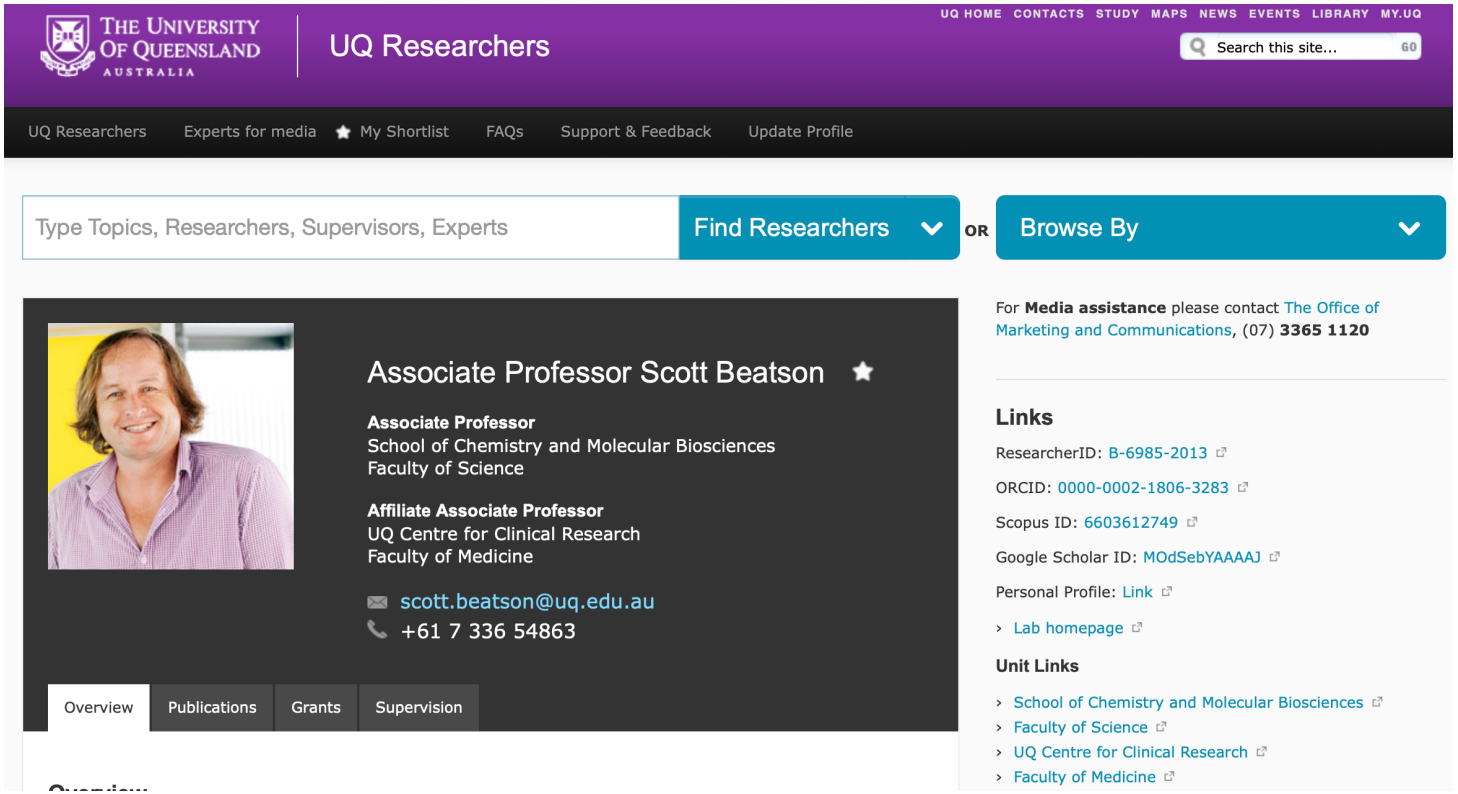
Two reasons to watch even if you "know the biology":

1. Coronavirus case studies
   – *how has bioinformatics been used during pandemic?*
2. Bioinformatics tips
   – *why is this content relevant for bioinformaticians?*

What now?

