# EMBL: Europe's Life Science Research Organization

**Cornelius Gross**
Head of EMBL Rome

CNR-DISBA Department Conference – 16 December 2021

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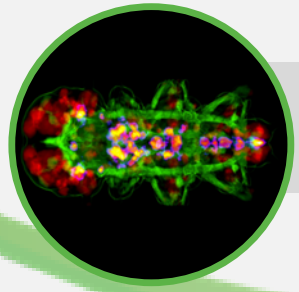
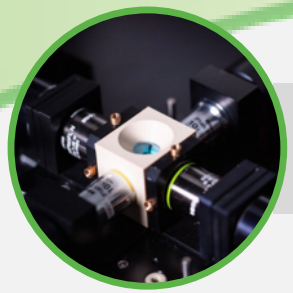
# About EMBL



Excellent Research

Advanced Training

Scientific Services



Innovation & Translation
Technology Development

Integration
of European life science research

| | | | | |
|---|---|---|---|---|
| **~1900** staff | **96** nationalities | **27** member states | **82 million** daily web requests to EMBL data services | **>6700** user visits to access scientific services |

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# EMBL is an intergovernmental organisation

## Member states (27)

**Austria** 1974
**Denmark** 1974
**France** 1974
**Germany** 1974
**Israel** 1974
**Italy** 1974
**Netherlands** 1974
**Sweden** 1974
**Switzerland** 1974
**United Kingdom** 1974
**Finland** 1984
**Greece** 1984
**Norway** 1985
**Spain** 1986
**Belgium** 1990
**Portugal** 1998
**Ireland** 2003
**Iceland** 2005
**Croatia** 2006
**Luxembourg** 2007
**Czech Republic** 2014
**Malta** 2016
**Hungary** 2017
**Slovakia** 2018
**Montenegro** 2018
**Poland** 2019
**Lithuania** 2019

## Associate member states

Australia 2008

## Prospect member states

Estonia
*full member in 2022*
Latvia

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# EMBL is a distributed research infrastructure

