# DRMCRL

## Group Meeting

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25th August, 2020

## Introduction

- Why such a long PhD?
- The Bioinformatics Hub
- Our Track Record

## Enrichment Analysis

## Incucyte Analysis

# Introduction

# Bioinformatics Hub

- Co-ordinator Bioinformatics Hub, 2014 - 2020
- Currently an ECR: PhD (2008-2018)
- Main areas of expertise:
  - `R`, `bash`, LaTeX
  - Transcriptomics and Statistics

# Why such a long PhD?

- Detect alternate transcript usage using whole-transcript microarrays
- Built a Bayesian model which ran a MCMC process (written in C)
- Implemented as an R package

# Why such a long PhD?

- Pre-RStudio, Pre-`tidyverse`, Pre-`RMarkdown`, Pre-`Rcpp`
- Model significantly "under-performed" on real data
- Broke the software with no version control strategy
  - MCMC process ran for a week on 4-cores
  - Failure was a random failure to complete (probably C memory issues)
  - Took 6 months to debug
- *No bioinformatics community able to help*

# Why such a long PhD?

- Tutored for School of Mathematical Sciences
- Picked up large amounts of work as a musician
- Landlord died $\Longrightarrow$ no place to live
- Bioinfosummer 2013 (Terry Speed)

# Formation of the Bioinformatics Hub

An application was made to the IDRF

1. Prof David Adelson: Head, School of Biological Sciences; Chair of Bioinformatics
2. Prof Gary Glonek: Head, School of Mathematical Sciences
3. Prof Mike Wilkinson: Head, School of Agriculture, Food & Wine
4. Prof Julie Owen: Head, School of Paediatrics & Reproductive Health

Others named with a key interest: *Prof Alan Cooper, Prof Wayne Tilley, Prof Sarah Robertson etc*

# Formation of the Bioinformatics Hub

- Run bioinformatics training workshops, seminars, journal clubs etc
- Manage a hot-desking facility
- Provide consultations and advice
- Develop formal courses and subjects
- Apply for external research funding
- Build a *critical mass*

# Formation of the Bioinformatics Hub

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Interestingly, this is not a core-facility

# Formation of the Bioinformatics Hub

- Directors:
  -  David Adelson (*Biol. Sci.*)
  -  Gary Glonek (*Mathematical Sciences*)
- Funded by DVCR to recruit Level B6-C3 Academic for 2014 only
- To be administered within School of Biological Sciences (BS)

# Formation of the Bioinformatics Hub

- I commenced in March 2014: 10 month contract at Level A4

Why?

# Formation of the Bioinformatics Hub

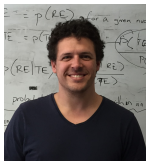
- I commenced in March 2014: 10 month contract at Level A4

Why?

- Not attractive for external recruitment
- I was the "best they could get"

# Formation of the Bioinformatics Hub

In 2015:

-  Jimmy Breen appointed to RRI $\Longrightarrow$ co-located
-  Hien To appointed as second staff member (2015-2018)
-  Rick Tearle appointed to Davies Research Centre (Roseworthy)

# Formation of the Bioinformatics Hub

Later:

-  Nathan Watson-Haigh (2018-2020)
-  Mark Armstrong (2019-2020)
- Additional 12 staff members (2015-2020)

# Our Track Record

Over our existence:

- $8.5m in grant funding
- >1400 distinct individuals through workshops
- Individual support for >360 postgraduate students
- Co-authored 84 publications + 2 software packages
- Established a Bioinformatics Undergraduate Major
- Very strong and supportive bioinformatics community

