



*The Integrative  
Molecular & Cellular Biology*

**GRADUATE SCHOOL**

A high-level training programme

Focused on Molecular & Cellular Biology

For Master & Doctoral students

English as a working language





An exciting scientific environment



Université			
			de Strasbourg

## What is IMCBio?

An unprecedented training programme focused on **Integrative Molecular & Cellular Biology**, gathering:

- 4 Research Clusters    
- Cutting-edge technological resources of 3 national infrastructures in Health Biology
- The insectarium I2MC, an equipment of excellence
- 5 host institutes (IGBMC, IBMC, IBMP, GMGM, INSERM U 1110)



RESEARCH

TECHNOLOGY

TRAINING

INNOVATION

## For whom?

Undergraduate or graduate students  
with a **strong motivation for research**  
& interested in the different areas of  
biological sciences

## What for?

- A **high-level training programme** for Masters & PhD students
- Add-on **training modules** at Master level
- Additional internships in laboratories
- Summer schools for undergraduates & Master students

**W**ith the joint support of the University of Strasbourg (Faculty of Life Sciences & Doctoral School of Life and Health & the Interdisciplinary Thematic Institute « ITI IMCBio+ »), the CNRS & the Inserm, this programme has a triple ambition to strongly link training to research, to enhance the research strengths of the Strasbourg site, and to contribute to its international visibility.

## What is a Research Cluster (former : LabEx)?

Allowing the recruitment or retention in France of scientists of a very high level or high potential, the significant funding granted to these Research Clusters allows

to increase scientific excellence and originality, the transfer of the knowledge produced and, by the same token, the international attractiveness of French research.

### Research Cluster INRT



The Research Cluster (further: RC) Integrative biology: Nuclear dynamics, Regenerative and Translational medicine (INRT). The INRT is driven by the Institute of Genetic and molecular Biology (IGBMC).

This programme explores mechanisms

of the regulation of gene expression in development, physiology, and disease by building upon the strengths of the IGBMC departments and on its emerging scientific research areas, by developing a cutting edge technology and support framework to tackle major questions of fundamental and clinical relevance.

### Research Cluster Mitocross



The RC MitoCross is constituted by seven teams from three Strasbourg Institutes, the Molecular Genetics, Genomics, Microbiology (GMGM), the Institute of Plant Molecular Biology (IBMP) and the Architecture and Reactivity of the RNA, working on various aspects of mitochondrial research. They are also implicated in aging, incurable neuromuscular diseases & common

pathologies such as Alzheimer's disease or some cases of cancer and diabetes. The MitoCross aim is to deepen the knowledge of the molecular mechanisms governing mitochondrial biogenesis, genetics and cross-talk with the nucleus and to exploit this knowledge to understand biochemical mechanisms of mitochondrial dysfunctions, to envision agronomic applications and innovative therapies.

### Research Cluster NetRNA



The RC NetRNA gathers 12 teams from 3 CNRS units located at the Institute of Molecular and Cellular Biology (IBMC) and the Institute of Plant Molecular Biology (IBMP). The general objective is to gain fundamental knowledge on regulatory RNAs and their machineries that play key roles in stress-related and adaptive responses, immune

responses, host-pathogen interactions, and in human infectious diseases. The broad range of organisms (pathogens, plants, mammals, insects) allows to assess similarities and differences between regulatory RNA networks in various phyla or species. The consortium is based on shared conceptualization and broad collective expertise and on the use of sophisticated instrumentation.

### Research Cluster HepSYS



The RC HepSYS consists of a team of highly qualified molecular biologists, cellular scientists, bioinformaticians, hepatologists and liver surgeons from the institute of Viral and Liver Disease (Unistra, Inserm Unit U1110), and the University Hospital of Strasbourg (HUS). A key strength of the LabEx is the full integration of basic, translational and clinical

research, along with strong collaborations and networks of excellence with experts from the field at the national and international level. Since its creation in 2011, HepSYS has made major contributions to the field supported by a long- standing track record in the understanding of viral and metabolic pathogenesis of liver disease and their translation into clinical applications including the development of novel preventive and therapeutic strategies.



labex-inrt.igbmc.fr  
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## INRT consortium

«The Integrative biology: Nuclear dynamics, Regenerative and Translational medicine (INRT) LabEx is based on the four departments of the IGBMC»

