Introduction to Genomics in Natural Populations

Eve198

Week 1: January 7, 2025

Introductions

- Name
- Pronouns
- Year
- Major
- What drew you to this class?

Class outline

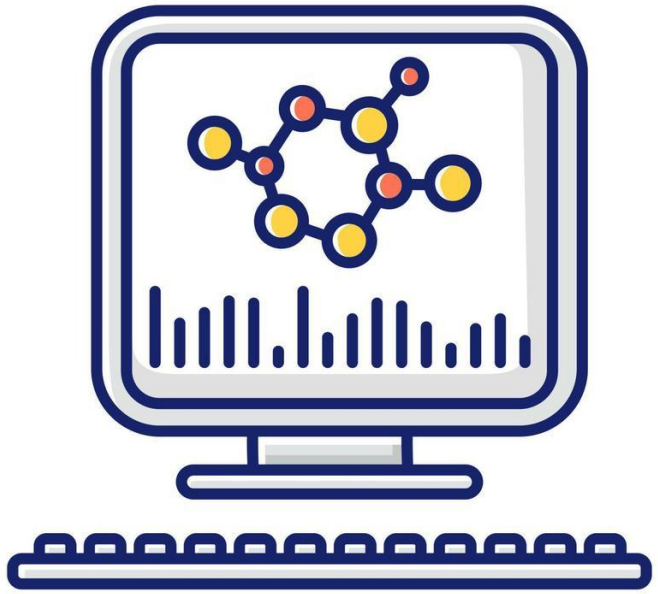
Week	Date	Topic
1	January 7th	Introduction to genomics, learning how to navigate FARM & introduction to coding
2	January 14th	Bash/UNIX coding: working with files
3	January 21st	Bash/UNIX coding: working with files continued
4	January 28th	Mapping to a Genome, Calling Variants and Calculating Allele Frequencies
5	February 4th	Intro to R: Introduction and Data Manipulation
6	February 11th	Intro to R: Plotting and Making Figures
7	February 18th	Population Structure
8	February 25th	Allele Frequencies and PCAs
9	March 4th	Fst outliers
10	March 11th	Taking Bioinformatics beyond the class

Grading:

- Attend class
- Participate in group coding activity
- Submit individual canvas assignment before the next class

Learning Objectives

- Use computing resources at UC Davis
- Write basic scripts in bash
- Perform genomic analyses modifying template scripts in R
- Describe the general bioinformatics pipeline
- Evaluate figures from published literature.



Why learn bioinformatics?

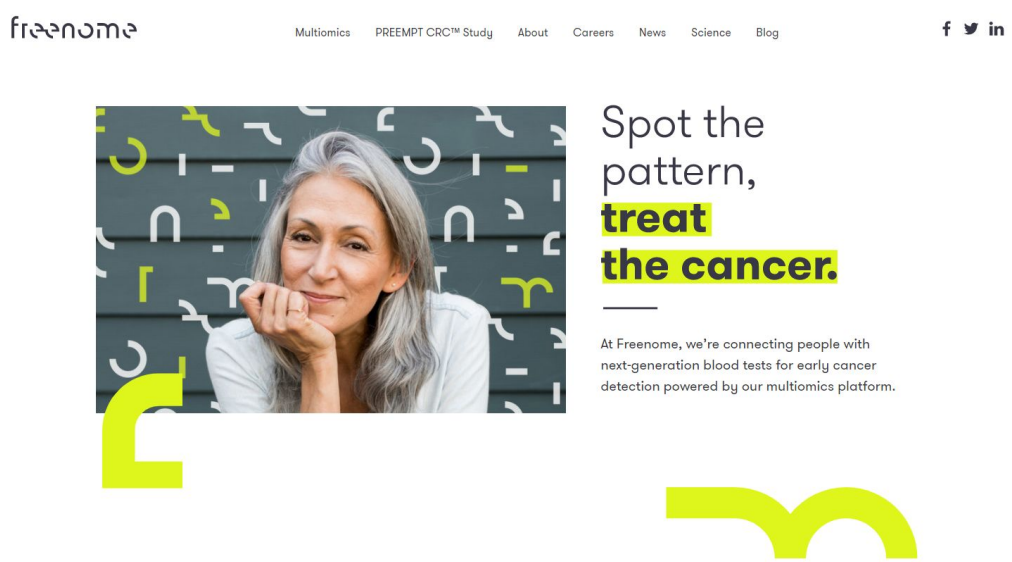
Data in Ecology and Genomics are getting bigger and bigger!

Students gain many transferable skills!

- Data science
- Personalized medicine
- NGO agency scientist
- Research scientist

Glossier.