**EMBL-EBI**

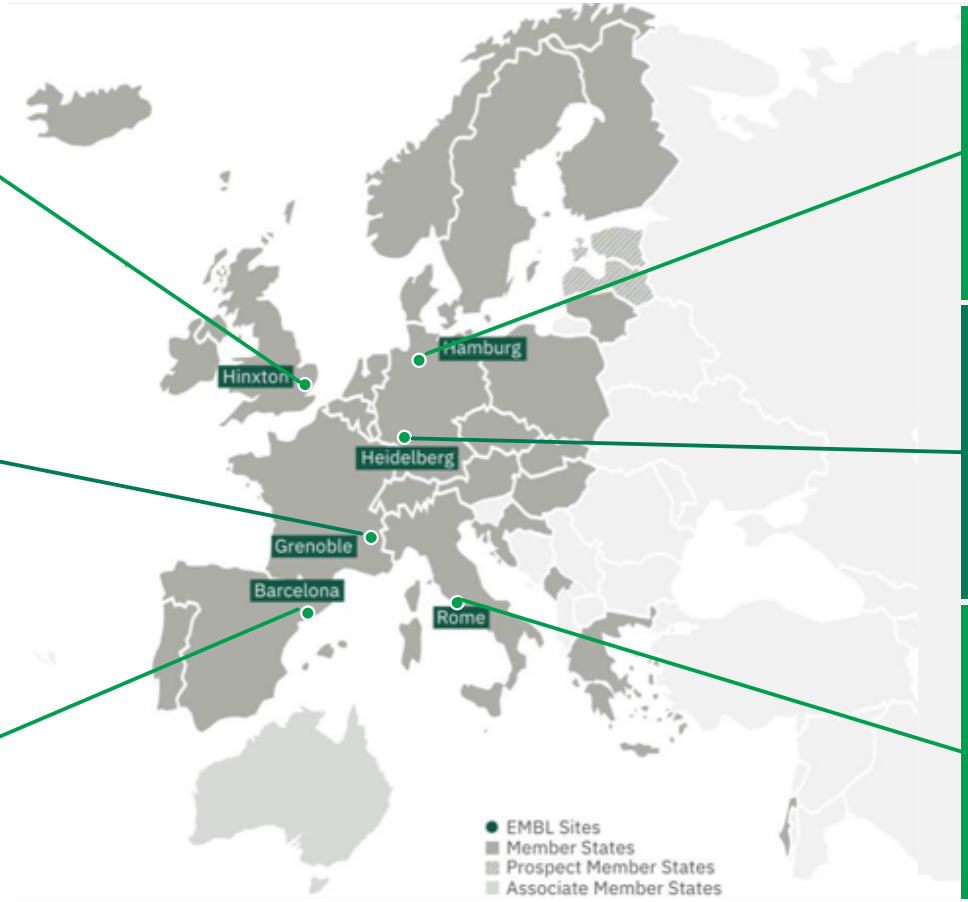
Bioinformatics

**Grenoble**

Structural biology

**Barcelona**

Tissue biology and disease modelling




**Hamburg**

Structural biology

**Heidelberg**

Life sciences

**Rome**

Epigenetics and neurobiology

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# EMBL Programme 2022-2026: Molecules to Ecosystems

## First pan-European Molecular Programme for Environmental and Human Health

### A bold scientific vision for societal challenges

EMBL will help understand **"Life in Context"** at the molecular level