Frédéric Dardel, Director of the IGBMC and coordinator of the INRT

## IGBMC DEPARTMENT OF Translational Medicine & Neurogenetics Biology



«**Modelling human diseases** to explain the main mechanisms implicated in the functioning of the nerve system and understand the molecular mechanisms responsible for the genetic diseases that affect the nerve system and the muscles»

Nicolas Charlet-Berguerand, Director of the Department

### RNA diseases Headed by Nicolas Charlet-Berguerand

nicolas.charlet-berguerand@igbmc.fr

Study human genetic diseases due to expansions of tri-, tetra- or penta-nucleotide repetitions that are located in the so-called «non-coding» regions of the genome, mainly: myotonic dystrophy, tremor and ataxia syndrome associated with fragile X and amyotrophic lateral sclerosis.



### Physiopathology of aneuploidy, gene dosage effect & Down syndrome Headed by Yann Héroult

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Better understand the physiopathology of aneuploidies and other genetic diseases with Intellectual Disabilities, using mouse and rat models. Explore behaviour and cognition in models of other intellectual disabilities of genetic origin.



### Pathophysiology of neuromuscular diseases Headed by Jocelyn Laporte

jocelyn.laporte@igbmc.fr

Identify the genetic basis, better understand and validate therapeutic proof-of-concepts for rare neuromuscular disease, especially for congenital myopathies.



### Regulation of cortical development in health & disease Headed by Juliette Godin

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Interpret the pathological mechanisms involved in the development and progression of neurological disorders. Characterize the cellular and molecular mechanisms by which the cell center and the network of fibres called Microtubules and the centrosome, the organizing center, control the development of the cerebral cortex in both physiological and pathological conditions.



### Study of copy number variants in autism spectrum disorders & their comorbidities Headed by Christelle Golzio

christelle.golzio@igbmc.fr

Understand how genetic variation can impact the development and homeostasis of the nervous system thanks to developed animal models and assays to study the impact of gene dosage defects on basic neurodevelopmental processes to: Discover genes and alleles that contribute to disease; Capture and validate genetic interactions (cis- and trans-modulators) and identify genes implicated in autism spectrum disorders-associated comorbidities.



### Genetics & pathophysiology of neurodevelopmental & epileptogenic disorders Headed by Amélie Piton and Hervé Moine

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herve.moine@igbmc.fr

Identify novel genes involved in neurodevelopmental disorders (NDD), intellectual disability, epilepsy, autism spectrum disorders; identify genotype/phenotype correlation; develop genomic and functional tools to interpret genetic variants. Understand the physiopathological mechanisms involved in fragile X-syndrome and other frequent forms of monogenic NDD and develop pre-clinical therapeutic proof-of-concepts.



## IGBMC DEPARTMENT OF Functional Genomics & Cancer



**«Expression and preservation of genetic information:** deciphering the fundamental mechanisms governing gene expression»

Susan Chan, Director of the Department

### Structural & functional basis of chromatin remodelling

**Headed by Elisa Bergamin**  
elisa.bergamin@igbmc.fr

Understand the mSWI/SNF complex at the molecular and atomic level through the combination of electron cryomicroscopy, X-ray crystallography, molecular biology and biochemistry.

### Genome expression & repair

**Headed by Frédéric Coin**  
frederic.coin@igbmc.fr

Study the mechanisms of aging and cancer in various cellular systems and animal models that are deficient in DNA repair and transcription, by using biochemistry, genetics and cell biology.

### Regulation of gene expression in cancer

**Headed by Irwin Davidson**  
irwin.davidson@igbmc.fr

Study how transcription factors and their cofactors such as chromatin remodeling complexes regulate gene expression during development, in physiological processes, oncogenic transformation and tumor progression, through high throughput genomics and at the single cell level.

### Immune & neural development

**Headed by Angela Giangrande**  
angela.giangrande@igbmc.fr

Understand how cell diversity is generated and how cells interact to build the highly complex architecture of pluricellular organisms. Study the molecular and the epigenetic events controlling cell differentiation and reprogramming.

### Chromatin & epigenetic regulation

**Headed by Ali Hamiche**  
ali.hamiche@igbmc.fr

Investigate the role of histone variants and their deposition mechanism in epigenetic control of human genome activity, including the role of histone variants in gene regulation and genome integrity.



### Hematopoiesis & leukemogenesis in the mouse

**Headed by Susan Chan & Philippe Kastner**  
susan.chan@igbmc.fr  
philippe.kastner@igbmc.fr

Investigate how transcription factors control the development of hematopoietic stem cells into pluripotent progenitor cells and then into mature blood cells, a process called hematopoiesis. Understand how altering the function of transcription factors contributes to malignant cell formation.

