

# Unlocking the potential of big data in biology: Applications of bioinformatics

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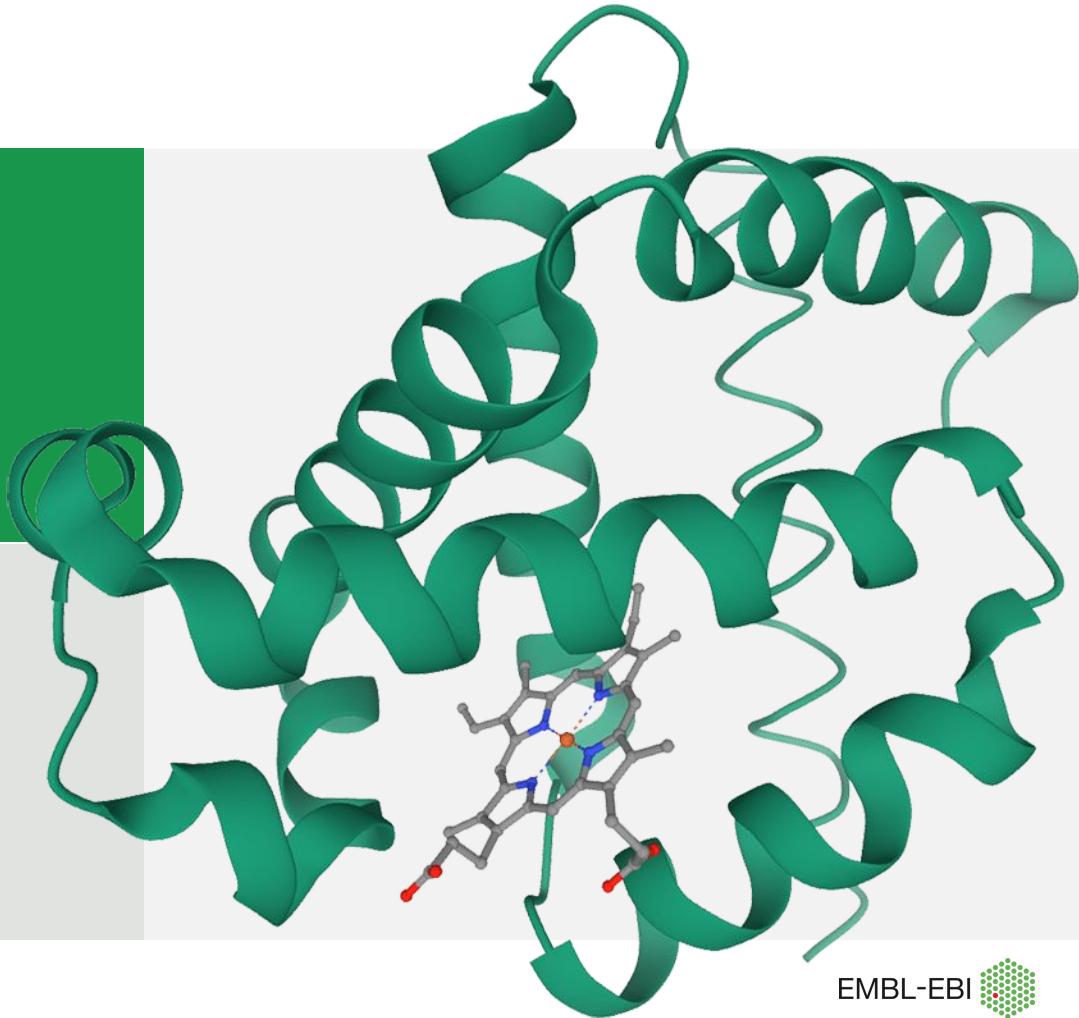
Presented to:

Wellcome Connecting Science - Genome Academy, 24 August 2023



# Bioinformatics

- Bioinformatics is the study of biology (bio) with computers (informatics).
- Involves storing, managing and analysing huge datasets.