Spotify®

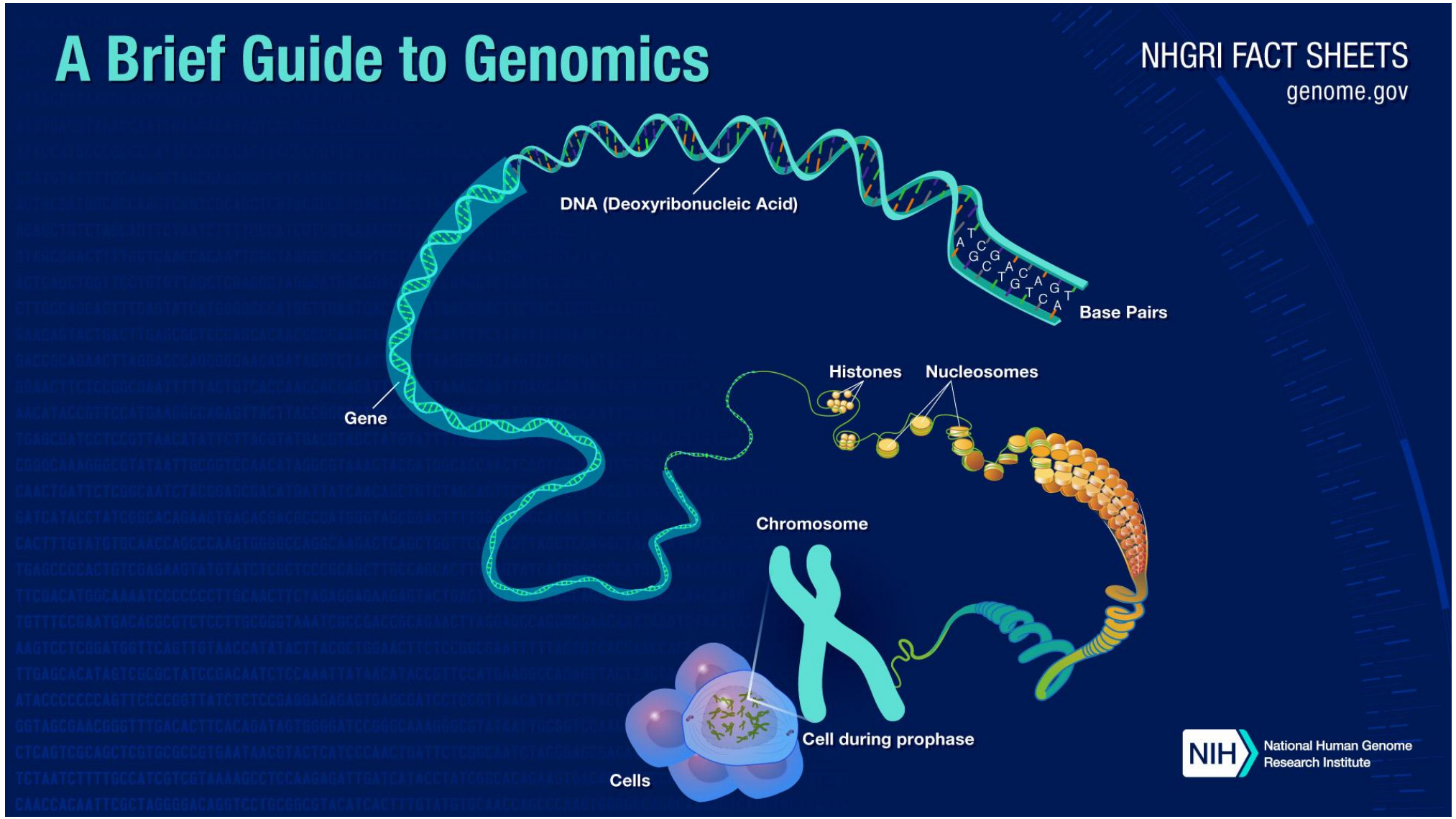


Week 1 Objectives:

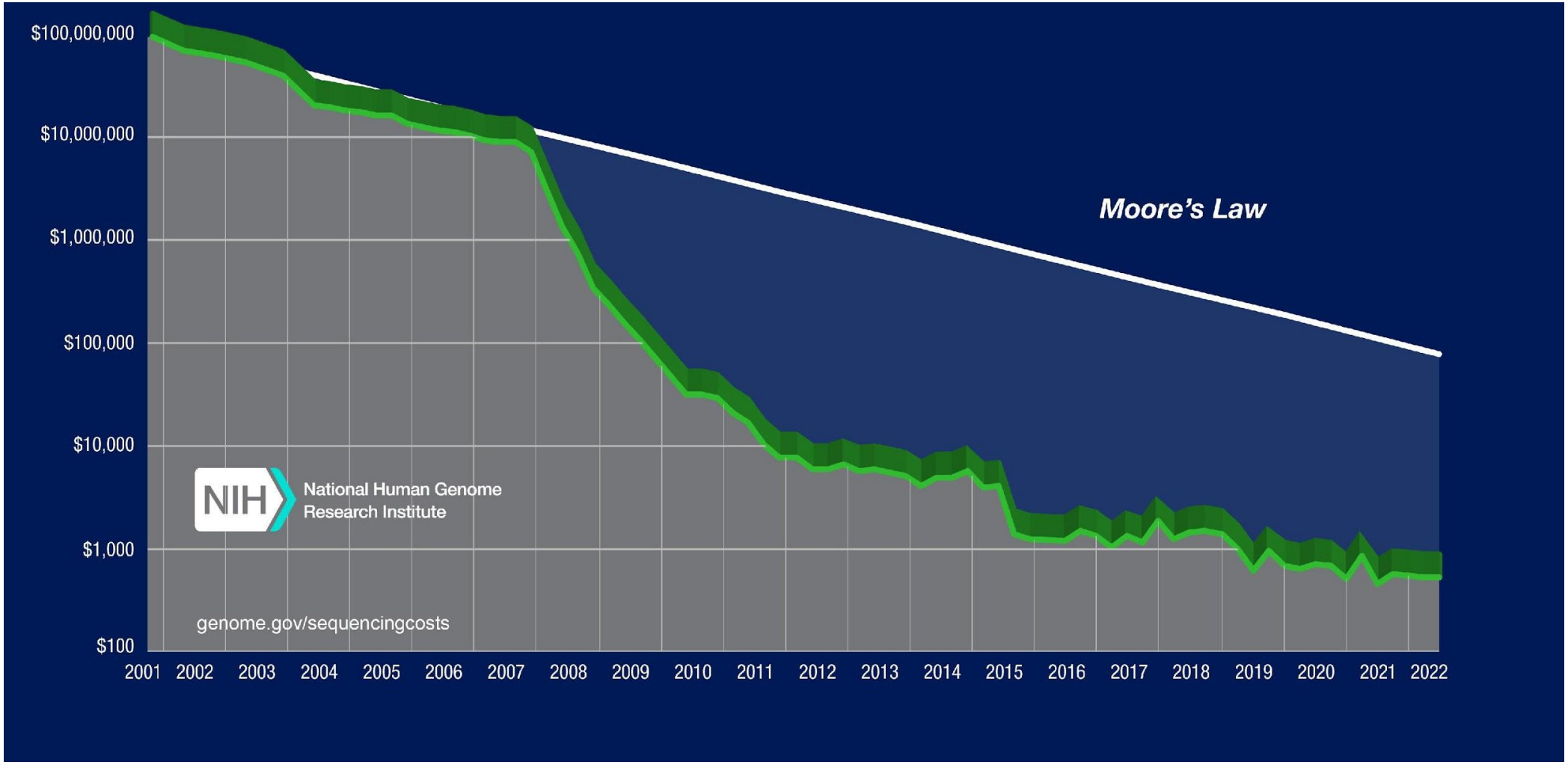
- Take Pre-class assessment
- Introduction to genomics & shell computing
- Accessing terminal via Farm OnDemand
- Learn how to use the command line interface to move around in your file system