### Pathogenesis of inflammatory diseases

**Headed by Mei Li**  
mei.li@igbmc.fr

Decode the complex molecular and cellular networks driven by epithelium-derived cytokines such as thymic stromal lymphopoietin (TSLP) during inflammatory responses, determine the function of these networks in the pathogenesis of inflammatory diseases, notably atopic diseases and cancer, and translate the acquired knowledge into new biomarkers and therapeutic strategies.



### Pathophysiological function of nuclear receptor signaling

**Headed by Daniel Metzger**  
daniel.metzger@igbmc.fr

Study, under physiological and pathophysiological conditions, the functions and interdependence of signaling pathways that are regulated by various nuclear receptors in different organs.

### Protein networks and complexes regulating eukaryotic mRNA decay

**Headed by Bertrand Séraphin**  
bertrand.seraphin@igbmc.fr

Understand how mRNA decay contributes to regulated gene expression and how these mechanisms are upset in some pathologies including cancer and specific genetic diseases.

### Spatial organization of the genome

**Headed by Thomas Sexton**  
thomas.sexton@igbmc.fr

Determine if and how chromosome folding can influence transcription. To show how gene programs can be co-ordinately regulated or lead to diseases such as cancer, and also provide tools for gene therapy.

### Molecular & cellular biology of breast cancer

**Headed by Catherine-Laure Tomasetto**  
catherine-laure.tomasetto@igbmc.fr

Understand at the molecular level the role of the mesenchymal factor, MMP11, in the progression of breast cancers. Characterize the function of genes amplified in breast cancer cells.



### Retinoic acid signaling pathways driving stem spermatogonia differentiation

**Headed by Norbert Ghyselinck & Manuel Mark**  
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manuel.mark@igbmc.fr

Combine innovative genetic, pharmacological and molecular approaches in mouse to study the cellular and molecular mechanisms underlying the ability of retinoic acid, the active metabolite of vitamin A, to promote the differentiation of spermatogonia and, more generally, stem cells *in vivo*.





## IGBMC DEPARTMENT OF Integrated Structural Biology



«**Mechanisms of gene expression, drug structure:** understanding the fundamental mechanisms regulating the expression of genetic information in messenger RNA and protein»

Marc Ruff, Director of the Department

### Structural biology of epigenetic targets

**Headed by Jean Cavarelli**

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Understand the structure/function relationships of selected epigenetic targets at the atomic level. To decipher at the molecular level the mechanisms governing selected epigenetic processes by biophysical and structural means. Structure-driven developments of chemical tools to modulate the activity of our molecular targets.

### Chemical biophysics of transcriptional signaling

**Headed by Annick Dejaegere**

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Combine biophysical experiments (x-ray crystallography, cryo-EM, SAXS, mass spectrometry, ITC) and numerical simulations (molecular dynamics simulations) to understand how chemical signals (ligands, post-translational modifications) affect the structure and dynamics of protein and protein-DNA complexes and how these changes are implicated in their regulation.

### Biomolecular condensation in nuclear organization & function

**Headed by Mikhail Eltsov**

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How are 2m of DNA packed into each cell nucleus into our body? We combine cryogenic optical microscopy and electron tomography to understand chromatin condensation and its role in regulating gene expression and maintaining genome stability.

### Nuclear magnetic resonance, molecular complexity & dynamics

**Headed by Bruno Kieffer**

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Characterize and study the relevant molecular properties which achieve a given biological function by combining multi-scale experimental and modeling approaches (from the atom to the cell). Develop numerical methods adapted to massive data analysis. Apply these approaches to developing new therapeutic strategies for prostate cancer.

### Large complexes involved in gene expression

**Headed by Bruno Klaholz**

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Analyze the molecular mechanism of action of the bacterial and human ribosome in different structural and functional states during the formation of complexes with regulatory molecules (proteins, messenger RNAs) or inhibitors having important implications for human health, through an integrative structural biology approach, including biochemistry, crystallography and high-resolution cryomicroscopy.

### Molecular basis of chromatin & transcription regulation

**Headed by Christophe Romier**

christophe.romier@igbmc.fr



Determine, at the molecular and structural level, epigenetic mechanisms, to discover how they regulate the organization of chromatin and nuclear mechanisms, and to understand their involvement in many diseases.

