

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

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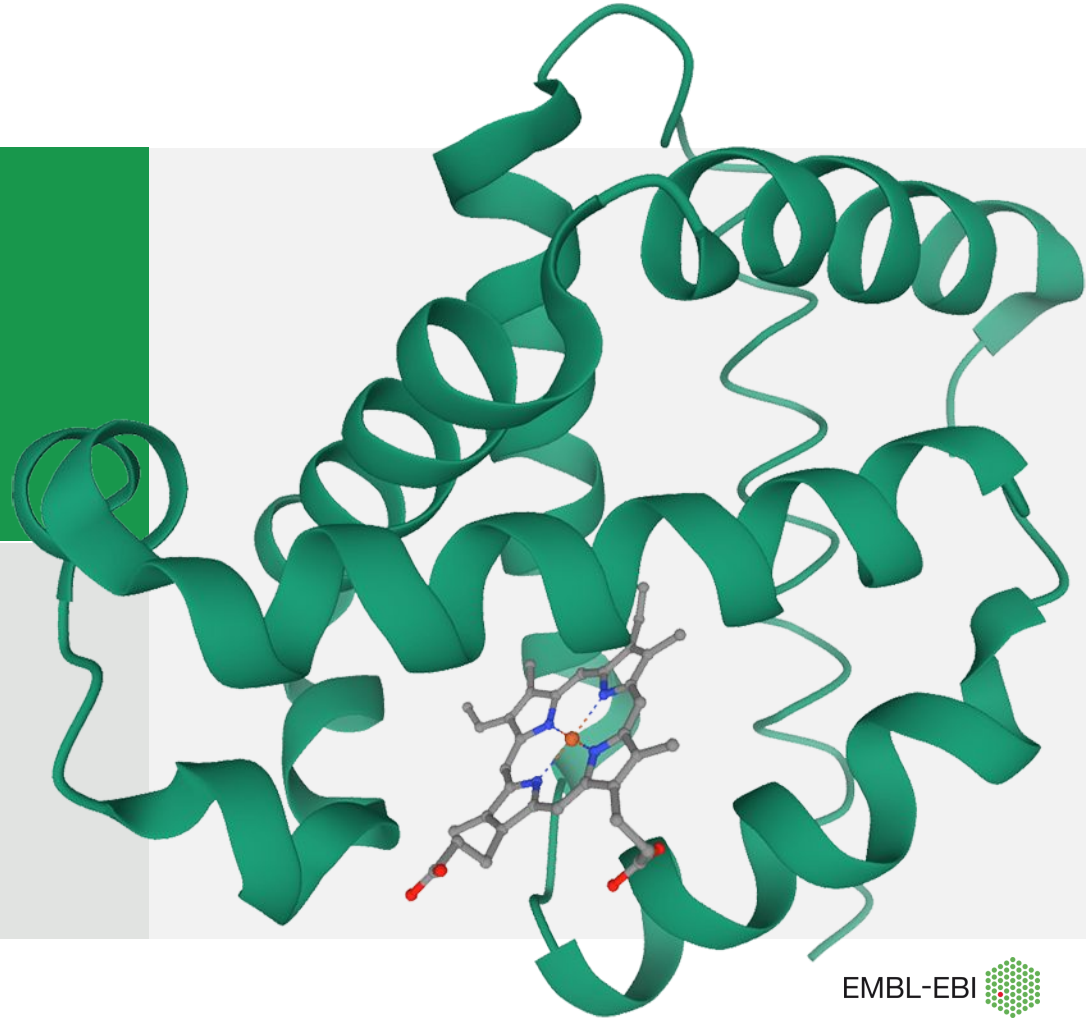
Presented to:

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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