Pre-Class Assessment!

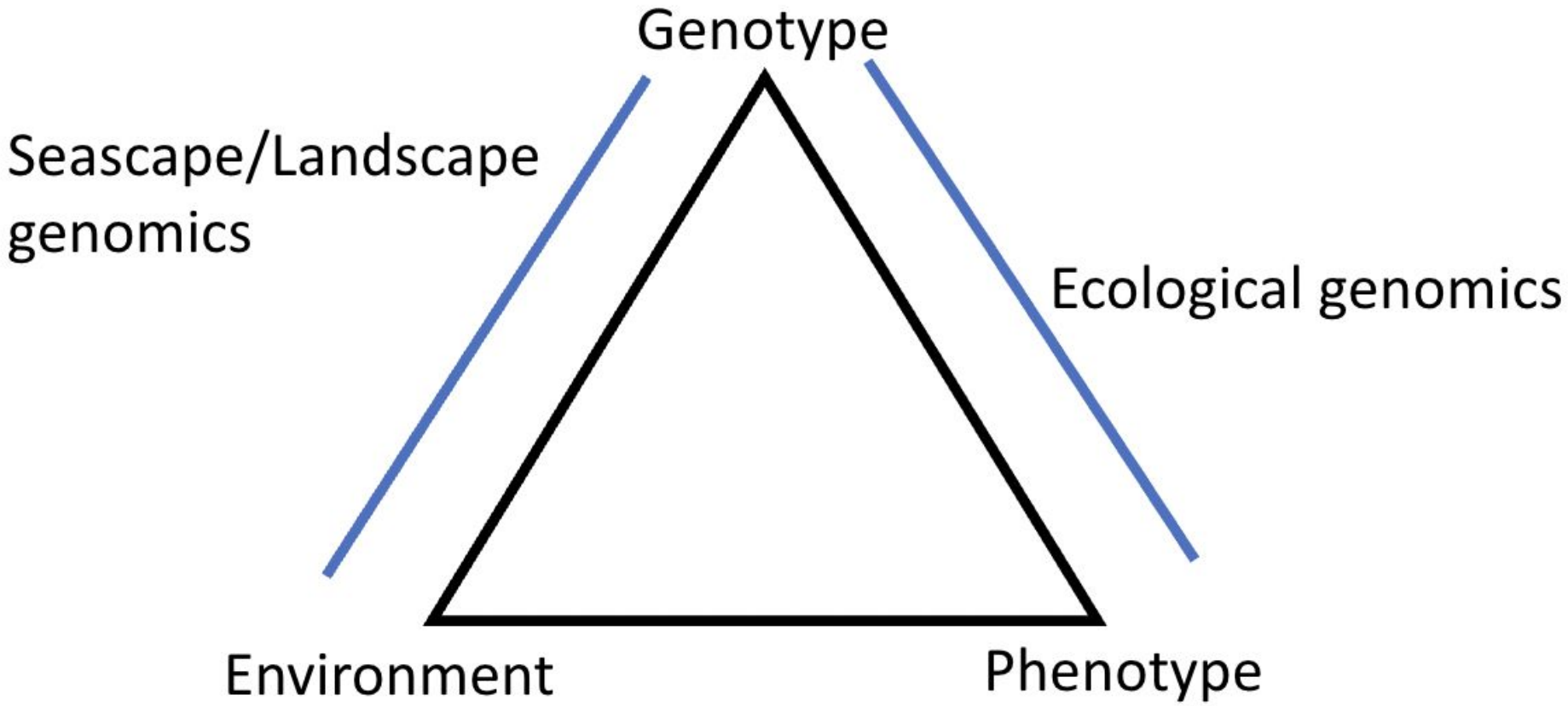
What is Genomics?



Genomics data is becoming more accessible & cheaper!



