2018

Research in brief

EMBL

About EMBL

EMBL is Europe's leading laboratory for the life sciences. We are an intergovernmental organisation established in 1974 and are supported by over 20 member states.

EMBL performs fundamental research in molecular biology, studying the story of life. We offer services to the scientific community; train the next generation of scientists and strive to integrate the life sciences across Europe.

We are international, innovative and interdisciplinary. We are more than 1700 people, from over 80 countries, operating across six sites in Barcelona (Spain), Grenoble (France), Hamburg (Germany), Heidelberg (Germany), Hinxton (UK) and Rome (Italy). Our scientists work in independent groups and conduct research and offer services in all areas of molecular biology.

Our research drives the development of new technology and methods in the life sciences. We work to transfer this knowledge for the benefit of society.

Barcelona

Hamburg

Heidelberg

Hinxton

Grenoble

Rome

Contents

Careers at EMBL

EMBL is no ordinary place to work. We are passionate about science and its potential to improve and enrich life. We are a vibrant, driven and open community that welcomes new and diverse perspectives. We are international, friendly and supportive, and our 1700 people include mathematicians, physicists, chemists and computer engineers, as well as biologists, biochemists and bioinformaticians. Together we strive for excellence in everything we do.

Our approach is to hire the best people from around the world and give them the freedom and the conditions to do the best possible science. This includes access to cutting-edge technologies and outstanding training opportunities, a collaborative work atmosphere and great benefits.

Do you have the EMBL spirit? It is a mix of passion, curiosity, openness and a drive to develop and do better – together with others. Then EMBL is the right place for you!
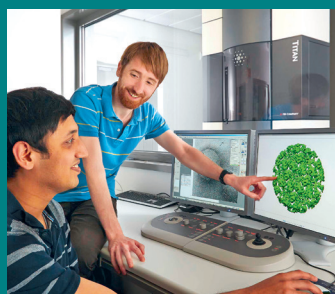
Career opportunities

s.embl.org/phdprogr
PhD programme

s.embl.org/jobs
Group and team leaders

s.embl.org/postdocprogr
Postdoctoral programme

s.embl.org/jobs
Other careers

Directors' Research

How are gene expression, metabolism and disease connected?
What determines cell shape? The range of themes in Directors' Research
reflects the interests of the Director of EMBL and the Director of EMBO.
Currently, some researchers in the unit combine biochemical and systems-level
approaches to study cell metabolism, working closely with colleagues in the
Genome Biology Unit. Others investigate cell shape in *Drosophila* and
innate immune signalling in zebrafish, often in collaboration
with the Developmental Biology Unit.

Matthias Hentze – *RNA biology, metabolism and molecular medicine*
EMBL Director; Senior Scientist – Joint appointment with the Genome Biology Unit

The Hentze group combines biochemical and systems-level approaches to investigate
the connections between gene expression and cell metabolism, and their roles in
human disease.   *embl.org/hentze*

Maria Leptin – *Cell shape and morphogenesis: subcellular and supracellular mechanisms*
EMBO Director; Group Leader

The Leptin group studies the mechanisms and forces that determine cell shape in
Drosophila and uses zebrafish to analyse innate immune signalling.
                                                            embl.org/leptin

Cell Biology and Biophysics

Located in Heidelberg, Germany

From ova to neurons, cells take on very different shapes and sizes to fulfil their roles. Scientists in the Cell Biology and Biophysics Unit investigate the molecular and biophysical mechanisms that enable cells to function. In the Unit, biologists, chemists and physicists probe molecular networks and machines as well as mechanical forces and signalling. Experts in optics work with biologists to develop new imaging technologies to visualise life's molecular machinery at work.

Jan Ellenberg – *Systems biology of cell division and nuclear organisation*
Head of the Cell Biology and Biophysics Unit; Senior Scientist

The Ellenberg group studies cell division and nuclear organisation, focusing on chromatin organisation and formation, segregation of mitotic and meiotic chromosomes, and nuclear pore complex structure and assembly.

embl.org/ellenberg

Sara Cuylen-Häring – *Cellular phase separation by surfactants*
Group Leader

The Cuylen group investigates how proteins act as surfactants to regulate the spatial separation of chromosomes and other cellular organelles.

embl.org/cuylen

Alba Diz-Muñoz – *Mechanics of cellular signalling*
Group Leader

The Diz-Muñoz group studies the crosstalk between mechanical properties and signalling processes that drive morphogenesis and fate specification in immune cells, embryonic stem cells and zebrafish embryos.

embl.org/diz-munoz

Christian Häring – *Chromosome structure and dynamics*
Group Leader – Joint appointment with the Structural and Computational Biology Unit

The Häring group aims to understand the molecular machinery that organises eukaryotic genomes.

embl.org/haering

Lars Hufnagel – *Dynamics of cell growth and tissue architecture*
Group Leader – Joint appointment with the Developmental Biology Unit

The Hufnagel group studies the role of mechanical constraints in processes such as cell growth, programmed cell death, orientation of cell division, intratissue rearrangements and cell differentiation.
embl.org/hufnagel

Martin Jechlinger – *Mechanisms of oncogene dependence and tumour relapse*
Group Leader – Joint appointment with the Epigenetics and Neurobiology Unit

The Jechlinger group uses a 3D culture system of primary mouse mammary epithelial cells to study cancer-initiating oncogenes.
embl.org/jechlinger

Simone Köhler – *Self-organisation in meiosis*
Group Leader

The Köhler group studies how chromatin is organised during meiosis to allow for the production of haploid gametes from diploid precursor cells.
embl.org/koehler

Anna Kreshuk – *Machine learning for bioimage analysis*
Group Leader

The Kreshuk group develops machine learning-based methods and tools for automatic segmentation, classification and analysis of biological images.
embl.org/kreshuk

Pierre Neveu – *Systems biology of stem cell differentiation*
Group Leader

The Neveu group takes an integrated systems biology approach to investigate the molecular changes that determine what a stem cell becomes.
embl.org/neveu

Rainer Pepperkok – *Membrane traffic and organelle biogenesis*
Head of Core Facilities and Scientific Services; Senior Scientist

The Pepperkok team develops novel approaches to study the temporal and spatial organisation of membrane traffic and organelle biogenesis in the secretory pathway. *embl.org/pepperkok*

Robert Prevedel – *Advanced optical techniques for deep tissue microscopy*
Group Leader – Joint appointment with the Developmental Biology Unit and the Epigenetics and Neurobiology Unit

The Prevedel group develops optical techniques for investigating dynamic cellular processes deep inside tissue *in vivo*. *embl.org/prevedel*

Jonas Ries – *Superresolution microscopy for structural cell biology*
Group Leader

The Ries group studies nanoscale multi-protein machineries in their functional cellular context, and elucidates their dynamic structural organisation using tailor-made superresolution microscopy technologies. *embl.org/ries*