### Chromatin stability & DNA mobility

**Headed by Valérie Lamour & Marc Ruff**

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marc.ruff@igbmc.fr



Decipher the molecular mechanisms governing the transport, processing and topological changes of nucleic acids. Our present targets are nucleoprotein complexes involved in retroviral DNA integration and eukaryotic DNA topoisomerases. We integrate structural data from high resolution (X-ray crystallography, NMR), medium resolution (CryoEM) with in vitro and in cellulo functional data.

### Structural biology of molecular machines

**Headed by Helgo Schmidt**

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Combine cryoelectron microscopy and x-ray crystallography to elucidate how the dynein motor produces force to generate movement and how it connects to and transports nuclei.

### Architecture of nucleoprotein systems by 3D electron microscopy

**Headed by Patrick Schultz**

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Decipher the three-dimensional organization and understand the functioning of molecular nanomachines involved in gene expression regulation and chromatin structure using electron cryomicroscopy to visualize isolated molecules in their native state.

### Viral oncoproteins & domain-motif networks

**Headed by Gilles Trave**

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Study viral oncoproteins (cancer-causing proteins) to describe the subversion of cellular functions by oncogenic viruses by generating quantitative and exhaustive information at two levels of analysis: atomic and interactomic.

### Regulation of transcription

**Headed by Albert Weixlbaumer**

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Combine molecular biology and biochemistry with X-ray crystallography and single particle Cryo-EM to study the universally-conserved multisubunit protein enzyme RNA polymerase. RNA polymerase performs transcription, the first step in the expression of genetic information.

### Molecular basis for protein synthesis by the ribosome

**Headed by Gulnara Yusupova & Marat Yusupov**

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Acquire new structural knowledge on the mechanism of ribosome protein synthesis and the mode of action of ribosome inhibitors.

Study X-ray and cryo-EM structures and mechanism of protein biosynthesis in bacteria, yeasts and humans, a process carried out by a large ribonucleoprotein complex: the ribosome.

## IGBMC DEPARTMENT OF Developmental & Stem Cell Biology



**“From cellular plasticity to regenerative medicine: we study the fate and reprogramming of embryonic and adult cells as well as the signals and mechanisms that allow an organ to take its shape and function”**

Bill Keyes, Director of the Department

### Brain development & physiology

**Headed by Pascal Dollé**  
pascal.dolle@igbmc.fr



Understanding the role of certain signals including those mediated by Vitamin A (retinoic acid) and its receptors during development and brain neurogenesis, and for the efficient functioning of neuron populations.

### Differentiation & physiopathology of endocrine cells in the pancreas & intestine

**Headed by Gérard Gradwohl**  
gerard.gradwohl@igbmc.fr



Study the mechanisms that control cellular destiny, maturation and the maintenance of pancreatic and intestinal endocrine cells identity in normal and pathological situations.

### Cellular plasticity & direct reprogramming in *C. elegans*

**Headed by Sophie Jarriault**  
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Exploring the mechanisms that make a specific cell capable of changing its identity whereas its seemingly identical neighbours are incapable.

### Syncytial cell biology

**Headed by Minchul Kim**  
minchul.kim@igbmc.fr



Understanding how the unique cellular anatomy of syncytial cells affects their functions in health and disease using the skeletal muscle as a paradigm. We currently explore the role and mechanism of diverse nuclear identities in muscle cells.

### Common mechanisms of development, cancer & aging

**Headed by Bill Keyes**  
bill.keyes@igbmc.fr



Investigating the cellular program of senescence, a process that can contribute to tissue development, regeneration and protection from cancer, but when misrelated causes aging and disease.

### Nuclear organization & division

**Headed by Manuel Mendoza**  
manuel.mendoza@igbmc.fr



Study cell division and differentiation, with a focus on how nuclear structures are reorganised in time and space during cell proliferation.

### Stochastic systems of biology of gene regulation

**Headed by Nacho Molina**  
nacho.molina@igbmc.fr



Measure protein-DNA interactions, post-transcriptional modifications of named histone proteins and the 3D structure of chromatin in the entire genome in populations and individual cells.

### Molecular biology of B cells

**Headed by Bernardo Reina San Martin**  
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Study molecular mechanisms driving antibody diversification, with a specific focus on the protein complexes involved in mediating AID targeting and in repairing AID-induced DNA damage *in vivo*.