Our goal is to rise to global challenges: use fundamental research to enable **innovation and translation**

### Advanced training

New visiting and sabbatical programmes facilitating scientific exchange and career development;
Postdoc and engineer training schemes with member states;
Outreach and training via mobile labs

### Tailored scientific services

New Imaging Center
Container-based Mobile Labs
Pre-commercial imaging technologies
Precision medicine support for national healthcare

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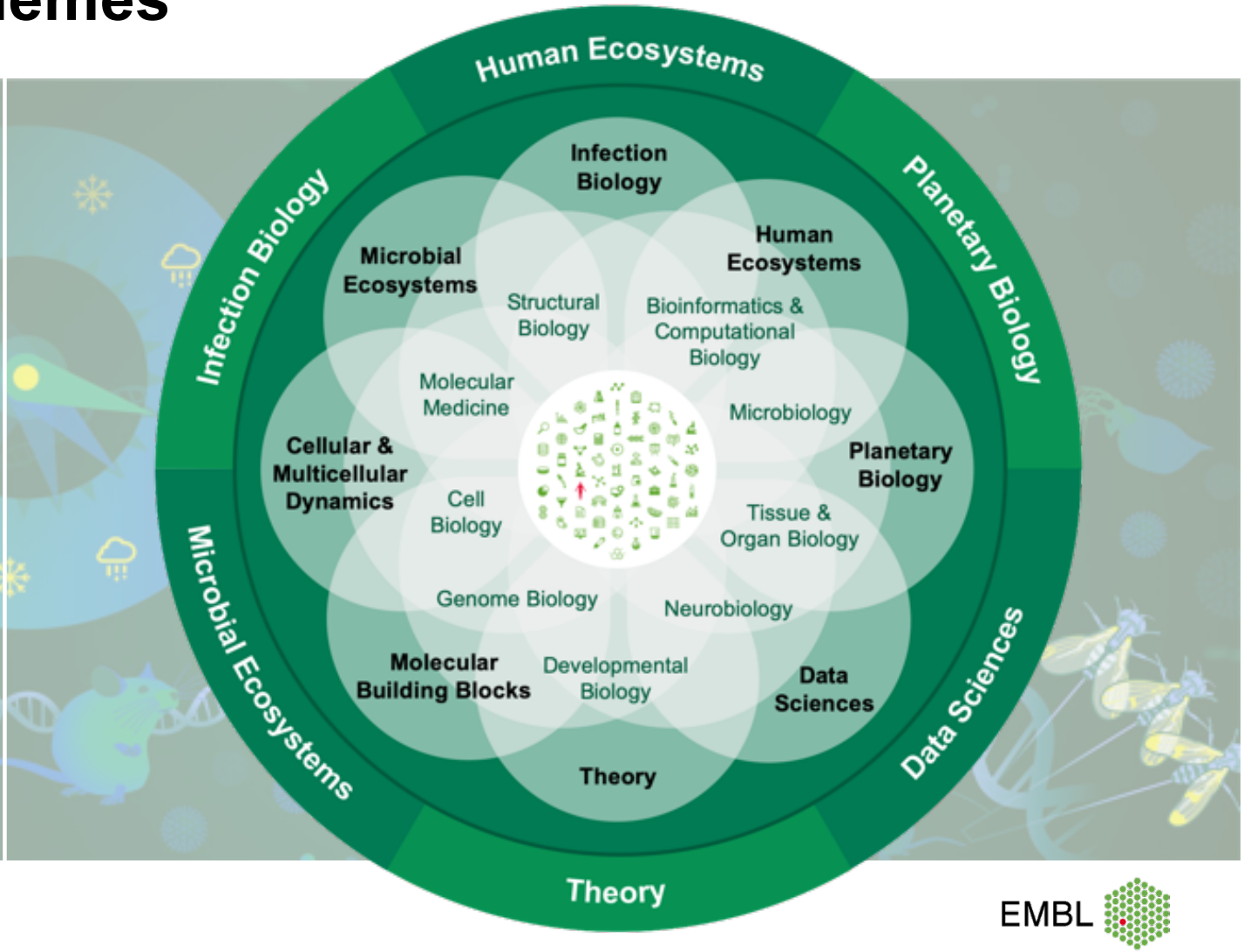
# New Programme Themes