Carsten Schultz – *Chemical cell biology*
Group Leader; Senior Scientist

The Schultz group develops tools for imaging and manipulating cellular enzyme activities, with an emphasis on lipid signalling in diabetes and the hereditary disease cystic fibrosis. *embl.org/schultz*

Yannick Schwab – *Volume correlative light and electron microscopy*
Head of the Electron Microscopy Core Facility; Team Leader

The Schwab team is interested in developing tools for the 3D correlation of data generated by fluorescence imaging and electron microscopy. *embl.org/schwab*

Joint appointments to the Cell Biology and Biophysics Unit
Martin Beck *(Structural and Computational Biology) – 14*
Julia Mahamid *(Structural and Computational Biology) – 14*
Paul Heppenstall *(Epigenetics and Neurobiology) – 34*

Developmental Biology

Located in Heidelberg, Germany

Multicellular development is a feat of coordination. Molecular and physical cues – both intrinsic and extrinsic – are integrated at the cellular and tissue levels to generate the morphology, patterning and physiology of living organisms, from embryo to adult. Scientists in the Developmental Biology Unit investigate these complex, dynamic interactions. They use highly interdisciplinary approaches to reveal the fundamental mechanisms that shape life during development and evolution.

Anne Ephrussi – *RNA localisation and localised translation in development*
Head of the Developmental Biology Unit; Senior Scientist

The Ephrussi group dissects the mechanisms underlying intracellular RNA transport and localised translation – fundamental processes mediating the functional polarisation of cells during development and in the nervous system.

embl.org/ephrussi

Detlev Arendt – *Evolution of the nervous system in bilateria*
Group Leader; Senior Scientist

By studying and comparing simple marine animals and their constituent cells, the Arendt group looks to understand the origin and evolution of the nervous system and of the entire animal body.

embl.org/arendt

Alexander Aulehla – *Timing in embryonic development*
Group Leader; Senior Scientist

The Aulehla group studies the role of timing during development, in particular how signalling dynamics and oscillations control spatiotemporal pattern formation as an embryo develops.

embl.org/aulehla

Justin Crocker – *Gene regulation during evolution and development*
Group Leader

The Crocker group aims to understand the fundamental principles driving development, to allow for programming and predictive control of cell fates.

embl.org/crocker

Stefano De Renzis – *Cell dynamics and signalling during morphogenesis*
Group Leader

The De Renzis group aims to understand how cells build tissues during organismal development, using a combination of quantitative imaging and optogenetics-based synthetic approaches.

embl.org/derenzis

Takashi Hiiragi – *Symmetry breaking and self-organisation*
Group Leader

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The Hiiragi group studies early mammalian development at the molecular, cellular and systems levels to elucidate how an intricate embryo emerges from a spherical mass of cells.

embl.org/hiiragi

Aissam Ikmi – *Plasticity of animal body design*
Group Leader

The Ikmi group studies how the interplay between genetic and environmental factors shapes animal body plans.

embl.org/ikmi

Joint appointments to the Developmental Biology Unit

Lars Hufnagel *(Cell Biology and Biophysics)* – *7*
Robert Prevedel *(Cell Biology and Biophysics)* – *8*
John Marioni *(EMBL-EBI)* – *21*
Hiroki Asari *(Epigenetics and Neurobiology)* – *33*
Cornelius Gross *(Epigenetics and Neurobiology)* – *33*
Christophe Lancrin *(Epigenetics and Neurobiology)* – *34*
Vikas Trivedi *(Tissue Biology and Disease Modelling)* – *35*

Genome Biology

Located in Heidelberg, Germany

Many of our traits stem from the information in our genome which
must be expressed at the right place and time. This entails strict regulation at multiple
stages, including transcriptional, post-transcriptional and post-translational. Scientists in
the Genome Biology Unit take an integrated, multi-tiered approach to study these
processes and how their alteration leads to disease. They combine wet-lab and
computational research, and work closely with colleagues in the Genomics and
Proteomics Core Facilities to understand the molecular processes
leading from genotype to phenotype.

Eileen Furlong – *Genome regulation and topology during embryonic development*
Head of the Genome Biology Unit; Senior Scientist

The Furlong group dissects fundamental principles of transcriptional regulation
and how this regulation drives cell fate decisions during development, focusing on
organisational and functional properties of the genome.   *embl.org/furlong*

Wolfgang Huber – *Multi-omics and statistical computing*
Group Leader; Senior Scientist – Joint appointment with the Structural and
Computational Biology Unit and EMBL-EBI

The Huber group develops computational methods for the analysis and comprehension of large-scale biological data.   *embl.org/huber*

Jan Korbel – *From genomic variation to molecular mechanism*
Group Leader; Senior Scientist – Joint appointment with EMBL-EBI

The Korbel group combines computational and experimental approaches, including
in single cells, to unravel determinants and consequences of germline and somatic
genetic variation with a special focus on disease mechanisms.   *embl.org/korbel*

Arnaud Krebs – *Decoding gene regulation using single molecule genomics*
Group Leader

The Krebs group develops and employs innovative genomics strategies to understand
the multiple regulatory layers that control gene expression.   *embl.org/krebs*

Christoph A. Merten – *Microfluidic approaches in drug discovery and personalised medicine*
Group Leader

The Merten group develops microfluidic technology to address complex questions in
biomedical science and developmental biology.   *embl.org/merten*

Kyung-Min Noh – *Epigenetic mechanisms of neurodevelopment and disease*
Group Leader – Joint appointment with the Epigenetics and Neurobiology Unit

The Noh group studies the vital role of chromatin structure and modifications in neurodevelopment and brain disorders. *embl.org/noh*

Mikhail Savitski – *Stability proteomics for assessing the state of the proteome*
Head of the Proteomics Core Facility; Team Leader – Joint appointment with the Structural and Computational Biology Unit

The Savitski team uses and develops stability proteomics for understanding the phenomena of aggregation and disaggregation, cell phenotyping, and detection of protein interactions with drugs, metabolites, DNA and RNA. *embl.org/savitski*

Lars Steinmetz – *Systems genetics and precision health*
Group Leader; Senior Scientist

The Steinmetz group develops interdisciplinary approaches to read, edit and control entire genomes across scales. The group applies these technologies to trace the developmental trajectory of individual stem cells, determine the molecular underpinnings of rare diseases and understand the genetic basis of complex phenotypes. *embl.org/steinmetz*

Nassos Typas – *Systems microbiology*
Group Leader – Joint appointment with the Structural and Computational Biology Unit

The Typas group develops high-throughput approaches to study bacterial cellular networks, and to understand their interactions with the environment, the host and other bacterial species. *embl.org/typas*

Joint appointments to the Genome Biology Unit

Matthias Hentze *(Directors' Research)* – 5
Christoph Müller *(Structural and Computational Biology)* – 13
Anne-Claude Gavin *(Structural and Computational Biology)* – 14
Judith Zaugg *(Structural and Computational Biology)* – 15
Ewan Birney *(EMBL-EBI)* – 18
Pedro Beltrão *(EMBL-EBI)* – 19
Oliver Stegle *(EMBL-EBI)* — 21
Jamie Hackett *(Epigenetics and Neurobiology)* – 34

Structural and Computational Biology

Located in Heidelberg, Germany

Life in the Structural and Computational Biology Unit is all about interactions: from the molecular networks inside cells to the ecological relationships between species, via the collaboration between experts from different fields. Scientists in the unit cover everything from crystallography to cryo-electron microscopy and from metabolomics to microbiomes. They support colleagues throughout EMBL in the use of state-of-the-art structural biology instruments. The unit also serves as a hub for bioinformatics activities across EMBL Heidelberg.

