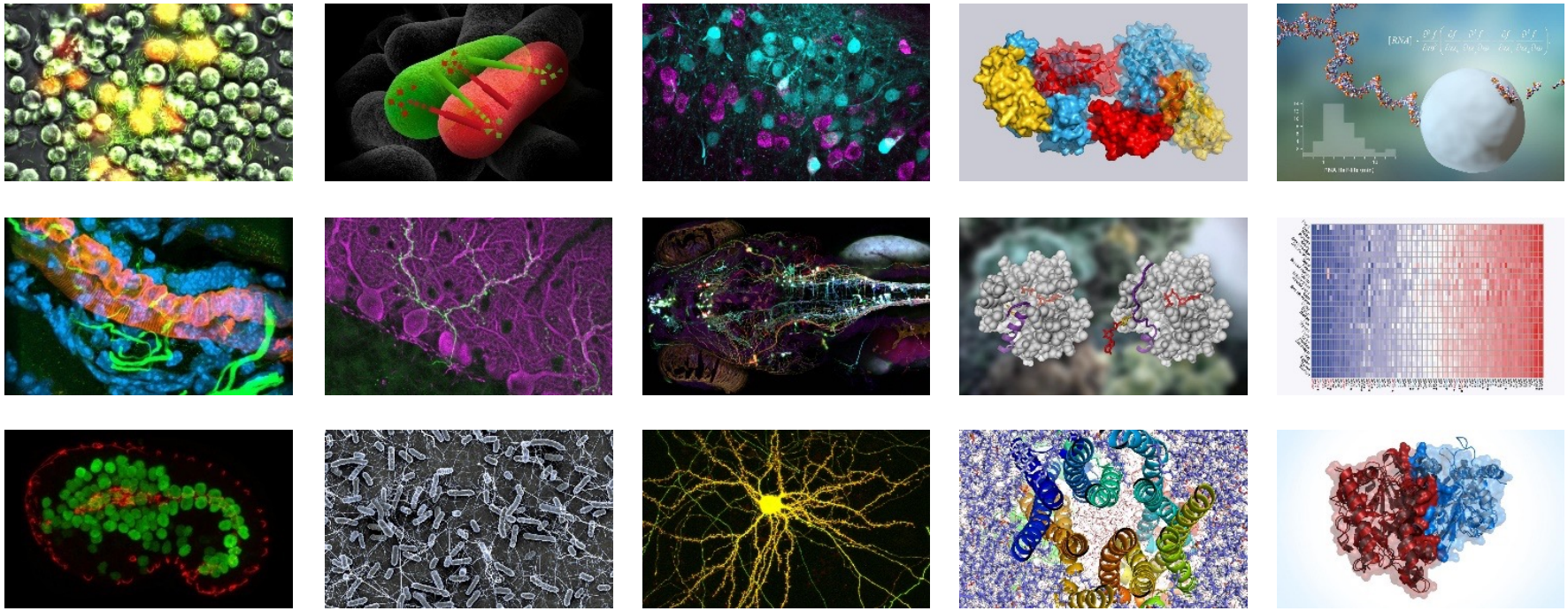
MASTER IN MOLECULAR BIOLOGY



Biozentrum, University of Basel

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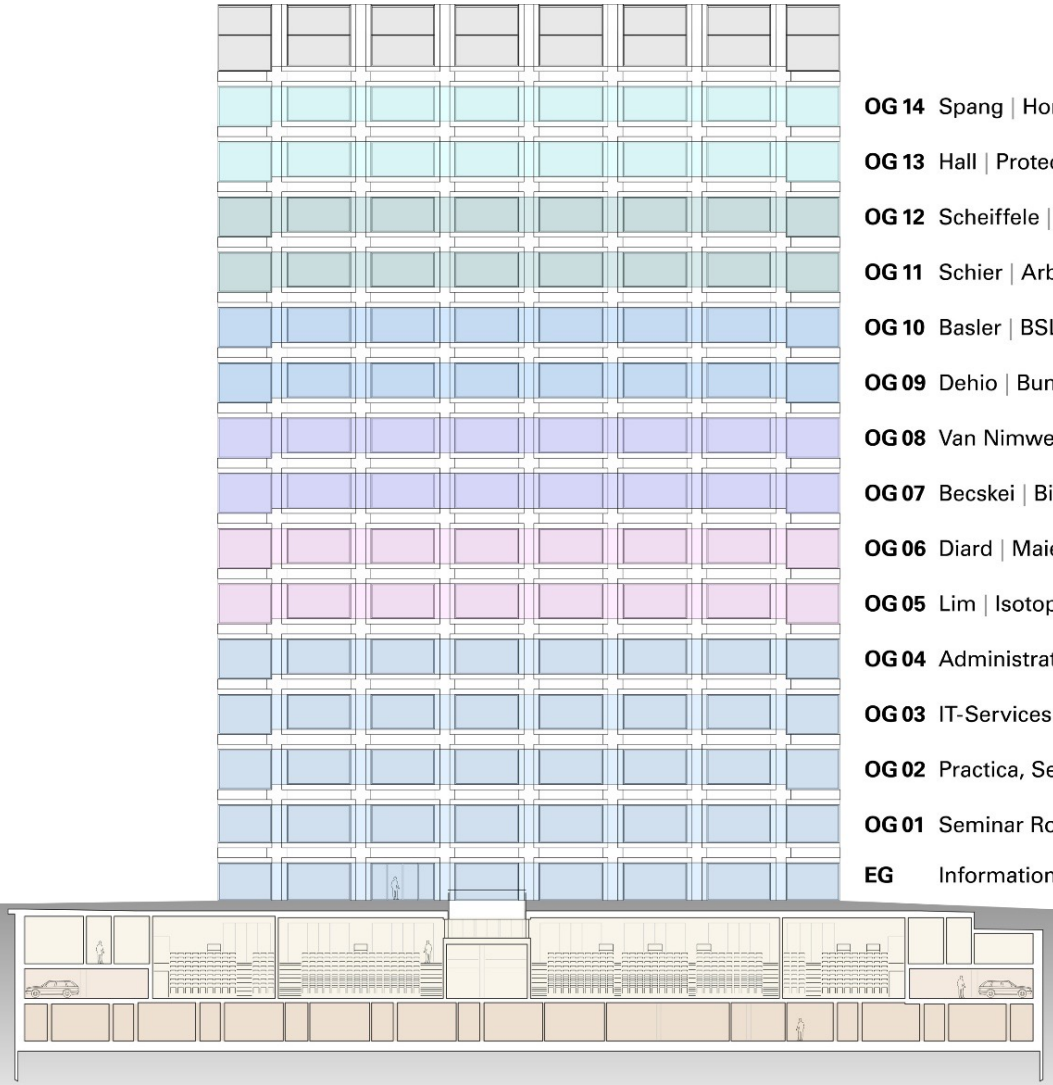

OG 14 Spang | Hondele | Affolter | Mango

OG 13 Hall | Proteomics CF | Handschin | Rüegg

OG 12 Scheiffele | Doetsch

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UG 01 Lecture Halls | Workshops | Store & Supply | Library | Restaurant BaCell's