To be built on EMBL's core strengths in molecular biology to gain a mechanistic understanding of **life in context**

Fundamental molecular research to inform advances in **human and planetary health**

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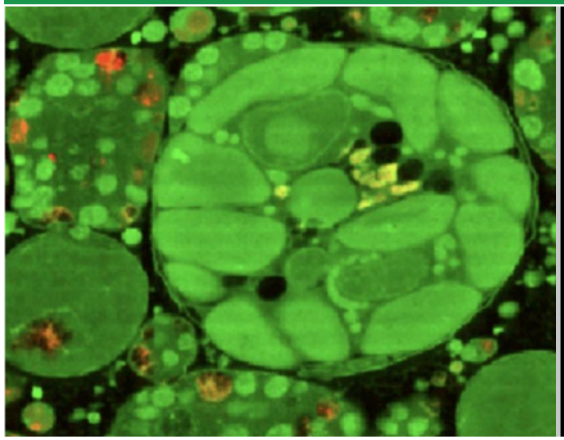
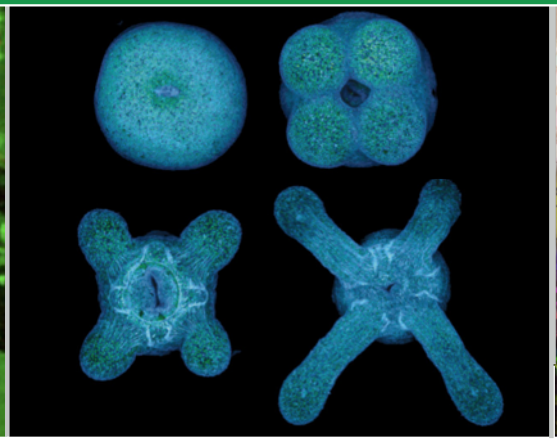
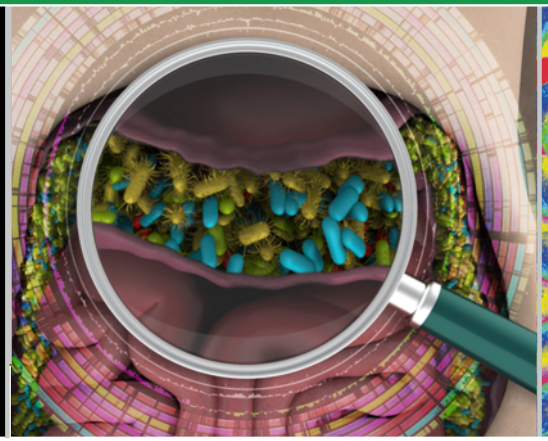
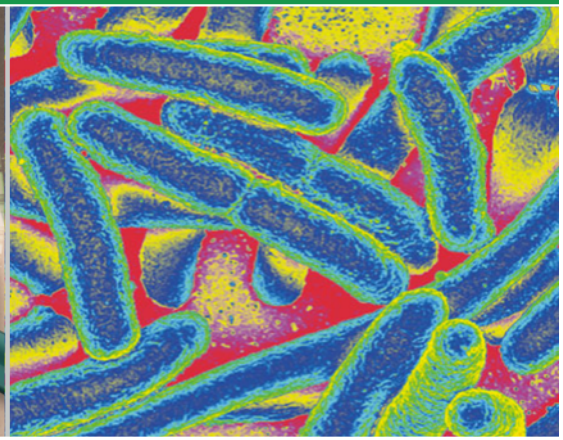
# Rising up to global challenges, finding new solutions