Peer Bork – *Deciphering function and evolution of biological systems*

Head of the Structural and Computational Biology Unit; Senior Scientist

The main focus of the Bork group is to gain insights into the functioning of biological systems and their evolution, by comparative analysis and integration of complex molecular data.

embl.org/bork

Christoph Müller – *Molecular mechanisms of transcriptional regulation in eukaryotes*

Head of the Structural and Computational Biology Unit; Senior Scientist – Joint appointment with the Genome Biology Unit

The Müller group uses cryo-electron microscopy, X-ray crystallography, biophysical and biochemical approaches to learn about the molecular mechanisms of transcription regulation in eukaryotes, whose DNA is packaged into chromatin.

embl.org/mueller

Theodore Alexandrov – *Spatial metabolomics*

Team Leader; Head of the Metabolomics Core Facility

The Alexandrov team develops novel computational biology tools to reveal the spatial organisation of metabolic processes.

embl.org/alexandrov

Orsolya Barabas – *Mechanisms, regulation and application of mobile DNA*

Group Leader

The Barabas group uses structural, biochemical and cell biology approaches to investigate how DNA rearrangements are carried out and regulated, using this knowledge to advance applications in research and medicine.

embl.org/barabas

Martin Beck – *Structure and function of large molecular assemblies*

Group Leader; Senior Scientist – Joint appointment with the Cell Biology and Biophysics Unit

Research in the Beck group combines biochemical approaches, proteomics and cryo-electron microscopy to study large macromolecular assemblies.   *embl.org/beck*

Anne-Claude Gavin – *Biomolecular networks in health and disease*
Group Leader; Senior Scientist – Joint appointment with the Genome Biology Unit

The Gavin group integrates proteomics, metabolomics, and biochemical and microfluidics-based methods to achieve a systems-level understanding of how cellular proteomes are organised.   *embl.org/gavin*

Toby Gibson – *Biological sequence analysis*
Team Leader

The Gibson team investigates protein sequences, interactions and networks, undertakes computational analyses of macromolecules, and develops tools to enhance sequence analysis research.   *embl.org/gibson*

Janosch Hennig – *Integrated structural biology of translation regulation mechanisms*
Group Leader

The Hennig group employs integrated structural biology (NMR, X-ray, small-angle scattering and cryo-EM) to investigate the molecular mechanisms underlying translation regulation and ribonucleoprotein complex assembly.   *embl.org/hennig*

Julia Mahamid – In situ *structural analysis of phase separation and molecular crowding*
Group Leader – Joint appointment with the Cell Biology and Biophysics Unit

The Mahamid group combines correlative approaches, cryo-focused ion beam milling and electron tomography to study mesoscale assemblies, such as centrosomes and stress granules, at molecular resolution in intact cells and model organisms.

embl.org/mahamid

Kiran Patil – *Architecture and regulation of metabolic networks*
Group Leader

The Patil group uses a combination of modelling, bioinformatics and experimental approaches to study metabolic networks and how they are controlled.

embl.org/patil

Carsten Sachse – *Single-particle electron cryomicroscopy of the autophagy machinery*
Group Leader

The Sachse group uses electron cryomicroscopy to study the structures of autophagy complexes, with the aim of elucidating the mechanisms by which cells eliminate aberrant structures such as large protein aggregates.

embl.org/sachse

Judith Zaugg – *Personalised genomics to study the genetic basis of complex diseases*
Group Leader – Joint appointment with the Genome Biology Unit and EMBL-EBI

The Zaugg group investigates the variation of molecular phenotypes among individuals and their genetic variation, with the aim of better understanding the molecular basis of complex genetic diseases and inter-individual differences in drug response.

embl.org/zaugg

Georg Zeller – *Computational analysis of host-microbiota interactions in disease and drug therapy*
Team Leader

The Zeller team develops analysis strategies and tools to investigate how the microbiome contributes to human health, disease progression and treatment success, and how it is shaped by host factors such as nutrition and drug intake.

embl.org/zeller

Joint appointments to the Structural and Computational Biology Unit
Christian Häring *(Cell Biology and Biophysics Unit) – 6*
Wolfgang Huber *(Genome Biology) – 11*
Mikhail Savitski *(Genome Biology) – 12*
Nassos Typas *(Genome Biology) – 12*

Core Facilities

Located in Heidelberg, Germany

Molecular life science requires a suite of sophisticated techniques –
from high-end microscopes to protein production platforms and next-generation
sequencers – and the expertise to make the most of them. In EMBL's Core Facilities,
experts support scientists in designing, running and refining experiments. They help
researchers make sense of results. Core Facilities staff work closely with
technology developers, and are always aware of the latest advances in their field.
They enable scientists across EMBL and beyond to achieve ambitious
research goals in a cost-effective way.

Advanced Light Microscopy Facility
Rainer Pepperkok
Head of Core Facilities and Scientific Services; Senior Scientist

The Advanced Light Microscopy Facility offers a collection of state-of-the-art light
microscopy equipment and image processing tools.   *embl.org/almf*

Metabolomics Core Facility
Theodore Alexandrov
Facility Head; Team Leader

The Metabolomics Core Facility provides services for analysis of metabolites
and lipids.   *embl.org/metabolomics*

Genomics Core Facility
Vladimír Beneš
Facility Head

The Genomics Core Facility is EMBL's genomics service centre equipped with state-of-
the-art technologies for functional genomics analyses.   *embl.org/genecore*

Chemical Biology Core Facility
Joe Lewis
Facility Head

The Chemical Biology Core Facility offers the infrastructure and expertise for assay
development, small-molecule screening and use of medicinal chemistry to optimise
compounds against novel targets for 'biotool' or early drug development.
embl.org/chemcore

Flow Cytometry Core Facility
Malte Paulsen
Facility Head

The Flow Cytometry Core Facility offers access to high-end FACS analysis and state-of-the-art cell sorting capabilities, providing scientists with adaptive setups and dedicated support.   *embl.org/fccf*