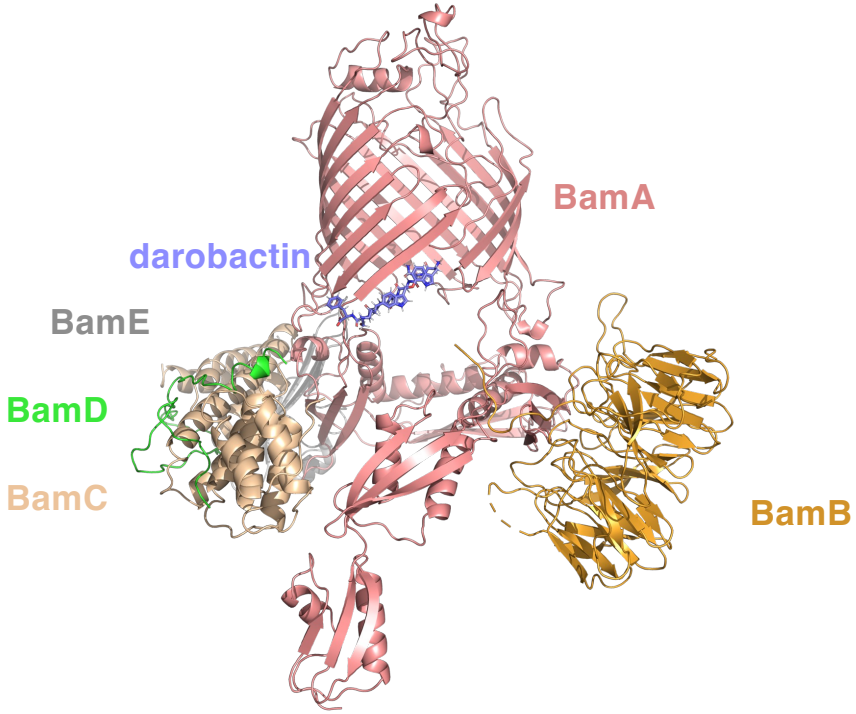
UG 02 Underground car park

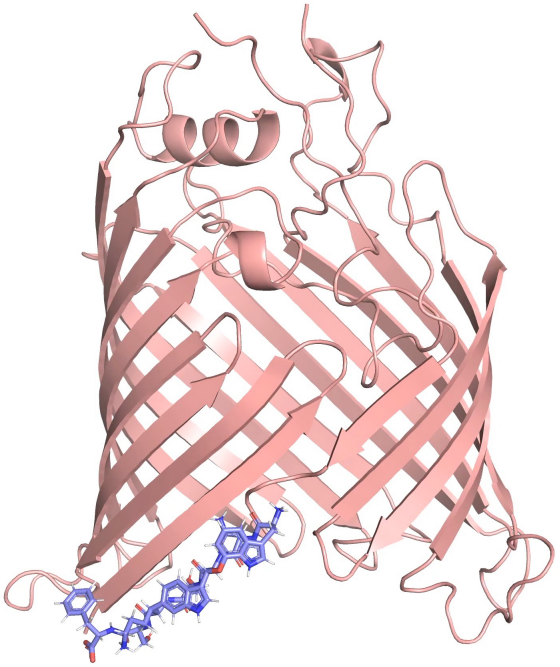
UG 03 Technology | AFM | NMR | BioEM

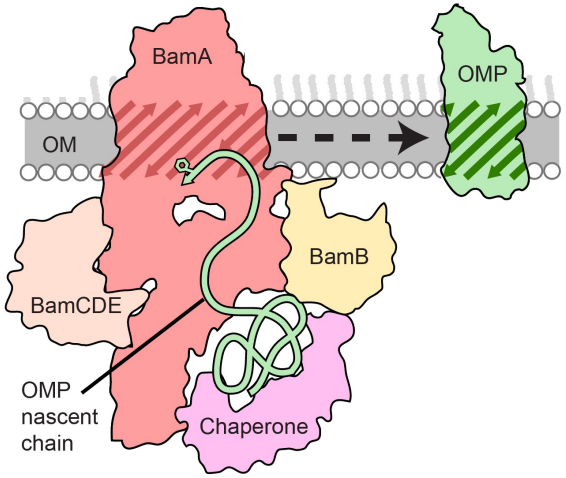
Biozentrum, University of Basel

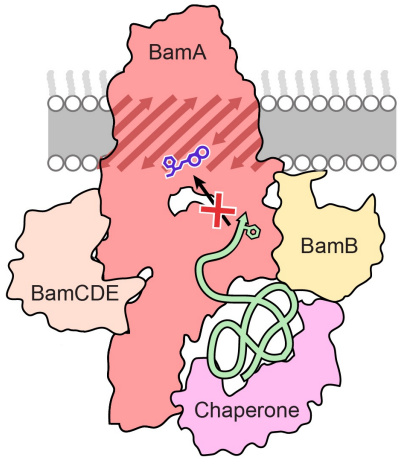
Biozentrum, University of Basel