## Researching life in its environment at the molecular level

|  |  |  |  |
|---|---|---|---|
| **Climate change** | **Biodiversity** | **Disease** | **Antimicrobial resistance** |
| Researching **ecosystems** to develop and scale-up carbon fixation solutions | Researching **organisms** in their **environment** to guide solutions that reverse the impact of biodiversity loss | Researching **cancer, infection, microbiomes** to understand & prevent disease | Researching **antimicrobial resistance** to combat multidrug-resistant pathogens |

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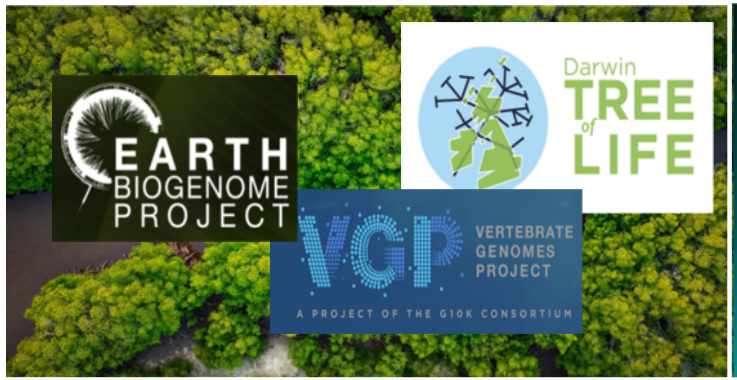
# EMBL Enables Genomic Research



| Genome Annotation | Transcontinental data management | Open Data |
|---|---|---|
| EMBL-EBI provides the infrastructure and resources for systematic genome annotation in large-scale sequencing initiatives. | The CINECA project partners, including EMBL-EBI, aim to develop common data infrastructures for national cohorts in Europe, Canada and Africa to accelerate disease research. | EMBL-EBI's data resources enable researchers worldwide to freely access and use genomic data to accelerate health, agricultural and biodiversity research. |

**EMBL is committed to contributing its expertise in these areas to promote Open Science**

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# EMBL Data Services for Healthcare

## The COVID-19 Data Portal

**Italy is one of only 8 countries in the world to have its own COVID-19 Data Portal**

– providing information, guidelines, tools and services to support research

elixir ITALY

## The Genomic Medicine Platform

will provide data, tools, expertise, secondments and training schemes to use **genomic information in national personalised medicine initiatives**