EMBL-EBI

Bioinformatics



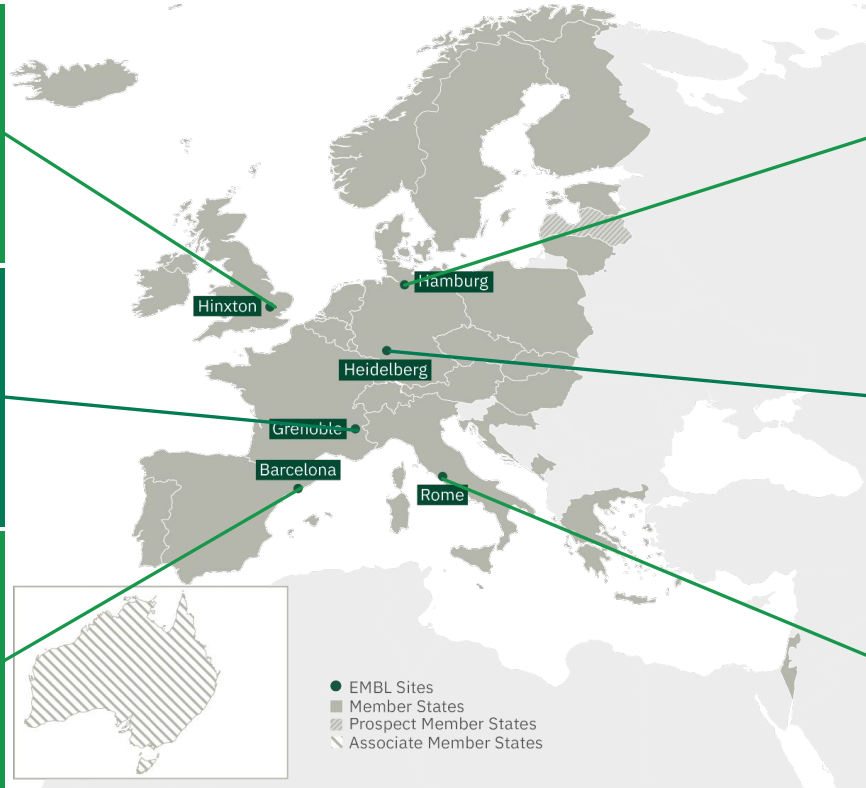
Grenoble

Structural biology



Barcelona

Tissue biology
and disease
modelling



Hamburg

Structural biology



Heidelberg

Life sciences



Rome

Epigenetics
and neurobiology



What skills are needed for bioinformatics?

1 Data Collection



2 Data Preparation



3 Data Visualization



4 Data Analysis



5 Data Storytelling



www.effective-datascorytelling.com

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!