Protein Expression and Purification Core Facility
Kim Remans
Facility Head

The Protein Expression and Purification Core Facility provides scientific advice and assistance regarding all experiments related to protein expression, purification and biophysical characterisation.   *embl.org/pepcore*

Proteomics Core Facility
Mikhail Savitski
Facility Head; Team Leader

The Proteomics Core Facility provides a full proteomics infrastructure for the identification and characterisation of proteins.   *embl.org/proteomics*

Electron Microscopy Core Facility
Yannick Schwab
Facility Head; Team Leader

The Electron Microscopy Core Facility provides advanced expertise in cellular electron microscopy, from sample preparation to image analysis, for a wide variety of biological samples.   *embl.org/em*

Bioinformatics Research

European Bioinformatics Institute

EMBL-EBI, located in Hinxton, United Kingdom

Researchers at EMBL-EBI are transforming the life sciences.
They are making sense of the vast, complex datasets produced using new and emerging technologies in molecular biology. Their work spans sequence analysis methods, multi-dimensional statistical analysis and data-driven biological discovery.
At EMBL-EBI, researchers work closely with experimental scientists worldwide, increasingly tackling problems of direct significance to
medicine and the environment.

Ewan Birney – *Sequence algorithms and intra-species variation*
Director of EMBL-EBI; Joint Head of Research; Senior Scientist – Joint appointment with the Genome Biology Unit

The Birney group focuses on developing sequence algorithms and uses intra-species variation to study basic biology.

embl.org/birney

Nick Goldman – *Evolutionary tools for genomic analysis*
Joint Head of Research; Senior Scientist

The Goldman group's research focuses on the processes of molecular sequence evolution, developing data analysis methods to exploit this information and glean powerful insights into genomic function, evolutionary processes and phylogenetic history.

embl.org/goldman

Alex Bateman – *Analysis of protein and RNA sequence*
Head of Protein Sequence Resources; Senior Team Leader

The Bateman group endeavours to classify proteins and certain RNAs into functional families with a view to producing a 'periodic table' of these molecules.

embl.org/bateman

Pedro Beltrão – *Evolution of cellular networks*
Group Leader – Joint appointment with the Genome Biology Unit

The Beltrão group studies the molecular impacts of genetic variability on phenotypic variability, to better understand the function and evolution of cellular networks.   *embl.org/beltrao*

Alvis Brazma – *Functional genomics research*
Head of Molecular Atlas; Senior Scientist

The Brazma team's research focuses on the analysis of gene, transcript and protein expression, cancer genomics and proteomics, and the integrative analysis of functional genomics data.   *embl.org/brazma*

Rob Finn – *Computational approaches to understanding microbiomes*
Team Leader

The Finn research group focuses on developing computational approaches for the reconstruction of genomes from metagenomes, and investigates the distribution of microbes and functions in different environments.   *embl.org/finn*

Paul Flicek – *Evolution of transcriptional regulation*
Head of Genes, Genomes and Variation; Senior Scientist

The Flicek team uses comparative regulatory genomics to study the evolution of transcriptional regulation, with the ultimate goal of understanding the mechanisms and maintenance of cell-type specificity.   *embl.org/flicek*

Moritz Gerstung – *Computational cancer biology*
Group Leader

The Gerstung group develops statistical models and bioinformatics tools for understanding the characteristics of cancer genomes and their effects. They seek to understand the differences in therapy success and outcomes between individuals.

embl.org/gerstung

Zamin Iqbal – *Computational microbial genomics*
Group Leader

The Iqbal group develops computational methods for analysing genetic variation and uses them to study bacteria and parasites. The group also works on translational projects, especially related to antimicrobial resistance, diagnostics and surveillance.

embl.org/iqbal

Gerard Kleywegt – *Protein structure, analysis and validation*
Head of Macromolecular and Cellular Structure; Senior Team Leader

Research in the Kleywegt team aims to transform the structural archives into a truly useful resource for biomedical and related disciplines. *embl.org/kleywegt*

Andrew Leach – *Molecular recognition and design*
Head of Chemistry Services; Team Leader

The Leach group uses a range of techniques to understand and predict molecular interactions, with a particular interest in drug discovery applications. *embl.org/leach*

John Marioni – *Computational and evolutionary genomics*
Group Leader – Joint appointment with the Developmental Biology Unit

The Marioni group develops statistical tools that exploit data generated using next-generation sequencing to understand the evolution and regulation of gene expression.

embl.org/marioni

Evangelia Petsalaki – *Whole-cell signalling*
Group Leader

The Petsalaki group uses diverse 'omics' datasets to create data-driven models of context-specific cell signalling. Their aim is to understand the principles of cell signalling and its rewiring in different conditions and genetic backgrounds.

embl.org/petsalaki

Oliver Stegle – *Statistical genomics and systems genetics*
Group Leader – Joint appointment with the Genome Biology Unit

The Stegle group develops advanced statistical approaches for unravelling molecular variation at a genome-wide scale, accounting for both genetic and environmental factors.

embl.org/stegle

Janet Thornton – *Computational biology of proteins (structure, function and evolution) and ageing*
Director Emeritus of EMBL-EBI; Senior Scientist

The Thornton group builds on knowledge of the 3D structures of proteins and their complexes to understand their evolution and how variants and small molecules can cause or modulate diseases and ageing.

embl.org/thornton

Virginie Uhlmann – *Mathematical models for bioimage analysis*
Group Leader

The Uhlmann group develops tools that blend continuous mathematical models and computer vision (e.g. learning-based) algorithms to extract quantitative information from bioimages.

embl.org/uhlmann

Daniel Zerbino – *High-throughput machine learning and gene expression regulation*
Team Leader

The Zerbino group aims to leverage the power of high-throughput processing and novel machine learning techniques to integrate large collections of available experiments and to better understand the mechanisms of gene expression regulation.

embl.org/zerbino

Joint appointments to EMBL – EBI
Wolfgang Huber *(Genome Biology) – 11*
Jan Korbel *(Genome Biology) – 11*
Judith Zaugg *(Structural and Computational Biology) – 15*

Bioinformatics Services

European Bioinformatics Institute

EMBL-EBI, located in Hinxton, United Kingdom

EMBL-EBI maintains the world's most comprehensive
range of freely available molecular data resources. Developed in collaboration with
colleagues worldwide, EMBL-EBI's databases and tools help scientists share data
efficiently, perform complex queries and analyse the results in different ways.
The service teams' work supports millions of wet-lab and computational biologists
working in all areas of the life sciences, from biomedicine to
biodiversity and agri-food research.