- Watch the rest of this video, including “Central Dogma” animation
- In preparation for next week, watch the 3 videos (Parts 1-3) (available later today)
- Make a note of anything you’re unclear on or require further explanation
  - Post a note on Piazza for discussion at the next tutorial
  - Where possible I’ll try to answer questions within Piazza before next week
- Next week, the tutorial will be a Q&A format in which you can “ask me anything” about the module content.
- Based on the Piazza feedback I will give further explanation where required, but there will be no repeat of the Parts 1-3 lecture content
- Please watch the videos before 8am Monday 28.
- Once you have watched videos, refer to Week 1-2 Study guide.

Choosing a bioinformatics research project @UQ



1. Use UQ Researchers to identify potential supervisors – also talk to your tutors about their projects; start early!
2. Approach potential supervisors by email (preferably after reading their website and one of their papers)
3. If unsure about the suitability of a project or research group, please feel free to contact myself, Mikael or CX for advice

My lab: Exploiting genomics to track outbreak dynamics

- In biology, by convention the senior author is normally last and corresponding – look at these papers when assessing the type of work a research group does, not articles in which the group leader is in the middle of the authorship list. Reviews are a good indicator of the main focus of a research group.

ARTICLE

https://doi.org/10.1038/s41467-019-14139-5 OPEN

Integrating multiple genomic technologies to investigate an outbreak of carbapenemase-producing *Enterobacter hormaechei*

Leah W. Roberts[1,2,3], Patrick N.A. Harris[4,5*], Brian M. Forde[1,2,3], Nouri L. Ben Zakour[1,2,3], Elizabeth Catchpoole[5], Mitchell Stanton-Cook[1,2], Minh-Duy Phan[1,2], Hanna E. Sidjabat[2,4], Haakon Bergh[5], Claire Heney[5], Jayde A. Gawthorne[1,2], Jeffrey Lipman[4,6], Anthony Allworth[7], Kok-Gan Chan[8,9], Teik Min Chong[8], Wai-Fong Yin[8], Mark A. Schembri[1,2], David L. Paterson[2,4] & Scott A. Beatson[1,2,3*]

Use Google Scholar to find out recent and highly cited papers

- Most unsuccessful approaches to potential supervisors are obviously generic bulk emails that give no indication why you want to do a project with a particular group leader: personalize your email and briefly demonstrate you have read a paper from that group and you will greatly increase your chances

Scott Beatson

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Verified email at uq.edu.au - Homepage

microbial genomics

TITLE	CITED BY	YEAR
Genome sequence of the Brown Norway rat yields insights into mammalian evolution RA Gibbs, GM Weinstock, ML Metzker, DM Muzny, EJ Sodergren, ... Nature 428 (6982), 493-520	2200	2004
BLAST Ring Image Generator (BRIG): simple prokaryote genome comparisons NF Alikhan, NK Petty, NLB Zakour, SA Beatson BMC genomics 12 (1), 402	1548	2011
Easyfig: a genome comparison visualizer MJ Sullivan, NK Petty, SA Beatson Bioinformatics 27 (7), 1009-1010	1348	2011

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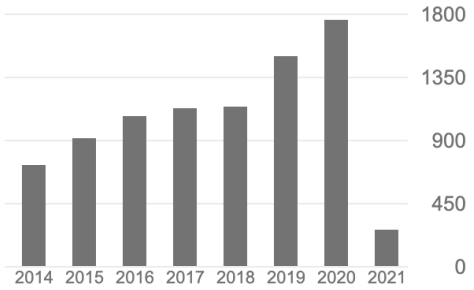

Co-authors EDIT

Back to the coursework…

- The major concept in this module is the “Central Dogma” of molecular biology: **DNA=>RNA=>protein**
- This video takes the viewer through all the key steps of synthesising a protein within a eukaryote cell
- Cellular machinery for transcription and translation are represented as “robots” - more realistic 3D structures are available in other videos throughout this module, however, I think this video is a unique introduction to the topic.
- Enjoy the video and see you next week!

https://www.youtube.com/watch?v=ZNcFTRX9i0Y&pbjreload=101