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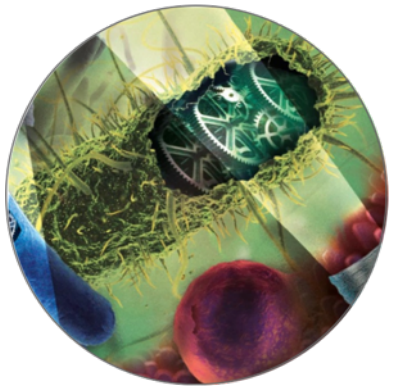
# Microbial Ecosystems and Infection Biology



| Understand microbial life in their natural environment | Lay the foundational knowledge for new model microbes | Novel approaches to study pathogens in context |
|---|---|---|
| Analyse community composition and functional capacities | Isolate new species and strains | Systematically map, view and model host-pathogen interfaces |
| Quantify environmental parameters | Develop systematic genetic/molecular tools | Devise new strategies to delay, prevent & revert antimicrobial resistance |
| Model interactions between microbial systems and the environment | Discover unknown gene functions | Establish resources to enable infection outbreaks and antimicrobial discovery |
| | Chart functional units in the cell | |

EMBL will provide unique resources, tools and functional insights to study microbial ecosystems and host-pathogen interactions

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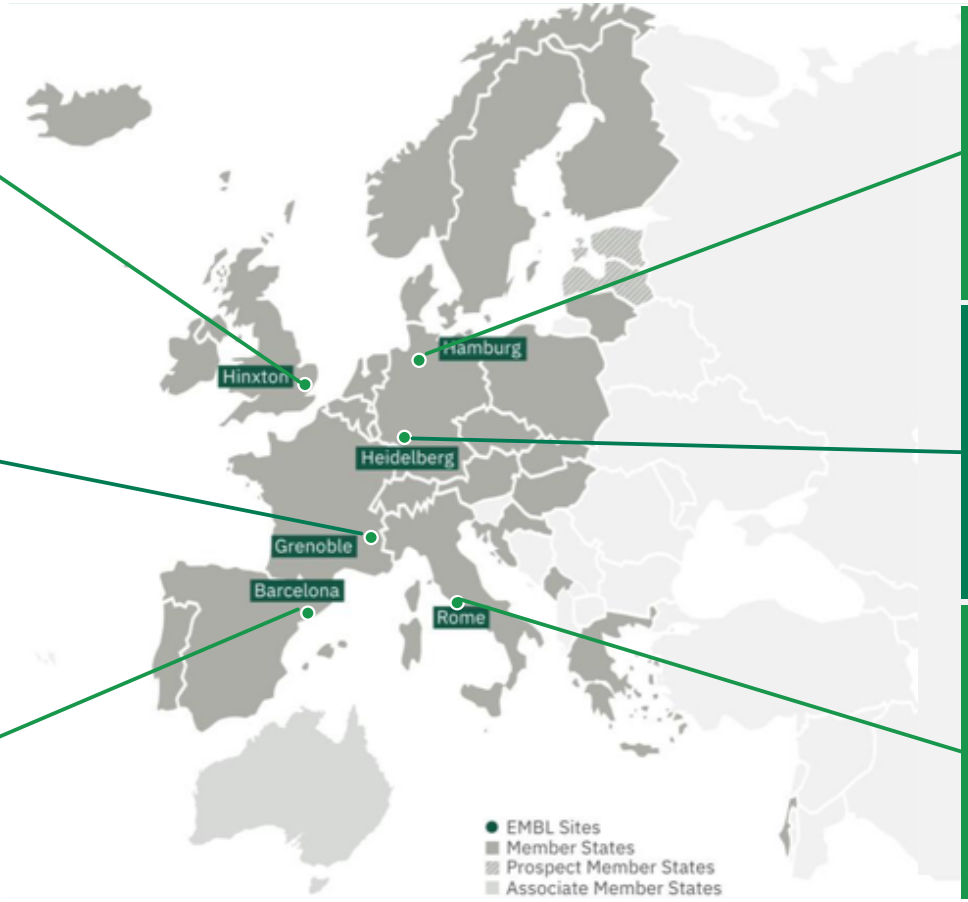


**Hamburg**

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Epigenetics and neurobiology

