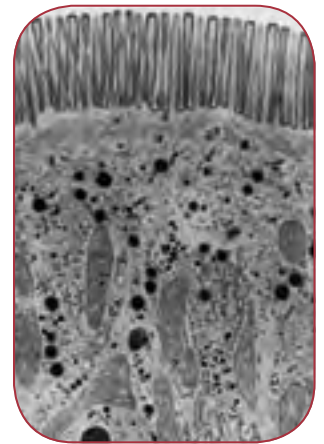


**The *Institut thématique multiorganismes* (ITMO) BCDE coordinates French research in “Cell Biology, Development and Evolution”. The objective is to improve the performance and competitiveness of French teams and ensure effective coordination of the French research organizations and institutions in these fields.**

### Fields covered

- ▶ **Cell biology:** cell proliferation, growth and division – mitosis and meiosis; cell death; cytoskeleton; adhesion and migration; sub-cellular compartmentalization and intra-cellular traffic; signaling; cell polarity and morphogenesis; stem cells, asymmetric division and cell lineages.
- ▶ **Developmental biology:** early embryonic axes; morphogenetic gradients, induction and organization of embryonic patterns; differentiation and organogenesis; plasticity and robustness of developmental mechanisms; regeneration; reproduction; aging.
- ▶ **Evolutionary biology:** evolution-development concepts –“evo-devo”– and links with the environment –“evo-devo-eco”–; molecular and cellular mechanisms of evolution.



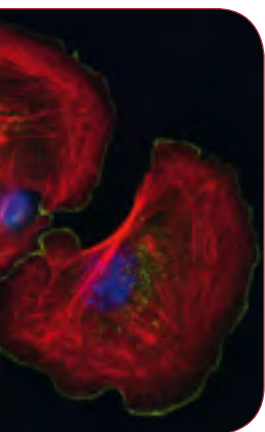
Electron micrograph of a rat intestinal epithelium cell during absorption of a fatty meal.  
© Cell Image Library

### Main scientific aims

- ▶ To understand the fundamental mechanisms of life underlying the formation, organization, physiology and evolution of complex organisms.
  - ▶ To understand the physiological constraints under which organisms function, and their pathological disruption (humans and other animals, as well as plants).
  - ▶ To gain insight into the reception of external signals, their transduction within cells, and the interconnection of subsequent cascades of signaling events.
  - ▶ To identify the evolutionary innovations at the main nodes of metazoan and plant trees.
  - ▶ To decipher the molecular mechanisms of morphological and physiological diversification.

### Main methodological and technical aims

- ▶ Use of systems biology to develop an integrated view of how multicellular living organisms function.
- ▶ Development of synthetic biology and its integration with systems biology to provide a new understanding of living systems through artificial design.
- ▶ Stimulate mathematical modeling approaches to solve and predict biological system behaviours.
- ▶ Support the exploration of different animal and plant models to promote a deeper understanding of “evo-devo” mechanisms.
- ▶ Foster the development of multi-scale and multimodal approaches of live observation to characterize mechanisms from the level of molecular complexes to the whole organism.
- ▶ Support the integration of “omics” data into signaling networks at the scale of the nano-machine, organelle, cell, whole tissue and organism.



Microscopic observation of Mouse Embryo Fibroblasts. Nuclei are stained in blue, actin fibers in red and Arpin in green. Arpin localises to the tip of lamellipodia, where plasma membrane protrudes.

Roman Gorelik © CNRS

## The scientific experts

### ITMO Directors

Thierry GALLI, Inserm  
Hervé MOREAU, CNRS

### Scientific policy Officer

Christine LEMAITRE, Inserm

### Main health and socio-economical aims

- ▶ Enhance knowledge in cell biology, developmental evolution for the development of new therapeutic approaches *via*:
  - an understanding of the diversity of mechanisms of morphogenesis and tissue physiology and organizations to enable prediction of individual differences in disease development and therapeutic responses through personalized medicine;
  - the characterization and identification of signaling pathways as targets for therapeutic intervention;
  - the development of new classes of drugs with fewer side effects, and predictive pharmacology.

- ▶ Progress in cell biology, developmental and evolution are the foundation of a control of the biological processes that allow for high quality agricultural production.
- ▶ Advances in cellular, developmental biology and evolution have implications for biotechnology, the development of artificial systems biotechnology (biosensors), bioengineering (tissue reconstructions, biopharmaceuticals, biofuels), and the production of animal models for drug screening for therapeutic purposes.

### Main initiatives

#### Actions:

- ▶ PhD/postdoc travel awards.
- ▶ Exhibiting with SBCF at ASCB annual Meeting 2013-2016. ASCB-EMBO 2017-2018 Meeting.
- ▶ Support to thematic schools/symposia in the field.