Pairing genetic data with environmental/phenotypic data



Article

The tuatara genome reveals ancient features of amniote evolution

https://doi.org/10.1038/s41586-020-2561-9

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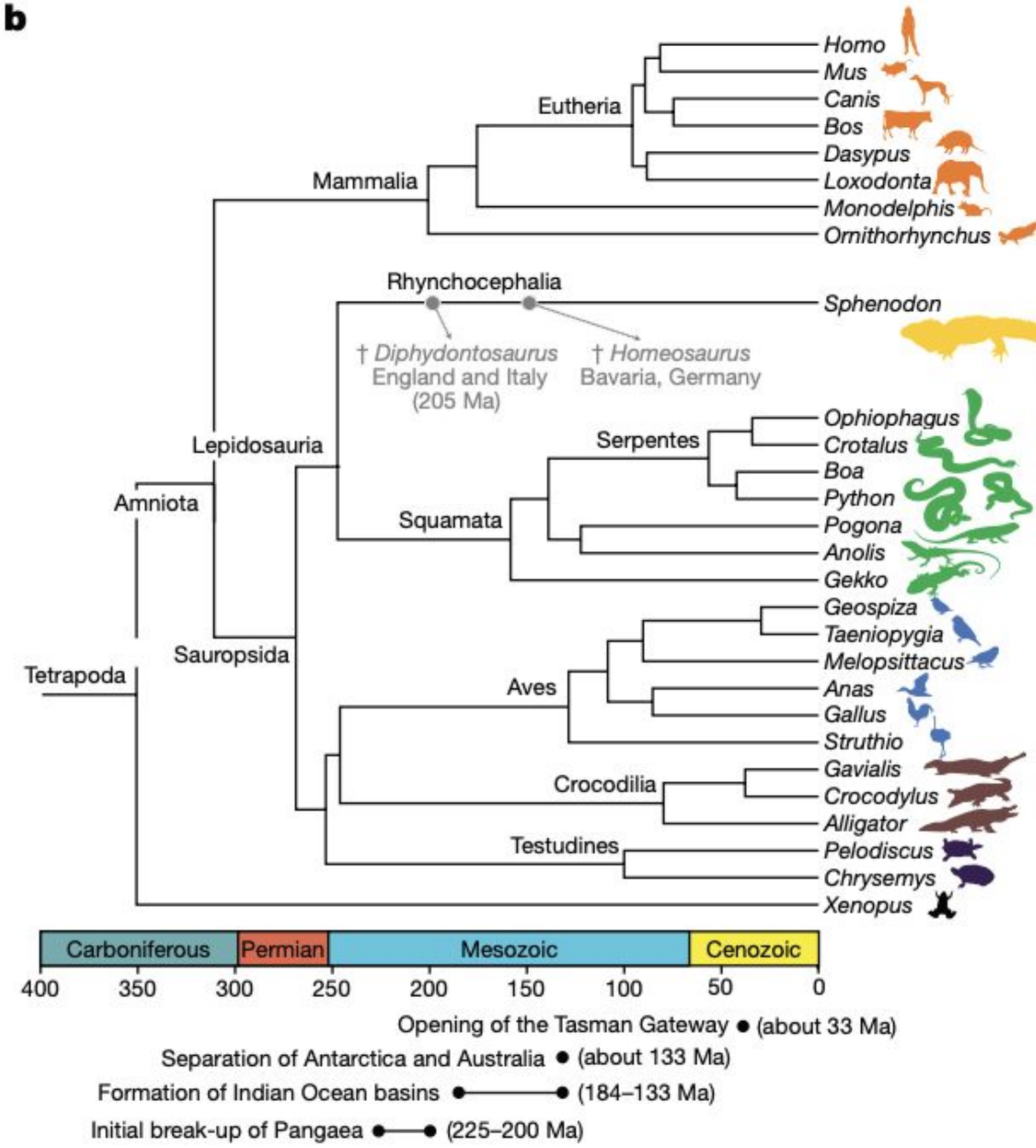
Open access

Check for updates

Neil J. Gemmell[1]✉, Kim Rutherford[1], Stefan Prost[2,3], Marc Tollis[4,5], David Winter[6], J. Robert Macey[7], David L. Adelson[8], Alexander Suh[9,10], Terry Bertozzi[8,11], José H. Grau[12,13], Chris Organ[14], Paul P. Gardner[15], Matthieu Muffato[16], Mateus Patricio[16], Konstantinos Billis[16], Fergal J. Martin[16], Paul Flicek[16], Bent Petersen[17], Lin Kang[18], Pawel Michalak[18,19,20], Thomas R. Buckley[21,22], Melissa Wilson[4], Yuanyuan Cheng[23], Hilary Miller[24], Ryan K. Schott[25], Melissa D. Jordan[26], Richard D. Newcomb[26], José Ignacio Arroyo[27], Nicole Valenzuela[28], Tim A. Hore[1], Jaime Renart[29], Valentina Peona[9,10], Claire R. Peart[9,30], Vera M. Warmuth[9,30], Lu Zeng[8], R. Daniel Kortschak[8], Joy M. Raison[8], Valeria Velásquez Zapata[28], Zhiqiang Wu[28], Didac Santesmasses[31], Marco Mariotti[31], Roderic Guigó[31], Shawn M. Rupp[4], Victoria G. Twort[21,22], Nicolas Dussex[1], Helen Taylor[1], Hideaki Abe[1], Donna M. Bond[1], James M. Paterson[32], Daniel G. Mulcahy[33], Vanessa L. Gonzalez[33], Charles G. Barbieri[7], Dustin P. DeMeo[7], Stephan Pabinger[34], Tracey Van Stijn[35], Shannon Clarke[35], Oliver Ryder[36], Scott V. Edwards[37], Steven L. Salzberg[38], Lindsay Anderson[39], Nicola Nelson[39], Clive Stone[40] & Ngatiwai Trust Board*