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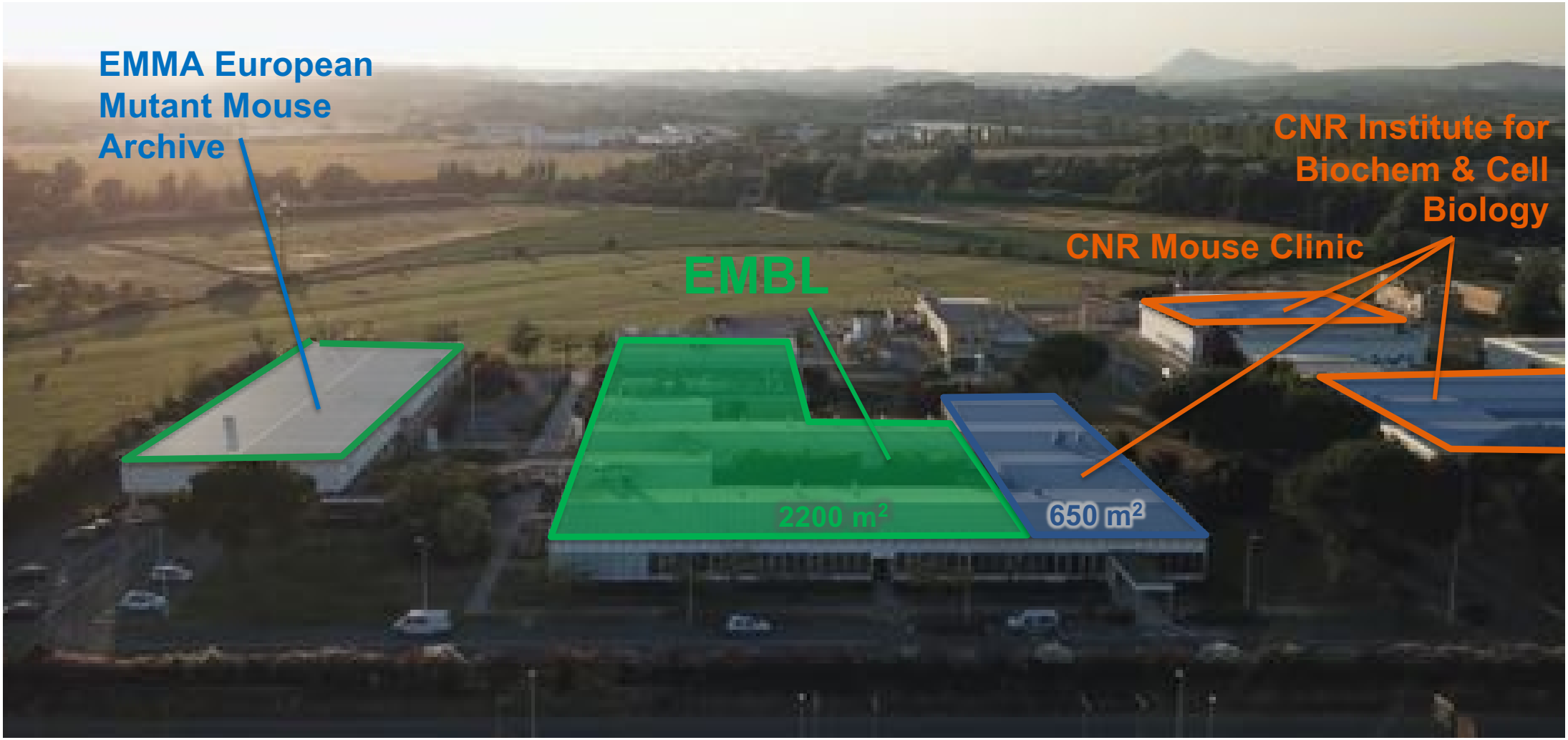
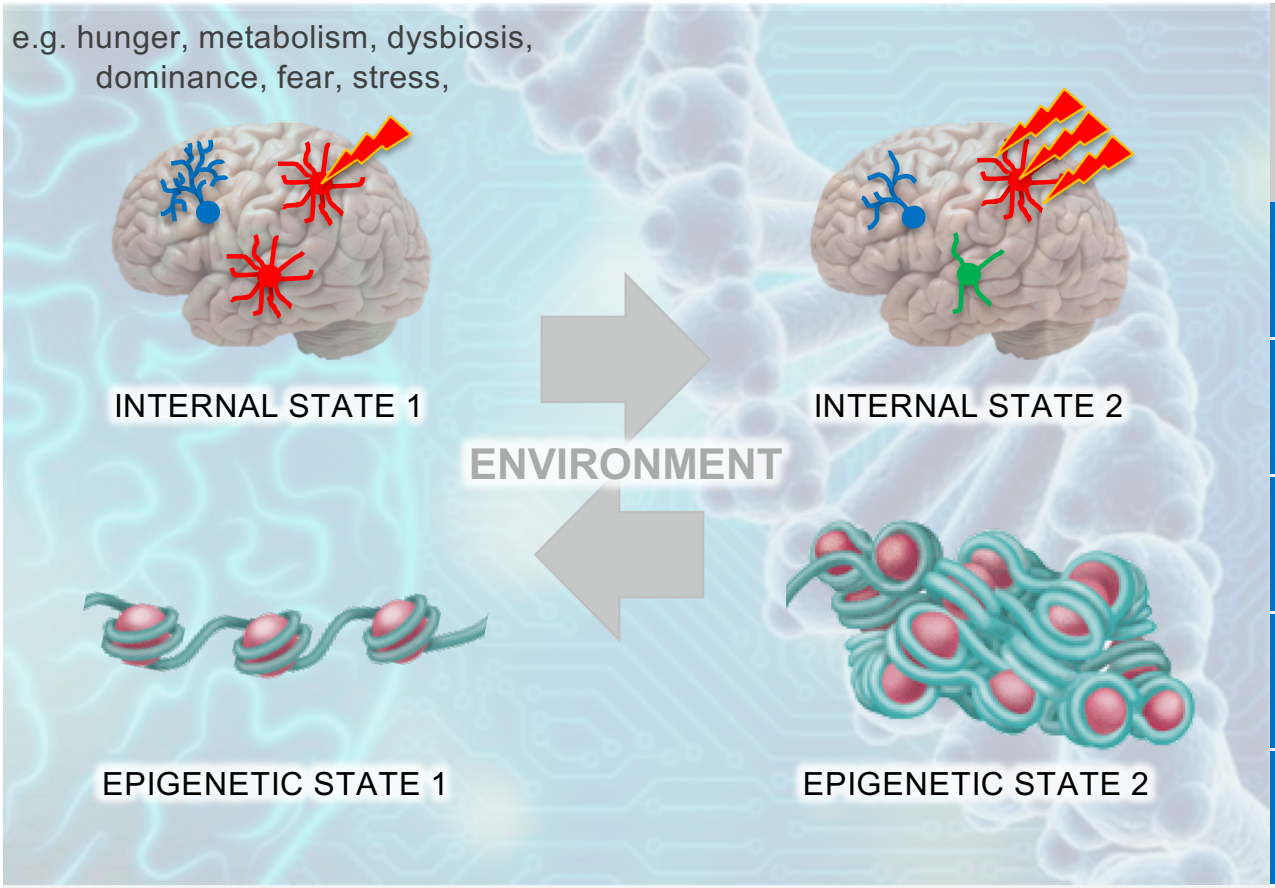
# EMBL Rome campus