### Experts committee

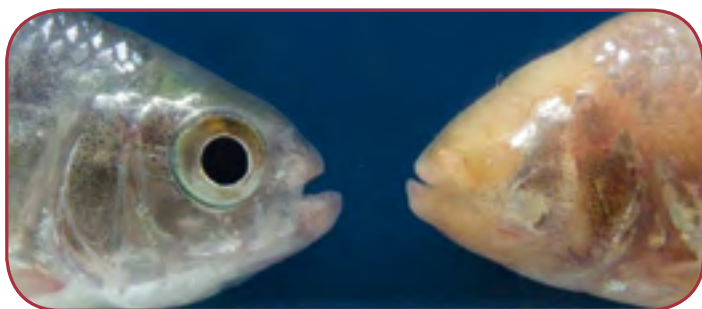
- ▶ Serge AMSELEM, UPMC/AP-HP, Paris
- ▶ Yohanns BELLAÏCHE, CNRS, Paris
- ▶ Frédérique CLÉMENT, INRIA, Paris
- ▶ Laurent COMBETTES, Inserm, Orsay
- ▶ Catherine DARGEMONT, Inserm
- ▶ Jacky GOETZ, Inserm
- ▶ Laurent HÉLIOT, CNRS, Lille
- ▶ Yann HÉRAULT, CNRS, Illkirch
- ▶ Anne HOUDUSSE, CNRS, Paris
- ▶ Evelyn HOULISTON, CNRS, Villefranche-sur-Mer
- ▶ Jean-Stéphane JOLY, CNRS, Gif-sur-Yvette
- ▶ Laurent KODJABACHIAN, CNRS, Marseille
- ▶ Carl MANN, CEA, Gif-sur-Yvette
- ▶ René-Marc MEGE, CNRS, Paris
- ▶ Christian MUCHARDT, Institut Pasteur, Paris
- ▶ Bertrand PAIN, INRA, Lyon
- ▶ Nadine PEYRIÉRAS, CNRS, Gif-sur-Yvette
- ▶ Simon SAULE, Université Paris-Sud 11
- ▶ Michel VERVOORT, Université Paris Diderot
- ▶ Katja WASSMANN, CNRS
- ▶ Chiara ZURZOLO, Institut Pasteur, Paris

### Conferences since 2014:

- ▶ November 19<sup>th</sup> 2014 Claude Bernard Conference on Vesicular Traffic with the three 2013 Nobel Prize Winners in Physiology/ Medicine, Paris
- ▶ Workshop for scientific prospective reflexion in the field of cell biology, development and evolution, November 28<sup>th</sup>, 2014, Paris
- ▶ China-France Exchange Symposia in Cell, Developmental and Evolutionary Biology: November 21<sup>st</sup>-23<sup>rd</sup>, 2014, Beijing; September, 9<sup>th</sup>-10<sup>th</sup>, 2015, Paris
- ▶ “Research on the human embryo in vitro: scientific and ethical aspects”, October 7<sup>th</sup>, 2015, Paris
- ▶ Workshop “Modeling in Cell and Developmental Biology”, December 1<sup>st</sup>, 2015, Paris
- ▶ Symposium “Current challenges in cell-cell communication”, July 1<sup>st</sup>, 2016, Paris
- ▶ Conference “Architecture and Plasticity of the Cell Nucleus”, November 29<sup>th</sup> & 30<sup>th</sup>, 2016, Paris
- ▶ Conference “Endoplasmic Reticulum functions in physiology and pathology”, October 2<sup>nd</sup> & 3<sup>rd</sup>, 2017, Cordeliers Research Centre, Paris
- ▶ Conference “The Origins of Metazoans”, November 7<sup>th</sup> & 8<sup>th</sup>, 2017, CNRS -Campus Gérard Méglie, Paris
- ▶ *Journée Recherche et Santé* “Animal models in bio-medical research: strengths and complementarities”, December 7<sup>th</sup>, 2017, BNF, Paris
- ▶ Conference on New ways of publishing, June 2018, Paris
- ▶ Conference on Tissue regeneration: mechanisms during evolution and organoid-based regenerative medicine, with ITMO Health technologies, 2018, Paris
- ▶ Conference on Mechanotransduction of Host-Pathogen Interactions, with I3M, 2018, Paris
- ▶ Meeting “Developmental and Cell Biology of the future”, with SBCF and SFBD, March 27<sup>th</sup>-29<sup>th</sup>, 2019, Aviesan, Paris
- ▶ Conference “Endoplasmic Reticulum: from basic cell biology to translational approaches: a path to the clinic”, October 9<sup>th</sup>-11<sup>th</sup>, 2019, IPNP, Paris.



African common grass-snake (“house snake”) bicephalous, in the 9<sup>th</sup> day of its embryonic development.  
Nicolas Denans ©Inserm



*Astyanax mexicanus*: Surface-dwelling fish and blind cavefish morphs head to head.  
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