a

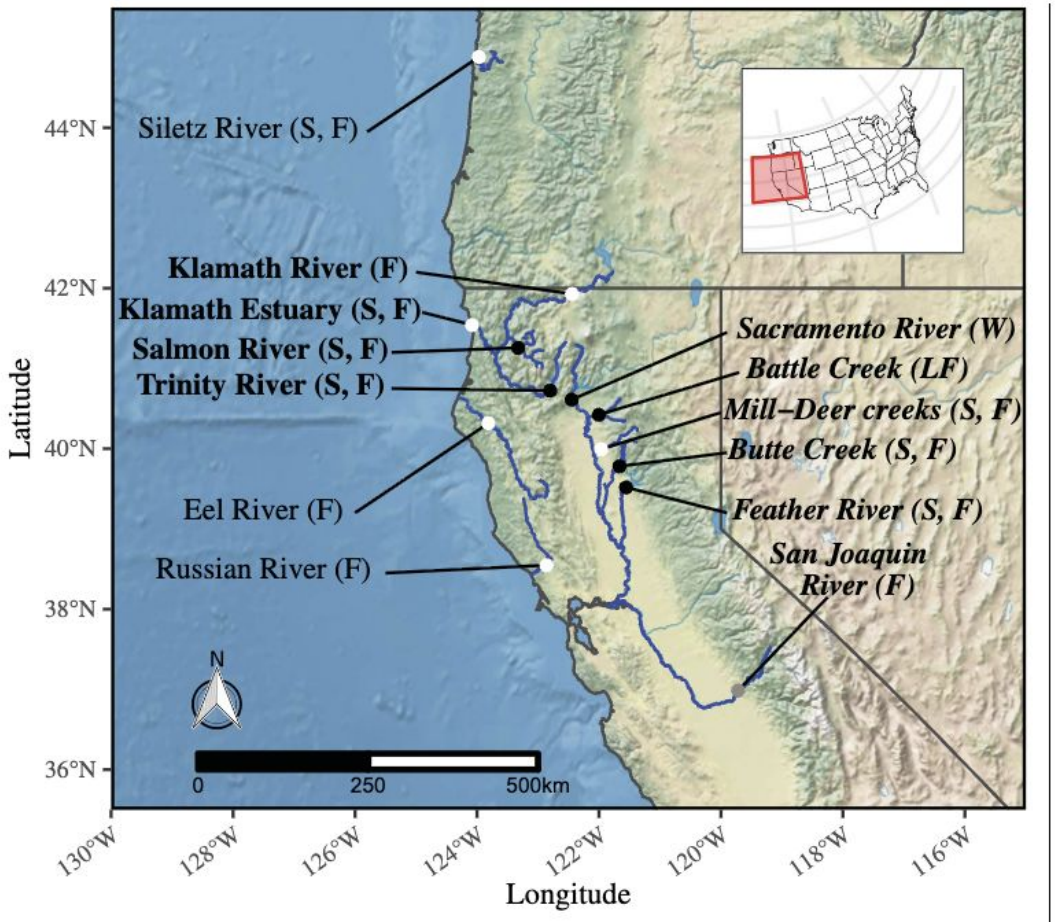
b

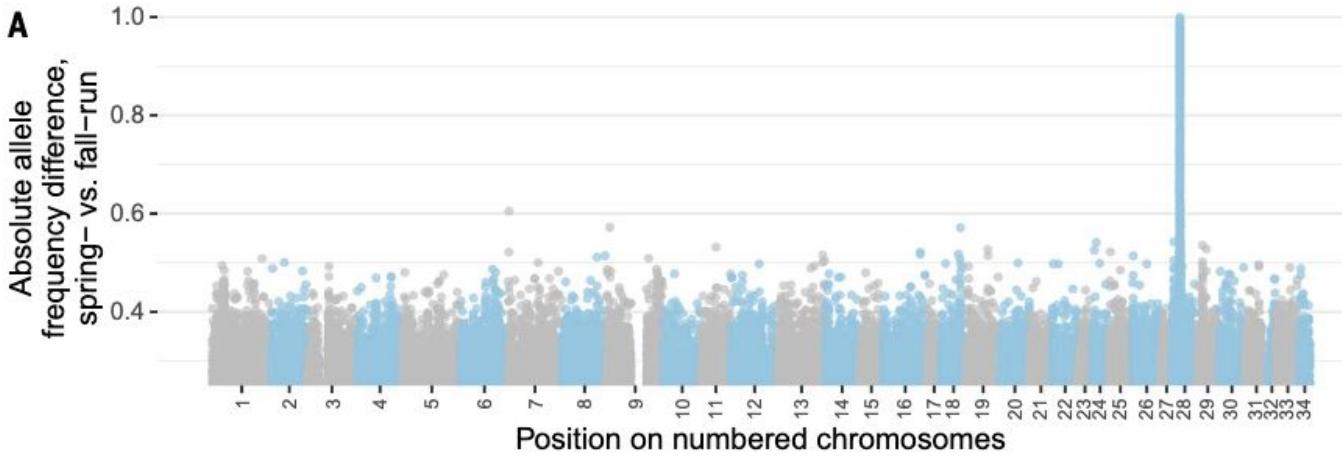


MIGRATION

A complex phenotype in salmon controlled by a simple change in migratory timing

Neil F. Thompson[1,2,3]*, Eric C. Anderson[2,3,4]*†, Anthony J. Clemento[2,3], Matthew A. Campbell[2,3,5], Devon E. Pearse[3,5], James W. Hearsey[6], Andrew P. Kinziger[6], John Carlos Garza[1,2,3]*†