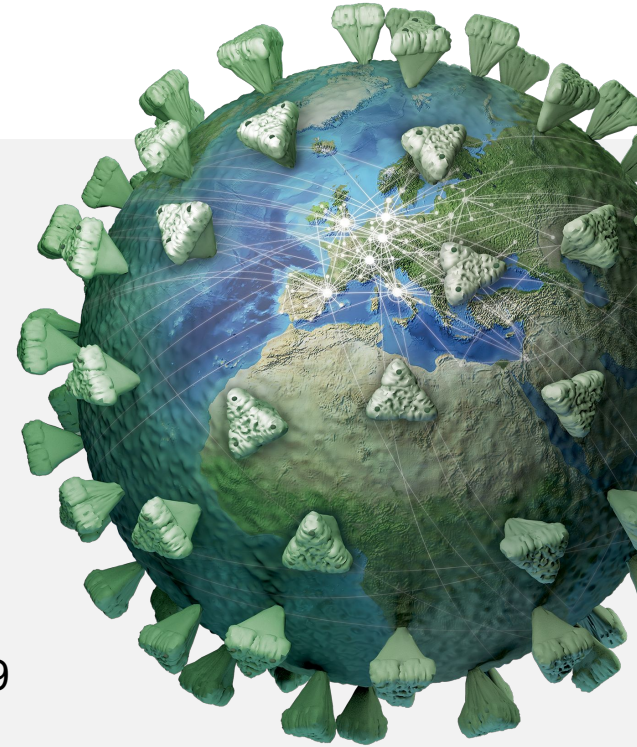
Pandemic preparedness

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



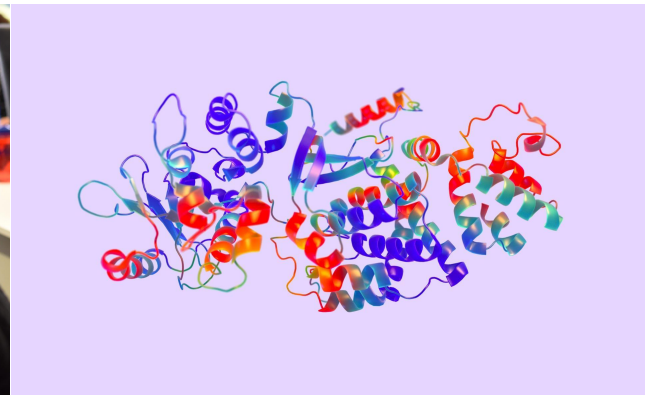
A growing field



100 million
requests to our websites
on an average day

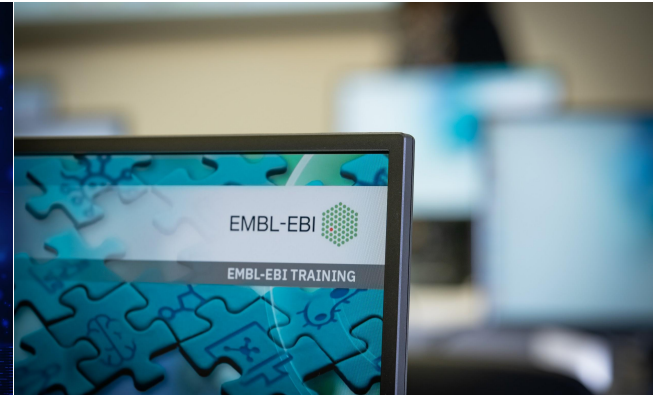
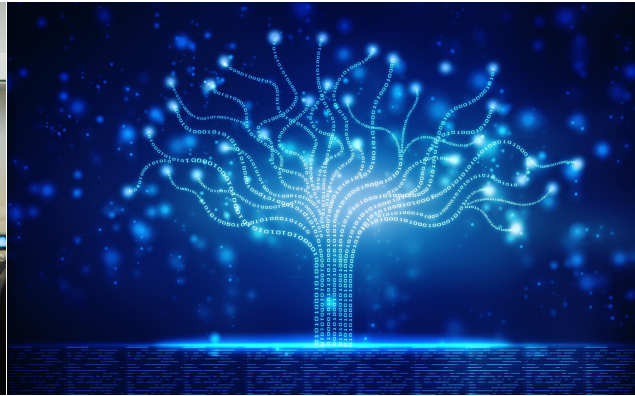


2 million scientists
access our websites
every month



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](#)

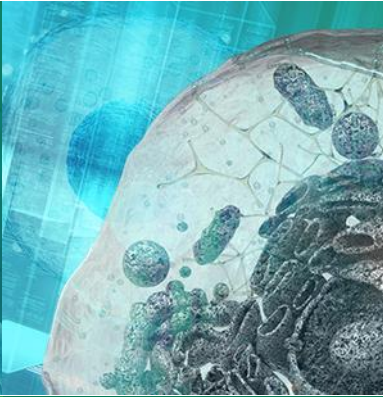
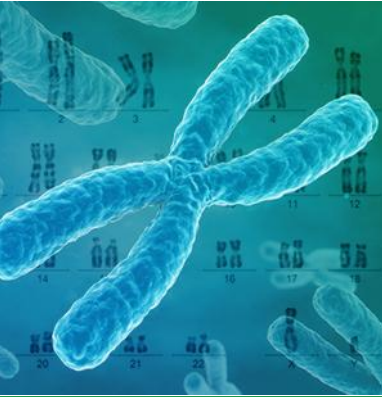
[EMBL-EBI tutorials -
Bioinformatics for the terrified](#)

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