### Signal transduction in metabolism & inflammation

**Headed by Roméo Ricci**  
romeo.ricci@igbmc.fr



Discover and understand the signaling axes of inflammation involving protein kinases and likely to have an important role in the mechanism of inflammation.

### Actin dynamics & biomechanics of the early embryo

**Headed by Anne-Cécile Reymann**

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Study the assembly dynamics of the cell cortex (thin layer of actin filaments and molecular motors allowing cell shape control) in early *C. elegans* development, we aim to reveal how these properties are regulated and change over time to control early morphogenesis processes during the first few divisions of the *C. elegans* embryo.

### Cell physics

**Headed by Daniel Riveline**  
daniel.riveline@igbmc.fr



Understand cellular motility and division as well as the shape of cells in tissues, by studying the dynamics of the cytoskeleton and the associated Rho signalling pathways.

### Cell cycle & ubiquitin signaling

**Headed by Izabela Sumara**  
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Ubiquitin-mediated control of cell division in health and disease.

### Dynamics of chromatin structure & transcription regulation

**Headed by László Tórá**  
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Identify and characterize transcription regulatory mechanisms, carried out by chromatin remodeling complexes, transcriptional coactivators, general transcription initiation factors and RNA polymerase II. Understand how deregulation of these highly controlled processes can lead to different pathologies.



mitocross.unistra.fr

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**« Mitochondria are essential intracellular organelles responsible for respiration, ATP-generation, ionic homeostasis, regulation of reactive oxygen species or apoptosis. Exploiting this knowledge and understand biochemical mechanisms of mitochondrial dysfunctions will allow us to envision agronomic applications and innovative therapies. »**

*Ivan Tarassov, coordinator of MITOCROSS*

## Intercompartmental RNA Traffic and Mitochondrial Pathologies

**Headed by Nina Entelis & Ivan Tarassov**

Contact : n.entelis@unistra.fr  
i.tarassov@unistra.fr



Focus on RNA-protein interactions in mitochondria and on different aspects of the phenomenon of targeting macromolecules (essentially RNAs) into this organelle. Understand these mechanisms to exploit development of new gene therapy approaches of human mitochondrial diseases. Human and murine and yeast cells are used as models and structural, imaging, genetic, biochemical and functional approaches are used.

## Metabolism and Traffic of RNA in Plant Cell

**Headed by Laurence Drouard & Anne-Marie Duchène-Louam**

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Understand better the molecular mechanisms linked to translation and involving mRNA trafficking and metabolism. First, study the mitochondrial translation machinery and the mitochondrial gene expression in the green alga *Chlamydomonas reinhardtii*. Second, elucidate the molecular mechanisms allowing cytosolic mRNA targeting and localized translation at the surface of plant and mammals mitochondria.

## Dynamics & Plasticity of Synthetases

**Headed by Hubert Becker**

Contact : h.becker@unistra.fr



Explore the nontranslational roles of aminoacyl-tRNA synthetases and other essential tRNA-binding proteins. In yeast, study organellar and membrane-bound pools of these proteins that participate in metabolic sensing and respiration. In pathogenic filamentous fungi, their cell-wall remodeling activity is studied to identify antimicrobial resistance strategies. In human, mutants responsible for severe diseases by loss- or gain-of-function are studied in yeast models and from patients' samples.

## Metabolism and Traffic of RNA in Plant Cell

**Headed by Jose-Manuel Gualberto**

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Study the recombination pathways and factors that modulate the structural plasticity and transmission of the plant mitochondrial genome, to better understand mitochondrial genome replication and segregation; to investigate the effects of genetic instability induced by recombination mutants on mitochondrial gene expression and plant development; to develop tools to promote mitochondrial genetic variability and segregation of valuable traits in crop plants.

## Functions of PPR proteins

**Headed by Philippe Giege**

Contact : philippe.giege@ibmp-cnrs.unistra.fr



Study gene expression mechanisms in plant mitochondria, more specifically on PPR proteins, a major class of RNA binding proteins. The team identified PPR proteins carrying the 5' rRNA Nase P activity as well as ribosome-associated PPR proteins for mitochondrial translation. The results obtained open up a wide range of applications from plant breeding to human health.

## Intraspecific Variation and Genome Evolution

**Headed by Joseph Schacherer**

Contact : schacherer@unistra.fr



Elucidate the genetic basis of the awesome phenotypic diversity observed in natural populations, a remaining major challenge in biology. In this context, we marry classical but high-throughput genetic methods with new approaches based on population genomics to connect the phenotypic and allelic landscape by taking advantage of the powerful budding yeast model system.