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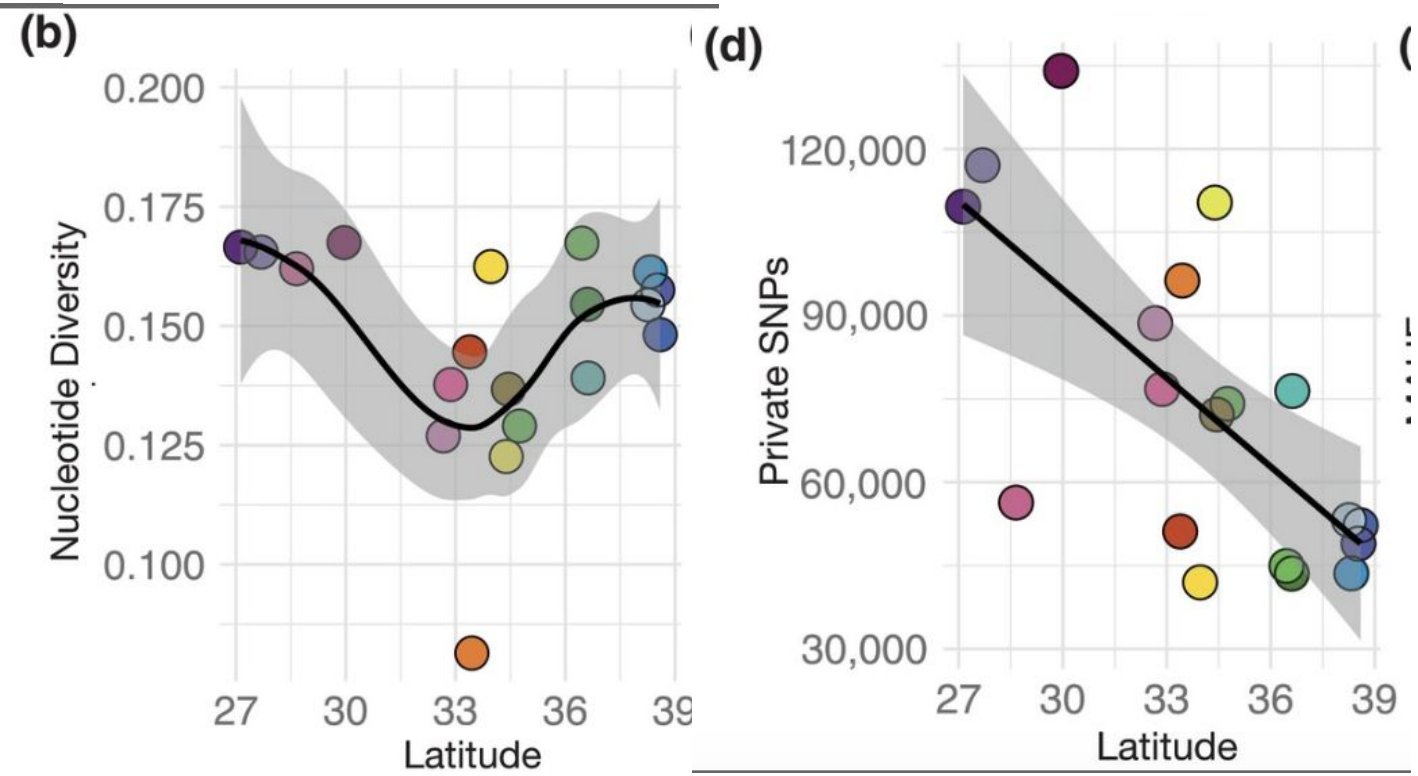
DOI: 10.1111/gcb.17414