Proteins and Protein Families
Alex Bateman
Head of Protein Sequence Resources; Senior Team Leader

The cluster provides foundational resources for researchers who work with protein
sequences and protein families, including the UniProt, InterPro and Pfam data
resources, and the HMMER homology search tool. They also provide unique resources
for studying non-coding RNA with Rfam and RNAcentral.   *embl.org/bateman*

Molecular Atlas
Alvis Brazma
Head of Molecular Atlas; Senior Scientist

The cluster manages ArrayExpress, the Expression Atlas and PRIDE data resources,
and works very closely with the Literature cluster to develop the BioStudies database.
embl.org/brazma

Data coordination and archiving
Guy Cochrane
Team Leader

The Cochrane team provides data coordination services for a host of collaborative
projects across vertebrate, microbial and marine biodiversity domains. They maintain
the European Nucleotide Archive, an open platform for sequence data.
embl.org/cochrane

Enriching understanding of genomic variation
Fiona Cunningham
Team Leader

The Cunningham team delivers robust, reliable reference resources for consistent variant annotation in any species. The team catalogues and stores large-scale data, and develops methods and tools to facilitate integration and broad access to these data.

embl.org/cunningham

Bioinformatics services for RNA, protein and metagenomic sequence data
Rob Finn
Team Leader

The Finn team is responsible for protein and RNA data resources that provide fast and sophisticated tools for analysis, simplify access to curated data, extend annotation and provide characterisation of sequences derived from environmental samples.

embl.org/sequence-families

Genes, Genomes and Variation
Paul Flicek
Head of Genes, Genomes and Variation; Senior Scientist

The data resources of the cluster include core EMBL-EBI services such as Ensembl, Ensembl Genomes and the GWAS Catalog. Within the cluster, the Flicek team has overall scientific leadership of the Ensembl genome annotation resources and analysis infrastructure.

embl.org/flicek

Molecular networks, pathways, mathematical models
Henning Hermjakob
Head of Molecular Systems; Team Leader

The Hermjakob team develops data resources for the representation, deposition, distribution and analysis of pathway and systems biology data, and develops standards for proteomics and systems biology.

embl.org/hermjakob

Sequence and variation archive infrastructure
Thomas Keane
Team Leader

The Keane team is responsible for the European Genome-phenome Archive (EGA), the controlled-access database of human genomic data, and the European Variation Archive (EVA), an open-access resource of raw variant data. *embl.org/keane*

Macromolecular and Cellular Structure
Gerard Kleywegt
Head of Macromolecular and Cellular Structure; Senior Team Leader

The cluster aims to bring structure to biology by making this complex field more accessible to non-specialists. They manage three major archives in structural biology: the Protein Data Bank in Europe, the Electron Microscopy Data Bank and the Electron Microscopy Public Image Archive*. embl.org/ kleywegt*

Chemistry Services
Andrew Leach
Head of Chemistry Services; Team Leader

The chemistry resources of the cluster help researchers to design and study small molecules and their effects on biological systems. Resources managed by the Leach team include ChEMBL, SureChEMBL, UniChem and ChEBI. *embl.org/leach*

Literature services
Johanna McEntyre
Head of Literature Services; Team Leader

The McEntyre team runs Europe PMC, the database for life science literature and platform for text mining, which has recently included preprints. The team also integrates textual content with molecular databases, both at EMBL-EBI and more widely. *embl.org/mcentyre*

Protein function development
Maria J. Martin
Team Leader

The Martin team provides the bioinformatics infrastructure for UniProt at EMBL-EBI, maintains the Gene Ontology Annotation and Enzyme Portal services, and develops novel automatic methods for protein annotation and representation.

embl.org/martin

Metabolomics
Claire O'Donovan
Team Leader

The O'Donovan team is responsible for the MetaboLights metabolomics resource. They develop workflows to process chemical information, predict metabolomes based on genomic information and enable the identification of molecules with desired properties.

embl.org/odonovan

Protein function content
Sandra Orchard
Team Leader

The Orchard team manually curates the Universal Protein Resource (UniProt) at EMBL-EBI, as well as the Gene Ontology Annotation and Enzyme Portal services. The team is instrumental in developing community standards for protein annotation.

embl.org/orchard

Gene expression
Irene Papatheodorou
Team Leader

The Papatheodorou team analyses expression data sets at tissue or single cell level and develops Expression Atlas, a multi-species resource for gene and protein expression patterns under different biological conditions. The team is responsible for data acquisition and curation for ArrayExpress.

embl.org/papatheodorou

Molecular Archival Resources
Helen Parkinson
Head of Molecular Archival Resources; Team Leader

The cluster provides international archiving and data access for millions of DNA sequences, genetic variants, and biological sample records. Within the cluster, the Parkinson team develops ontologies, tooling and data resources that provide access to samples and ontologies. *embl.org/parkinson*

Imaging data services
Ardan Patwardhan
Team Leader

The Patwardhan team is responsible for the EMDB and EMPIAR data resources. The team develops resources for searching, validation and visualisation of structural and bio-imaging data, and integrates and data-mines multi-scale structural and bioimaging data to facilitate data reuse. *embl.org/patwardhan*

Functional genomics development
Ugis Sarkans
Team Leader

The Sarkans team develops software for ArrayExpress and the BioStudies database. They build and maintain data management tools, user interfaces, programmatic interfaces, and annotation and data submission systems for functional genomics resources. *embl.org/sarkans*

Protein Data Bank in Europe (PDBe)
Sameer Velankar
Team Leader

The Velankar team is responsible for PDBe, which is a founding member of the Worldwide Protein Data Bank. Within this international consortium, PDBe works to collate, maintain and provide access to the global repository of macromolecular structure models, the Protein Data Bank (PDB). *embl.org/ velankar*

Proteomics resources and tools
Juan Antonio Vizcaino
Team Leader

The Vizcaino team is responsible for the PRIDE Archive database of mass spectrometry proteomics data (a founding member of the ProteomeXchange Consortium), integrates proteomics data in public data resources and develops open-source tools. They are active in developing community data standards.

embl.org/ vizcaino

Data visualisation, tools and outreach for Ensembl resources
Andy Yates
Team Leader

The Yates team develops novel data visualisations for genome interpretation, creates tools for genome data processing and provides outreach and support for the Ensembl and Ensembl Genomes projects. They also maintain the data-mining tool BioMart.

embl.org/yates

Genome-scale analysis and storage for Ensembl
Daniel Zerbino
Team Leader

The Zerbino team stores, processes and analyses genome-wide datasets for the Ensembl project and maintains the services that unite its associated databases. This includes the functional annotation of non-coding variants from experimental epigenomic data.

embl.org/genome-analysis

Structural Biology

Located in Grenoble, France

The 3D shape of a biological molecule can tell you a lot about what that molecule does – and how its biological activity might be altered, for example to treat a disease. Scientists at EMBL Grenoble determine 3D structures of human and viral proteins to understand how they interact with the nucleic acids DNA and RNA.

To do so, they work closely with instrumentation developers and colleagues across the European Photon and Neutron (EPN) science campus to obtain the best possible data from synchrotron X-ray diffraction or cryo-electron microscopy experiments.