# Research Cluster NetRNA



labex-ibmc.u-strasbg.fr/NetRNA  
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## NetRNA consortium



**«Networks of Regulatory RNAs across kingdoms and dynamical responses to biotic and abiotic stresses»**

*Pascale Romby, Coordinator of NetRNA*

### tRNA Biology and pathogenesis

**Headed by Magali Frugier**

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Investigate the influence of host/pathogen interactions on the synthesis and co-translational folding of Plasmodium (parasite responsible for malaria) proteins, with emphasis on the molecular mechanisms involved in the import and role of host tRNAs in the development and virulence of parasites.

### Non-coding RNAs and viral infections

**Headed by Sébastien Pfeffer**

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Explore the importance and regulation of RNA silencing mediated by microRNAs and other small RNAs during viral infection in cultured cells, mice and patient samples with a specific focus on how microRNAs themselves are regulated and the interplay with other innate immunity signaling pathways.

### Bacterial regulatory RNAs

**Headed by Pascale Romby**

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Investigate the role of non-coding RNAs and multifunctional RNAs in gene expression in *Staphylococcus aureus*, elucidate regulatory mechanisms at the molecular level, and their involvement in establishing *S. aureus* pathogenicity, generate regulatory networks involving RNAs and proteins from the data, and study the dynamic properties of these networks.

### Digital biology of RNA

**Headed by Michael**

**Ryckelynck**

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Set-up and use ultrahigh-throughput analytical pipelines exploiting droplet-based microfluidics in tandem with next generation sequencing to: i) develop new RNA-based fluorescence imaging tools, ii) finely characterize RNA-based regulatory mechanisms and iii) perform single-cell resolution gene expression monitoring (especially non-coding RNAs).

### RNA-based antiviral immunity in drosophila and vector insects

**Headed by Jean-Luc Imler**

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Explore the interactome of Dicer-2, R2D2 and AGO2 in drosophila cells infected by different types of viruses, investigate the post-translational modifications in the regulation of the molecular complexes assembled around these molecules, and monitor antiviral RNA interference using live imaging. Responsible of a novel Equipment of Excellence Insectarium (EquipEx I2MC).

### Control of arthropod-borne viruses by mosquito antiviral pathways

**Headed by Joao T. Marques**

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Dissect the biology of virus-host interactions in *Aedes aegypti* mosquitoes to: (i) characterize mechanisms such as RNA interference that contribute to resistance or susceptibility to arbovirus infection in mosquitoes, (ii) identify the natural virome of *Aedes* mosquitoes and determine its impact on vector competence, and (iii) manipulate antiviral mechanisms to generate mosquitoes that are resistant to arboviruses.

### Genetic immune response

**Headed by Nicolas Matt**

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Decipher the complex regulatory network underlying the innate immune response in *Drosophila*, analyze the epigenetic mechanisms involved in the control of the transcriptional selectivity of NF- $\kappa$ B induced target genes focusing on the roles of non-coding RNAs in transcriptional regulation and selectivity of the innate immune response in *Drosophila*.

### RNAi and receptors

**Headed by Carine Meignin**

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Investigate how RNA viruses in *Drosophila* are recognized by the endonuclease Dicer-2, identify the antiviral complexes in opposite to RNAi pathway, and monitor the dynamics of the antiviral innate immunity using live imaging.

### Mechanisms of small RNA biogenesis and action

**Headed by Todd Blevins**

UPR 2357, IBMP  
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Investigate how multisubunit RNA polymerases distinguish genetic parasites (e.g., retrotransposons and endogenous retroviruses) from essential host genes in plant chromosomes, allowing the synthesis of small-interfering RNAs and the targeted silencing of repetitive DNA by repressive chromatin modifications and DNA methylation.

### Role of ubiquitin in cellular regulation

**Headed by Pascal Genschik**

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Investigate post-translational regulations that control RNA silencing machinery in the model plant *Arabidopsis thaliana* in normal and stress conditions. The work focuses on Argonaute proteins post-translational modifications, and aims to define the molecular components and machineries triggering AGO1 degradation and to determine their physiological functions.