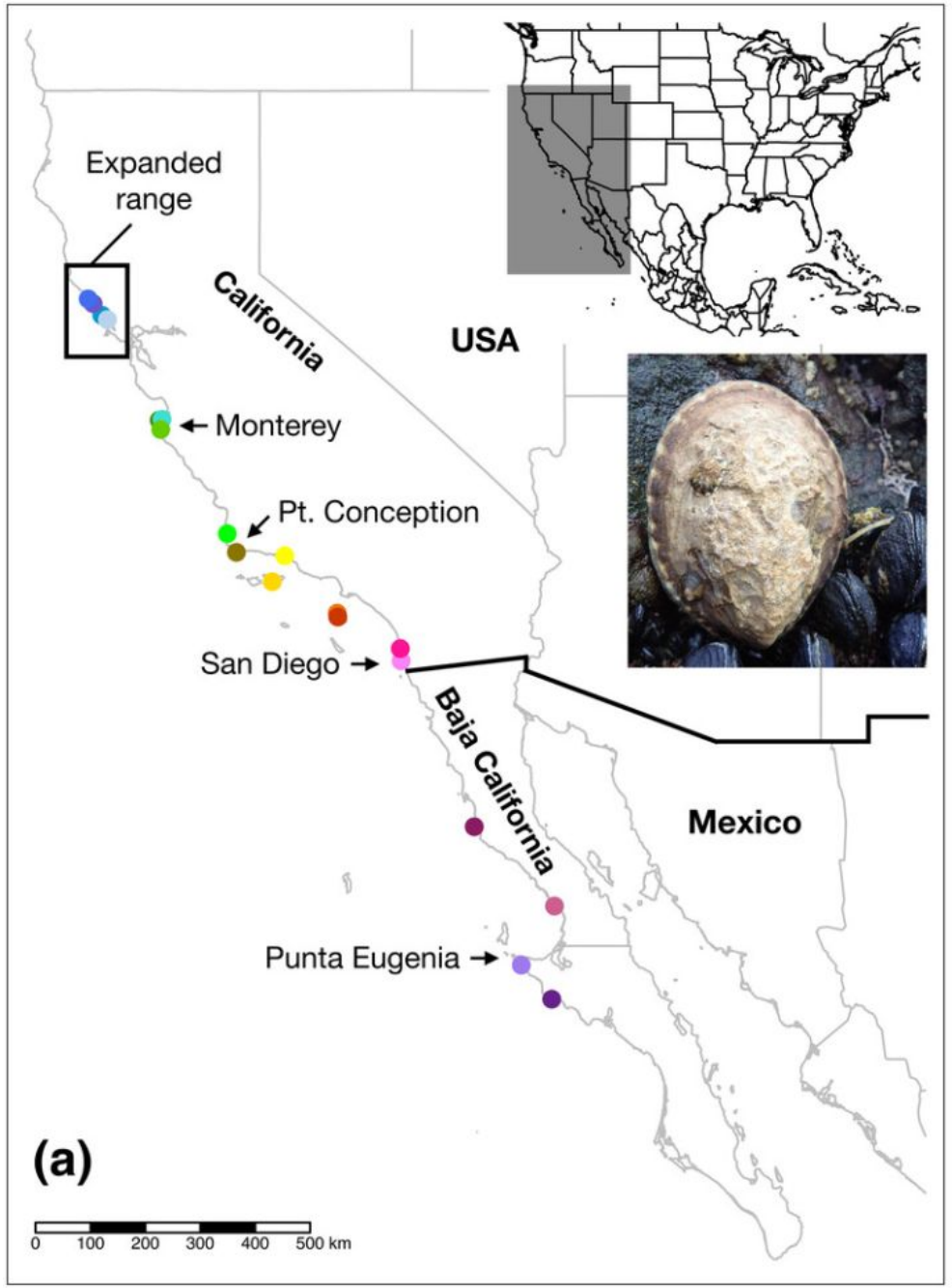
Global Change Biology WILEY

RESEARCH ARTICLE

Pushed waves, trailing edges, and extreme events: Eco-evolutionary dynamics of a geographic range shift in the owl limpet, *Lottia gigantea*

Erica S. Nielsen[1] | Samuel Walkes[1,2] | Jacqueline L. Sones[3] | Phillip B. Fenberg[4] | David A. Paz-García[5] | Brenda B. Cameron[1] | Richard K. Grosberg[1] | Eric Sanford[1,2] | Rachael A. Bay[1]





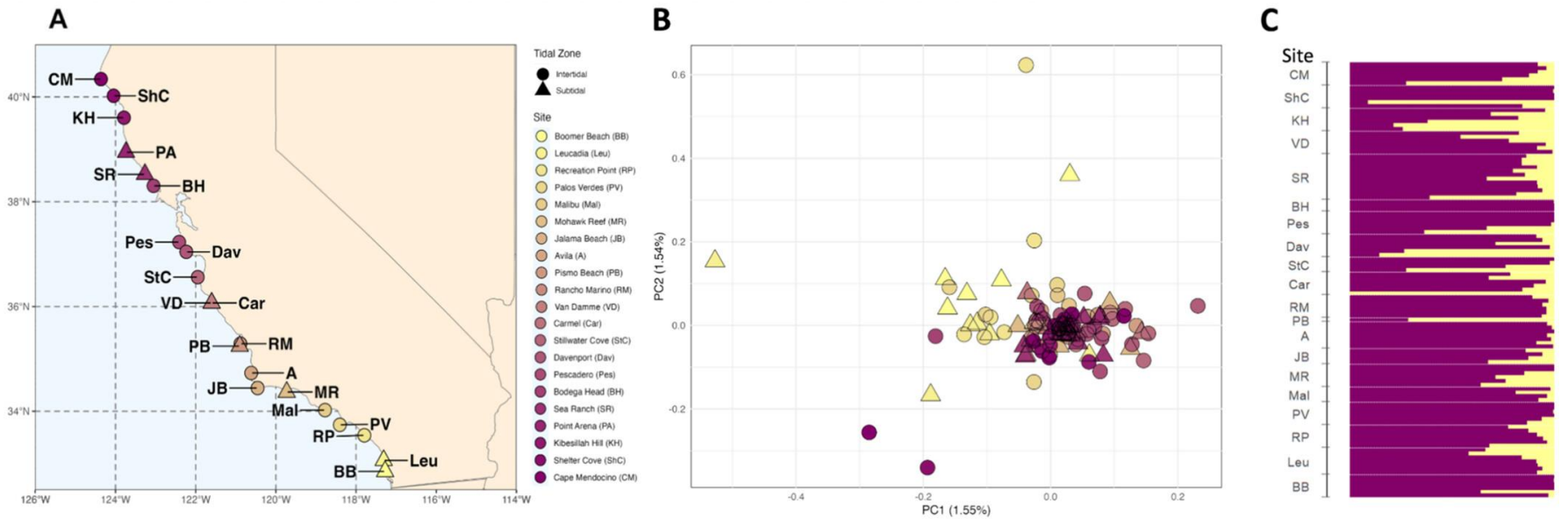
MOLECULAR ECOLOGY

ORIGINAL ARTICLE | Open Access

Selection Over Small and Large Spatial Scales in the Face of High Gene Flow

Camille Rumberger, Madison Armstrong, Martin Kim, Raquel Ponce, Josue Melendez, Melissa DeBiasse, Serena Caplins, Rachael Bay