# Our Track Record

*Journal Club on Steve's Birthday, 2019*

# Publication Highlights

nature > letters > article

MENU

nature

Published: 08 March 2017

## Neanderthal behaviour, diet, and disease inferred from ancient DNA in dental calculus

Laura S. Weyrich, Sebastian Duchene, Julien Soubrier, Luis Arriola, Bastien Llamas, James Breen, Alan G. Morris, Kurt W. Alt, David Caramelli, Veit Dresely, Milly Farrell, Andrew G. Farrer, Michael Francken, Neville Gully, Wolfgang Haak, Karen Hardy, Katerina Harvati, Petra Held, Edward C. Holmes, John Kaidonis, Carles Lalueza-Fox, Marco de la Rasilla, Antonio Rosas, Patrick Semal, Arkadiusz Soltysiak, Grant Townsend, Donatella Usai, Joachim Wahl, Daniel H. Huson, Keith Dobney & Alan Cooper -Show fewer authors

*Nature* **544**, 357–361(2017) | Cite this article

**6767** Accesses | **157** Citations | **2291** Altmetric | Metrics

# Publication Highlights

PNAS
Proceedings of the National Academy of Sciences of the United States of America



RESEARCH ARTICLE

## A comprehensive genomic history of extinct and living elephants

Eleftheria Palkopoulou, Mark Lipson, Swapan Mallick, Svend Nielsen, Nadin Rohland, Sina Baleka, Emil Karpinski, Atma M. Ivancevic, Thu-Hien To, R. Daniel Kortschak, Joy M. Raison, Zhipeng Qu, Tat-Jun Chin, Kurt W. Alt, Stefan Claesson, Love Dalén, Ross D. E. MacPhee, Harald Meller, Alfred L. Roca, Oliver A. Ryder, David Heiman, Sarah Young, Matthew Breen, Christina Williams, Bronwen L. Aken, Magali Ruffier, Elinor Karlsson, Jeremy Johnson, Federica Di Palma, Jessica Alfoldi, David L. Adelson, Thomas Mailund, Kasper Munch, Kerstin Lindblad-Toh, Michael Hofreiter, Hendrik Poinar, and David Reich

PNAS March 13, 2018 115 (11) E2566-E2574; first published February 26, 2018
https://doi.org/10.1073/pnas.1720554115

Edited by David M. Hillis, The University of Texas at Austin, Austin, TX, and approved January 24, 2018 (received for review November 24, 2017)

# Other Highlights

- Return on Investment over 6.5 years: \$4.4/dollar
- Improved PhD Completion rates (ECMS, Sciences, HMS)
  - 66% with no Hub engagement vs 75% with ($p = 0.0091$)
- Establishment of UoA as a national player in bioinformatics
- Student engagements strongly biased towards women:
  - ECMS: 41.7% Vs 22.0% (12 students)
  - HMS: 61.9% Vs 59.5% (89 students)
  - Sciences: 59.2% Vs 48.3% (260 students)

# Weaknesses

- Strategic Vision authored and submitted to Exec Dean of Sciences in 2018
- Rejected in it's entirety with no further discussion
- Included reimbursement for teaching courses
- In 2019 he approved a separate bioinformatics position inside School of BS (still unappointed)

# Weaknesses

- Income
  - Money from grants awarded
  - Money for course delivery & student supervision
- No expectation of reimbursement from DVCR
- Short-term contracts made leading grant applications challenging
  - I'm too junior
- Lack of single "high-profile" project
- How to limit access whilst providing open-access?

# Challenges

In 6.3 years

- Biological Sciences: 4 Heads of School
- Agriculture, Food & Wine: 4 Heads of School

# SAGC / Our Demise

- Current DVCR didn't believe he should fund us
  - Gave additional money to faculties for these projects
  - HMS unambiguously supportive whilst Sciences "receive no benefit at all from the Bioinformatics Hub"
  - Sciences subsequent internal review found we were beneficial & vital infrastructure requiring funding
- 3 positions provided by UofA as "in-kind" for SAGC funding
  - 1xDVCR, 1xHMS, 1xSciences
  - DVCR re-negotiated this down to the HMS position only

# My role

- I was ready to move on this year
- Being spread across literally everything is exhausting
- Being funded on the whims of DVCR, Exec Deans etc is not ideal
- Looking to focus more deeply both *biologically* and *bioinformatically*
- Take advantage of my "ECR window"

# Enrichment Analysis

# Incucyte Analysis