# Scientific Vision of EMBL Rome




**Experience-dependent control of internal states**

**Encoding, regulation, and adaptation**

**Impact on behavior and sensory processing**

**Underlying dynamic gene expression (epigenetic) states**

**Developmental origins**

**Inter-generational non-genetic inheritance**

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# EMBL Rome Structure & Research

**Repression by DNA methylation**
- OGT in mCG repression
- KRAB-ZnF as mCG readers

since 2018

Boulard

**Instinctive Defense**
- Plasticity of social fear
- Territorial behavior

since 2003

Gross

since 2016

Prevedel

**IMAGING**

***In vivo* Brain Imaging**
- Deep & fast *in vivo* brain Imaging
- 3P imaging with adaptive optics
- Photoacoustic imaging

INTERFACE GRANT

EIPOD

EIPOD

EIPOD

EIPOD

COLLABORATION

COLLABORATION

COLLABORATION

**Epigenetic programming**
- Early genome activation
- Intergenerational non-genetic inheritance

Boskovic

since 2021

since 2016

Asari

**Retinal processing**
- Impact of internal brain states on early vision
- Computational models

since 2018

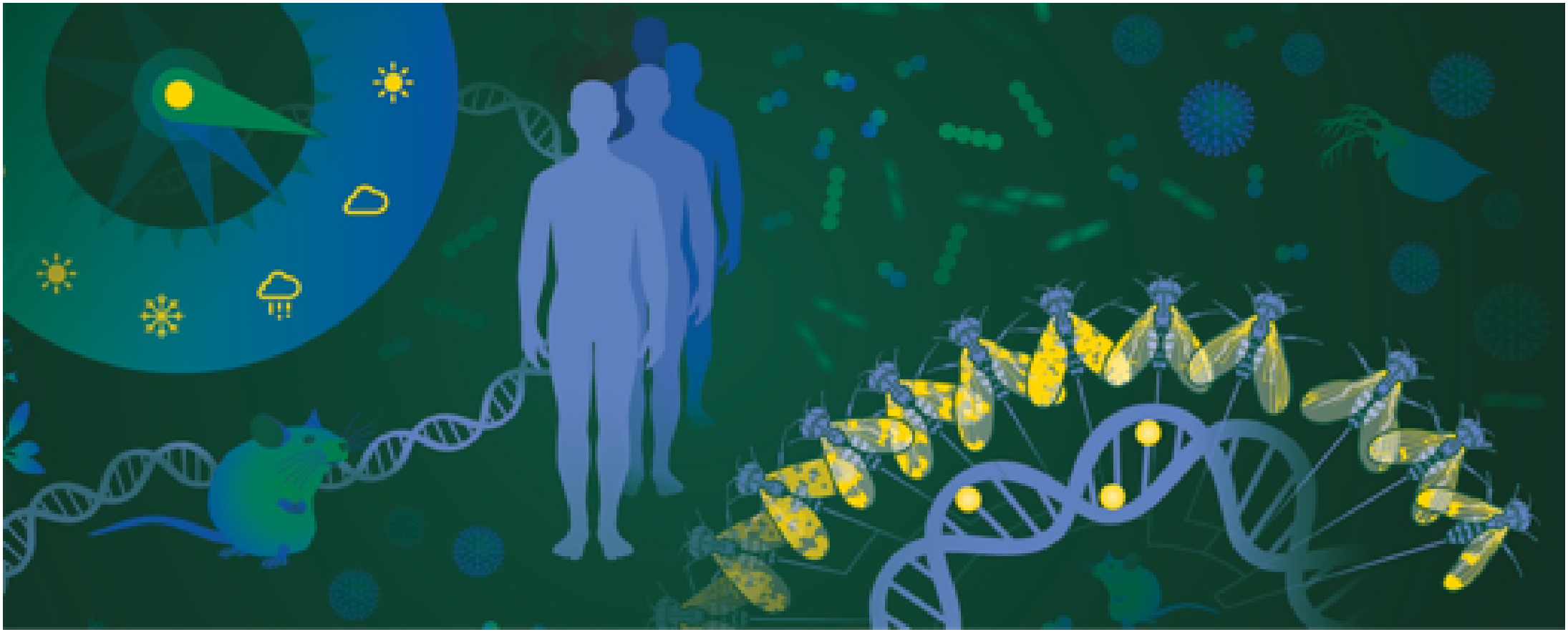
Rompani

**Epigenetic memory**
- Causal *in vivo* epigenetics
- Intergenerational non-genetic inheritance

Hackett

**Diet & Microbiome**

**Visual thalamus function**
- Sensory integration in visual thalamus
- Mating and visual function



# Thank you

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