### RNA degradation in plants

**Headed by Dominique Gagliardi**

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Investigate mechanisms of RNA substrate recognition by the degradation machinery in the plant model *Arabidopsis thaliana*, and determine the impact of non-canonical polyadenylation and uridylation in controlling activity and stability of mRNAs, non-coding RNAs, and viral RNAs.



www.liverstrasbourg.org

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« **Unravelling the cell circuits of liver disease and cancer:** an innovative integrative research program to uncover novel therapeutic strategies for prevention and treatment of liver disease and associated cancer. By integrating basic, translational and clinical research, our program aims at translating our findings and compounds into clinical applications.»

*Thomas Baumert, coordinator of HepSYS*

**Unraveling the cell circuits  
of liver disease and  
cancer to discover  
novel therapeutic targets**

**Headed by Thomas Baumert**

Contact : thomas.baumert@unistra.fr



Chronic liver disease and cancer are key challenges of public health with unsatisfactory treatment options. Using a recently established single cell RNASeq pipeline, combined with advanced proteomics, patient - derived cell culture and animal models, we aim to understand the cell circuits of virus - induced and metabolic liver cancer. The understanding of disease biology on a molecular level, enables us to uncover novel targets and compounds for treatment. A unique hallmark of our program is the integration of laboratory studies with patient data using advanced computational analyses.

#### **Key aims of HepSYS:**

- Unravel the cell circuits driving liver disease progression
- Develop innovative patient-derived models for liver disease
- Characterize SARS-CoV / HBV / HCV / HDV virus host interactions
- Translate discoveries into novel therapeutic strategies.

## An exciting scientific environment

**3** national infrastructures in biology and health and  
**1** equipment of excellence

The CELPHEDIA PHENOMIN-ICS (Clinical Mouse Institute) infrastructure provides a complete range of specific services to the scientific community for using mouse models to progress in the functional diagnosis of

the human genome and to better understand human diseases, their physiological and pathological bases.

www.phenomin.fr  
www.celphedia.eu



FRISBI is an infrastructure for integrative structural biology approaches, from the molecular to the cellular level, integrating resolution data from X-ray crystallography, small angle X-ray scattering, NMR, Cryo-EM and functional data, including

development for protein expression and crystallization.

frisbi.eu



FRANCE GENOMIQUE is an infrastructure that shares the resources of the main French platforms in genomic data production and analysis, which are strategic technologies in all areas of research. It offers the community cutting edge expertise in genomics

and associated bioinformatics.

www.france - genomique.org



The Insectarium for Molecular Cellular Infectiology (I2MC) is an equipment of high excellence that includes a biosecurity insectarium to study the interactions

between pathogens such as the Plasmodium falciparum parasite (malaria agent), the Dengue virus and the mosquitoes transmitting them to humans.

**the insectarium I2mc**





# REGISTRATION PROCESS

## At Master level

■ **1<sup>st</sup> stage:** Online registration in the Master course of your choice in the Faculty of Life Sciences, via E-Candidate:

**<https://ecandidat.unistra.fr>**

■ **2<sup>nd</sup> stage:** Check your wish to include the IMCBio Graduate School in your wish list when applying online

■ **3<sup>rd</sup> stage:** End of June, selection of candidates for admission to the Master's degree by Faculty of Life Sciences

■ **4<sup>th</sup> stage:** Selection of candidates for cycle 2022-2023 beginning September 2022 at the **Master Day IMCBio** - for more info:



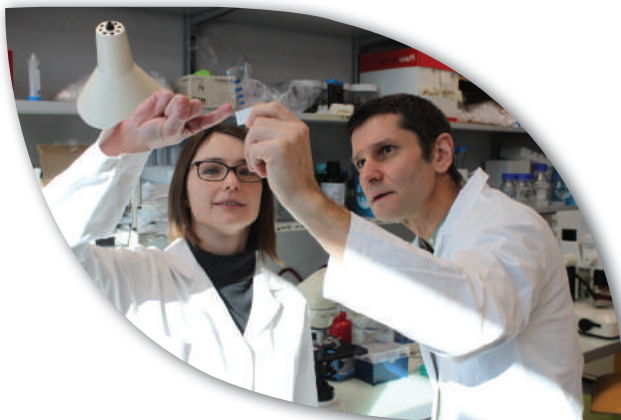
<https://imcbio.unistra.fr/imcbio-training-programs/#master>

## At Doctoral level:

Check out our current PhD Call here:



**<https://imcbio-phdprogram.unistra.fr>**



# Apply now!



IMC Bio

## Heads of project:

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