Stephen Cusack – *Structural biology of RNA-protein complexes in gene expression and host-pathogen interactions*
Head of the Structural Biology Unit in Grenoble; Senior Scientist

The Cusack group uses X-ray crystallography and cryo electron-microscopy (cryoEM) to study the structural biology of protein-RNA complexes involved in RNA virus replication, innate immunity and cellular RNA metabolism.   *embl.org/cusack*

Sagar Bhogaraju – *Ubiquitin signalling in bacterial pathogenicity and cancer*
Group Leader

The Bhogaraju group uses structural and cell biology-based approaches to study ubiquitination pathways in normal physiology and disease.   *embl.org/bhogaraju*

Florent Cipriani – *Instrumentation team*
Team Leader; Senior Scientist

The Cipriani team develops instruments and methods for structural biology research and works with industry to make them available to scientists worldwide.
embl.org/cipriani

Wojciech Galej – *Structure and function of RNA-protein complexes*
Group Leader

The Galej group uses an integrated structural biology approach combined with biochemistry and biophysics to investigate large RNA-protein complexes involved in gene expression.   *embl.org/galej*

Eva Kowalinski – *Structural biology of macromolecular protein-RNA complexes*
Group Leader

The Kowalinski group investigates the architecture and mechanisms of macromolecular complexes involved in cellular RNA editing.　　*embl.org/kowalinski*

Andrew McCarthy – *Synchrotron crystallography team*
Team Leader

The McCarthy team works on the development and operation of MX and BioSAXS beamlines, and studies proteins involved in neuronal development and cell signalling.
embl.org/mccarthy

Marco Marcia – *Structure and function of lncRNA-protein complexes regulating development and stress responses*
Group Leader

The Marcia group uses structural biology and biophysical approaches to study the molecular interactions between long non-coding RNAs (lncRNAs) and nuclear proteins, and how their complexes regulate gene expression processes.
embl.org/marcia

José A. Marquez – *High-Throughput Crystallisation Laboratory*
Head of the Crystallisation Facility; Team Leader

The Marquez team develops methods and software supporting high-throughput and fully automated crystallography pipelines, using them to study the structure of sensing and signalling molecules.　　*embl.org/marquez*

Structural Biology

Proteins are key components of the cell's workforce.
Alone or in groups, they can fine-tune genes, break down bacteria, or make muscles contract. At EMBL Hamburg, scientists unveil the structure of proteins that impact human health. Researchers in the unit use the state-of-the-art infrastructure for integrative structural biology available on the DESY campus. They investigate how molecules behave, and use the insights gained to develop new therapies.

Matthias Wilmanns – *Structure and function of molecular machinery for protein translocation across membranes*
Head of the Structural Biology Unit in Hamburg; Senior Scientist

The Wilmanns group aims to unravel the overall architecture of machineries for protein translocation across membranes and mechanisms of molecular elasticity, by employing an integrative structural biology approach complemented by functional experiments.

embl.org/wilmanns

Stefan Fiedler – *Synchrotron instrumentation for structural biology beamlines at PETRA III*
Team Leader

The Fiedler team focuses on the construction, customisation and integration of X-ray optics, precision mechanics, robotics, control electronics, cryogenics and control software for synchrotron-based structural biology research.

embl.org/fiedler

Maria Marta Garcia Alai – *Molecular biophysics and high-throughput crystallisation*
Team Leader

The Garcia Alai team develops methods for sample optimisation and characterisation for SAXS, MX and EM experiments and applies systematic pipelines of biophysical techniques to solve dynamic structural puzzles, with particular focus on protein-lipid interactions.

embl.org/garcia-alai

Jan Kosinski – *Integrative modelling of infection cycles*
Group Leader

The Kosinski group investigates infection cycles and host-pathogen interactions using computational and experimental approaches.

embl.org/kosinski

Victor Lamzin – *Integrative modelling for structural biology*
Group Leader; Senior Scientist

The Lamzin group applies and develops cutting-edge computational methods and experimental approaches for sample quality control, experimentation, data interpretation and model validation in structural biology, with a major focus on macro-molecular crystallography.   *embl.org/lamzin*

Christian Löw – *Structural and dynamic insights into nutrient uptake systems*
Group Leader

Using biophysical and biochemical methods, the Löw group aims to enhance understanding of the structural basis for substrate recognition in nutrient transporters.   *embl.org/loew*

Rob Meijers – *Structural biology of cell surface receptors*
Group Leader

The Meijers group investigates signalling mechanisms across the cell membrane using integrated structural biology and biophysical techniques.   *embl.org/meijers*

Thomas Schneider – *Tools for structure determination and analysis*
Joint Head of Research Infrastructures; Senior Scientist

The Schneider group operates two beamlines for macromolecular crystallography at the PETRA III synchrotron and develops new methods for structure determination.   *embl.org/schneider*

Dmitri Svergun – *Small-angle X-ray scattering from macromolecular solutions*
Joint Head of Research Infrastructures; Senior Scientist

The Svergun group runs and further enhances a biological small-angle X-ray scattering beamline at the PETRA III storage ring and develops novel approaches for scattering data analysis and hybrid structural modelling.   *embl.org/svergun*

Epigenetics and Neurobiology

Located in Rome, Italy

How do we perceive the world around us? Can our surroundings
influence our genes, and our children's genes? At EMBL Rome, scientists
explore the connections between genome, environment and neural function.
Traditionally, neuroscientists and epigeneticists have moved in different circles.
Here, they come together and draw on each other's insights,
approaches and experience.

Philip Avner – *Dynamics of epigenetic regulation*
Head of the Epigenetics and Neurobiology Unit; Senior Scientist

The Avner group combines genetics, genomics, biochemistry and cell biology to study
the nature of the X-inactivation process and the role of epistasis in genetic regulation.

embl.org/avner

Cornelius Gross – *Neural control of instinctive behaviour*
Deputy Head of the Epigenetics and Neurobiology Unit; Senior Scientist –
Joint appointment with the Developmental Biology Unit

The Gross group uses pharmacological, histochemical, electrophysiological and
behavioural genetic approaches to study the neural circuits underlying instinctive
behaviour in mice.

embl.org/gross

Hiroki Asari – *Visual systems neuroscience*
Group Leader – Joint appointment with the Developmental Biology Unit

The Asari group combines experimental and computational approaches to study
the principles and the function of neuronal circuits, specifically in the early visual
system in mice.

embl.org/asari

Matthieu Boulard – *Heritable gene silencing in mammals*
Group Leader

The Boulard group integrates genetic, molecular biology and genomic approaches to
explore how cytosine methylation represses transcription.

embl.org/boulard

Jamie Hackett – *Epigenetic reprogramming and inheritance*
Group Leader – Joint appointment with the Genome Biology Unit

The Hackett group aims to understand the interplay between epigenetics, genome regulation and cell identity, with emphasis on transgenerational epigenetic inheritance.