First published: 19 February 2025 | https://doi.org/10.1111/mec.17700



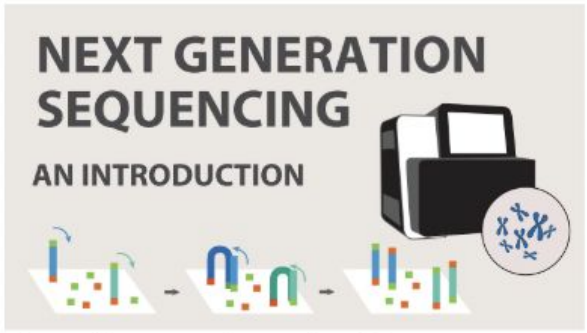
How do we do it?

Research idea/question

Design experiment

Lab experiment
Field collection scheme

Extract DNA/RNA



https://www.youtube.com/watch?v=jFCD8Q6qSTM&ab_channel=AppliedBiologicalMaterials-abm

Download data

Perform analyses

Present results at conference
Publish paper

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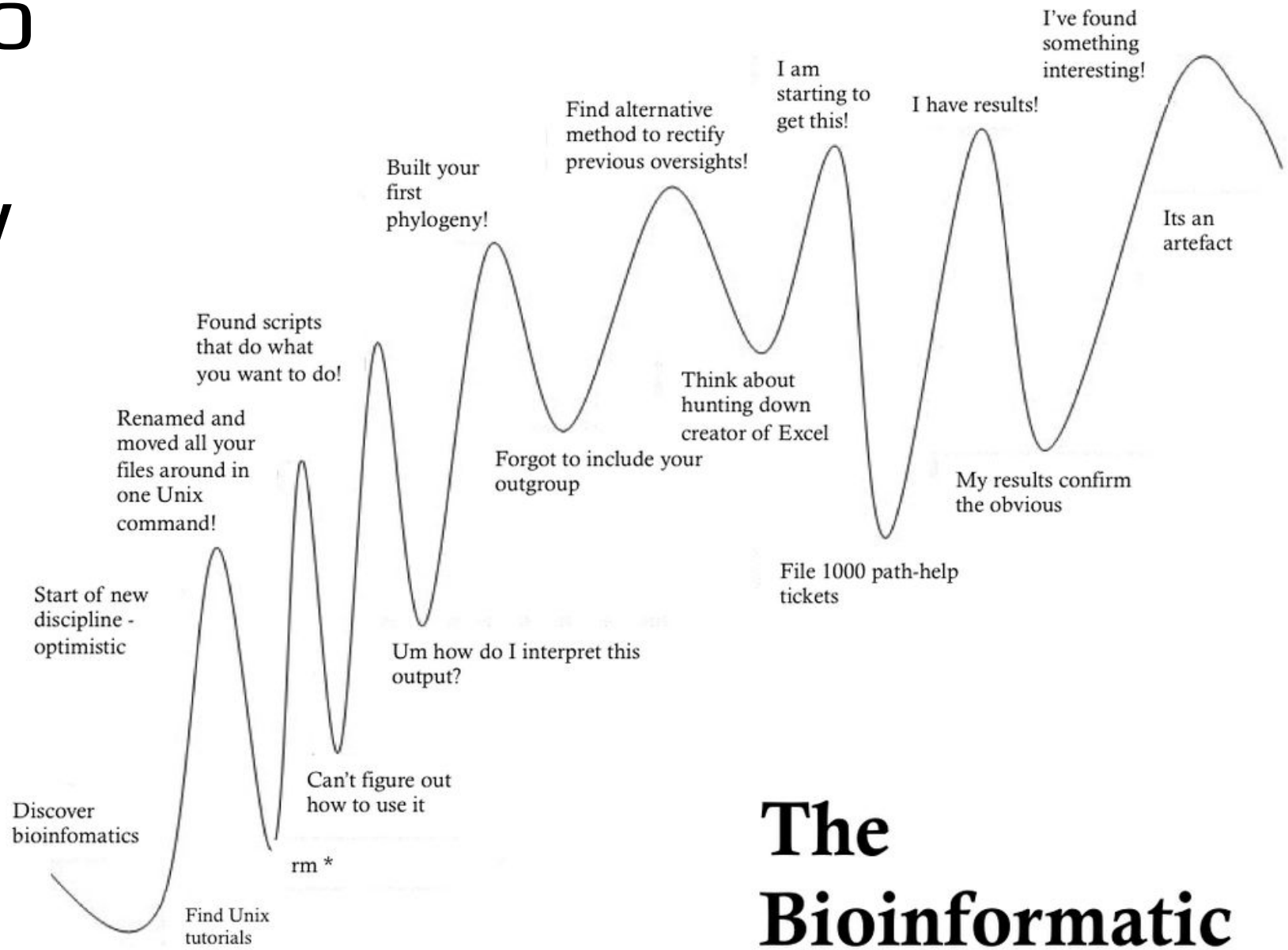
- Makes your work more reproducible

Let's navigate to Farm OnDemand now and our course website for the rest of class!



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