# What is EMBL-EBI?

- The home of big data in biology
- One of the six sites of the European Molecular Biology Laboratory (EMBL)
- Intergovernmental organisation



# The European Molecular Biology Laboratory



# What skills are needed for bioinformatics?

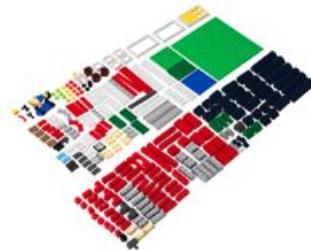
1 Data Collection



2 Data Preparation



3 Data Visualization



4 Data Analysis



5 Data Storytelling



Organisational

Problem-solving

Creativity and Experimentation

Communication

# Data resources at EMBL-EBI

107 million requests to our data resources on an average day



# What is open data?

- Open data can be freely used, re-used and redistributed by anyone.
- When research data is open others can use it to ask new questions and get new insights.
- Open data drives new discoveries.
- EMBL-EBI data resources are open data.



# We don't wear labcoats

Biologists, physicists  
mathematicians

Software engineers

Biocurators

Bioinformaticians

Data wranglers

And more!



# Pandemic preparedness

Data science was essential in the COVID-19 pandemic.

EMBL-EBI supported the pandemic response:

- Set up the COVID-19 Data Portal to access SARS-CoV-2 molecular and genomic data from all over the world
- Supported countries to set up data sharing platforms
- Revealed insights on new ‘variants’
- Analysed molecular causes of different immune responses
- Identified existing drugs that could be used to treat COVID-19

EMBL-EBI and collaborators are helping to improve European pandemic preparedness.



# Sustainable food production

Bioinformatics helps to feed a growing population in a changing climate.

- Plant genomics – identify which species will be most tolerant to drought and pests while still providing optimum nutrition
- Pests and pollinators – genomics can inform strategies for dealing with pests while protecting pollinators
- Precision breeding – linking genes to traits, farmers and breeders can make food production more sustainable



# Biodiversity conservation

Bioinformatics helps us

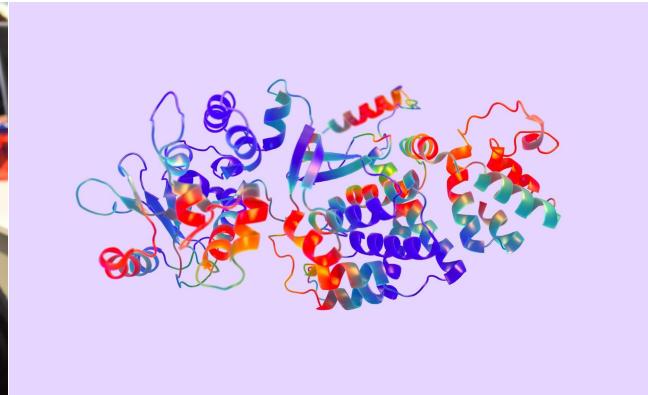
- understand and protect biodiversity
- develop clean technologies to reduce environmental pollution

## Darwin Tree of Life project

- Sequence 77,000 eukaryotic species in Britain and Ireland
- Data made openly available by EMBL-EBI



# A growing field

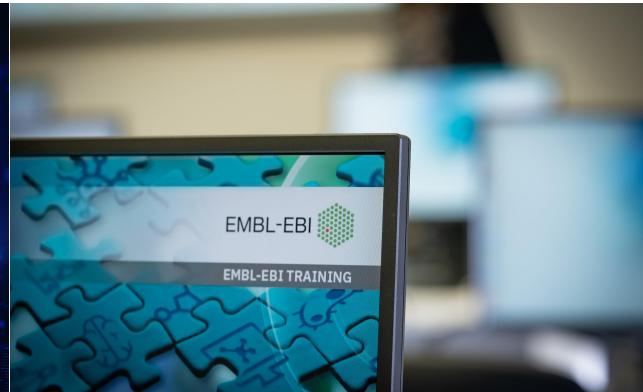


**100 million**  
requests to our websites  
on an average day

**2 million scientists**  
access our websites  
every month

**7 out of 10 users say**  
“not having access to  
EMBL-EBI data resources  
would have a major impact  
on my work”

# Want to learn more and develop your skills?



[EMBL's TeachingBASE](#)

[Tree of Life project tutorial](#)

[EMBL-EBI tutorials -  
Bioinformatics for the terrified](#)

# Thank you

<https://www.ebi.ac.uk/>



# What does EMBL-EBI do?



Provide data resources for the life sciences

Perform excellent research

Train the next generation of scientists

Work with the private sector

Coordinate bioinformatics in Europe