embl.org/hackett

Paul Heppenstall – *Molecular physiology of somatosensation*
Group Leader – Joint appointment with the Cell Biology and Biophysics Unit

The Heppenstall group combines molecular, imaging and electrophysiological techniques to examine how sensory neurons turn information about touch and pain into electrical signals.

embl.org/heppenstall

Christophe Lancrin – *Understanding the formation of hematopoietic progenitor and stem cells during development*
Group Leader – Joint appointment with the Developmental Biology Unit

The Lancrin group studies the haematopoietic system and looks to develop strategies to improve methods for generating blood cells from pluripotent stem cells.

embl.org/lancrin

Santiago Rompani – *Visual circuits in the thalamus*
Group Leader

The Rompani group studies the function of visual circuits in the thalamus, using a combination of functional imaging, genetics, virology, and behavioral assays in mice.

embl.org/rompani

Joint appointments to the Epigenetics and Neurobiology Unit
Martin Jechlinger *(Cell Biology and Biophysics) – 7*
Robert Prevedel *(Cell Biology and Biophysics) – 8*
Kyung-Min Noh *(Genome Biology) – 12*

Tissue Biology and Disease Modelling

Located in Barcelona, Spain

An organ or a tissue is much more than just a collection of cells.
It has genetic patterns, specific cell types, 3D structure and
arrangement. Scientists at EMBL Barcelona trace the connections between
these scales. They unveil how tissues develop, work, regenerate and heal. Thanks to
the site's imaging facilities, researchers can observe, manipulate and model how
changes in genes percolate through cells, tissues and organs,
in health and disease.

James Sharpe – *Multicellular systems biology*
Head of the Tissue Biology and Disease Modelling Unit; Senior Scientist

The Sharpe group brings together an interdisciplinary team of biologists, physicists
and computer scientists to build multi-scale computer simulations of a paradigm of
organogenesis – mammalian limb development.   *embl.org/sharpe*

Miki Ebisuya – *Synthetic developmental biology: gene circuit and organoid zoo*
Group Leader

The Ebisuya group reconstitutes developmental mechanisms by making artificial
gene circuits, and studies interspecies differences by comparing organoids of different
animals.   *embl.org/ebisuya*

Vikas Trivedi – *Self-organisation in multi-cellular systems*
Group Leader – Joint appointment with the Developmental Biology Unit

The Trivedi group aims to understand self-organisation of cells, fundamental to
metazoan development, through comparative study of embryos and organoids that
generate a global coordinate system *de novo*.   *embl.org/trivedi*

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Heidelberg
Germany

Themes

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Developmental Biology: Ephrussi, Arendt, Aulehla, Crocker, De Renzis, Hiiragi, Ikmi

Genome Biology: Furlong, Huber, Korbel, Krebs

Genome Biology: Merten, Noh, Savitski, Steinmetz, Typas

Structural & Computational Biology: Bork, Müller, Alexandrov, Barabas, Beck, Gavin, Gibson, Hennig, Mahamid, Patil, Sachse, Zaugg, Zeller

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- Cell signalling and differentiation
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- Bioinformatics and software development
- Integrated structural biology

**Hinxton
United Kingdom**

**Grenoble
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Germany**

**Rome
Italy**

**Barcelona
Spain**

Bioinformatics Research – EMBL-EBI

Structural Biology

Structural Biology

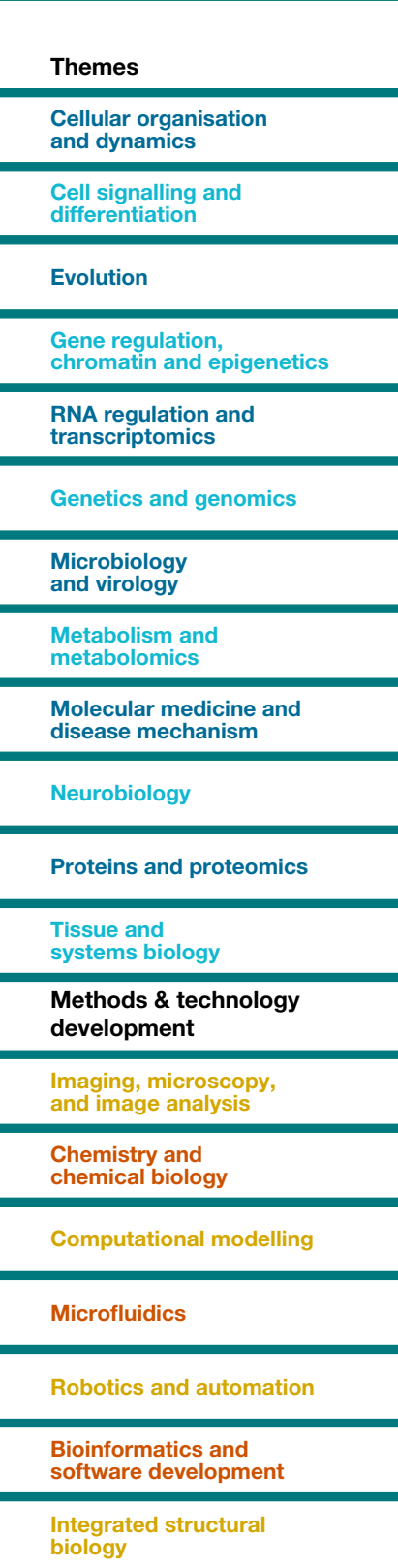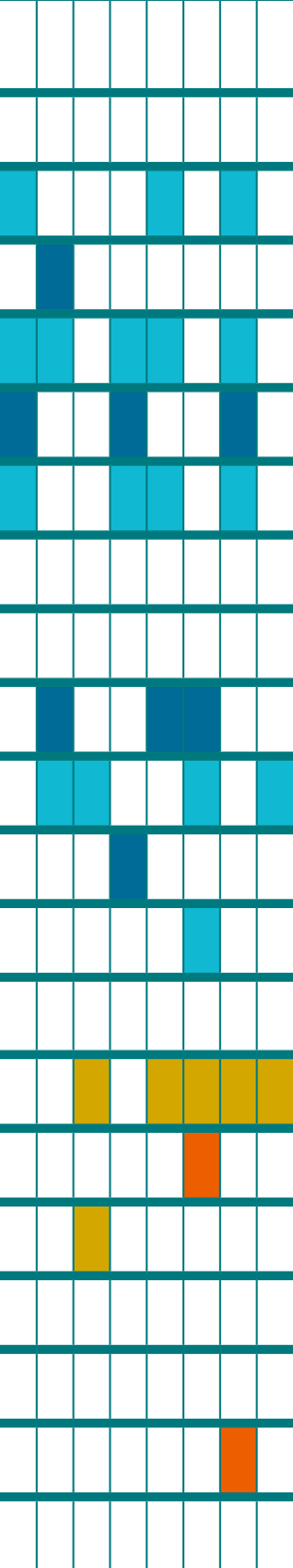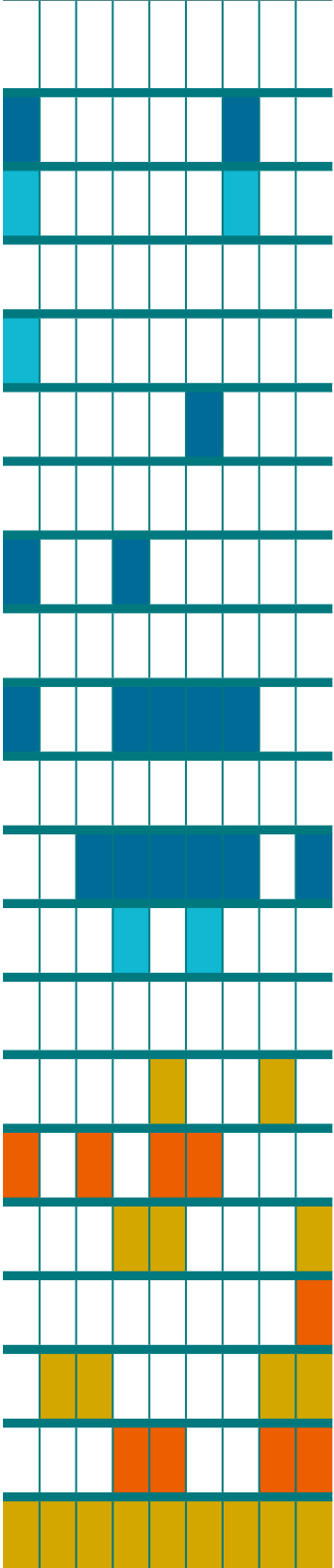Epigenetics &
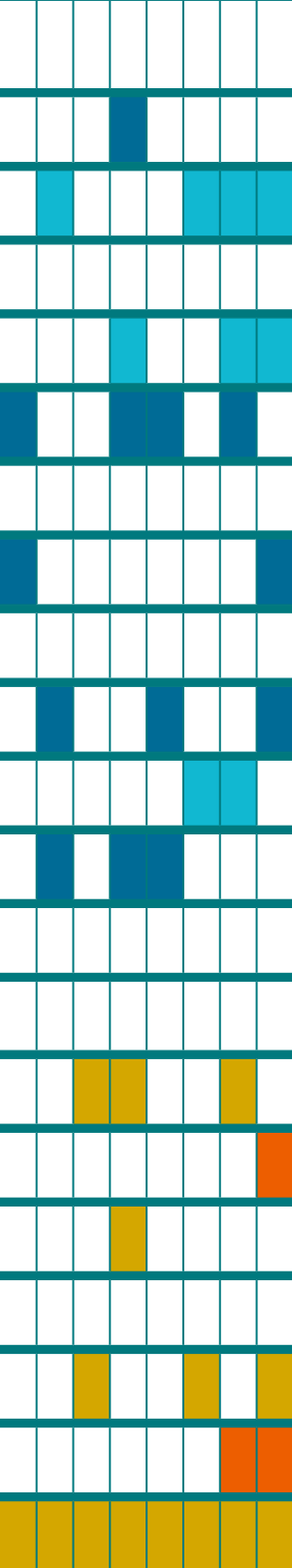Neurobiology

Tissue Biology
& Disease
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Column labels (top and bottom):

- Hinxton: Birney, Goldman, Bateman, Beltrão, Brazma, Finn, Flicek, Gerstung, Iqbal, Kleywegt, Leach, Marioni, Petsalaki, Stegle, Thornton, Uhlmann, Zerbino
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- Barcelona: Sharpe, Ebisuya, Trivedi
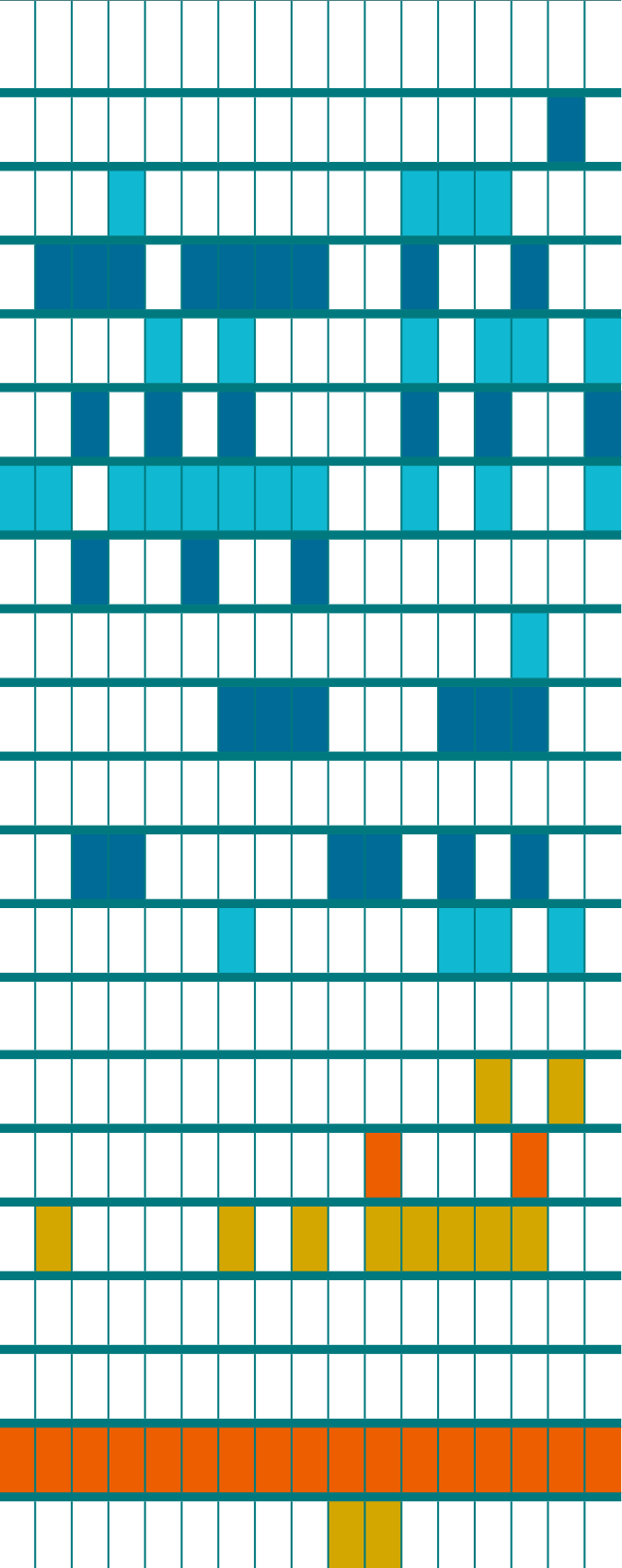
Themes

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