Research projects: The antibiotic darobactin



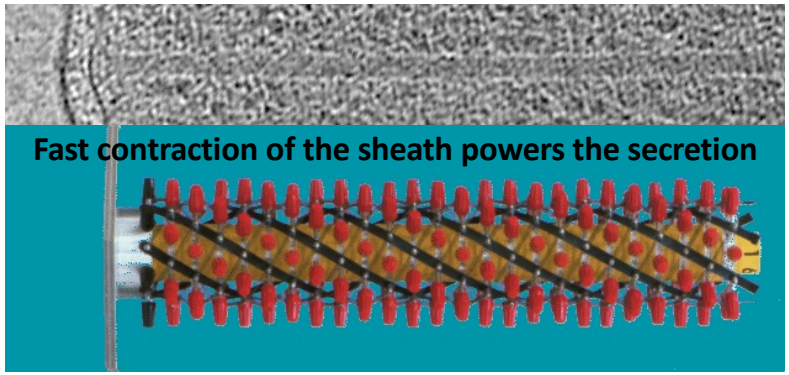




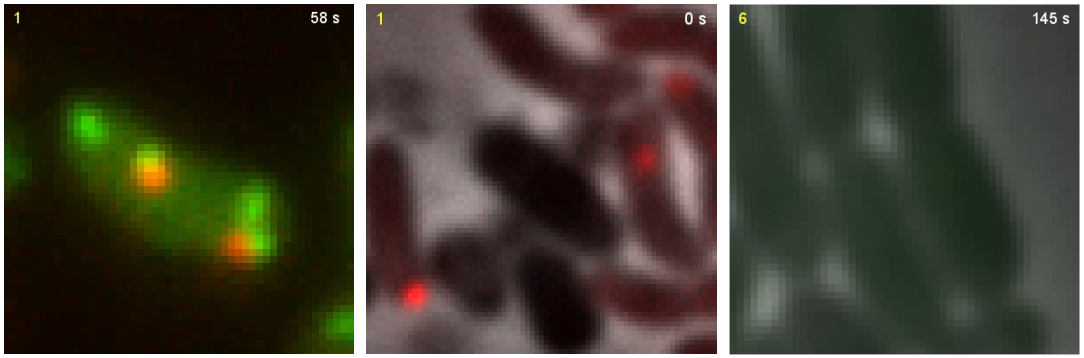


Structure, function and dynamics of Type VI secretion systems

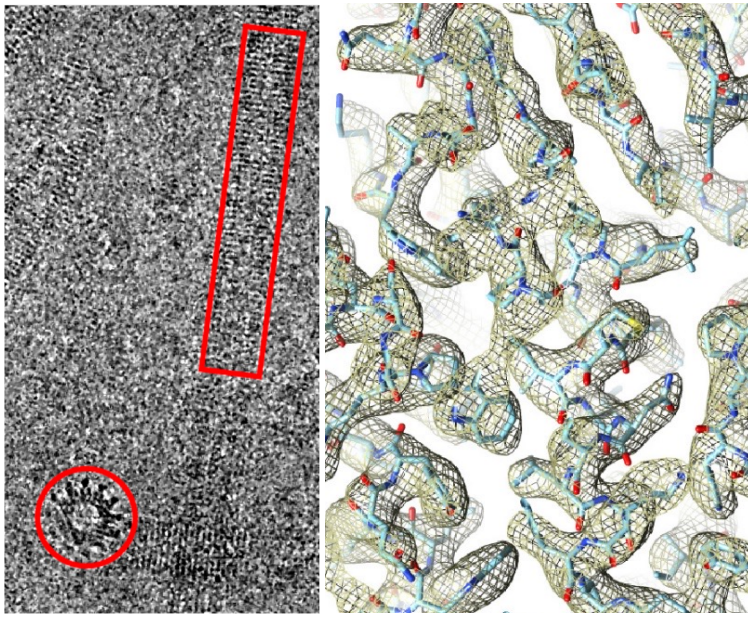
Cryo-electron tomography of T6SS



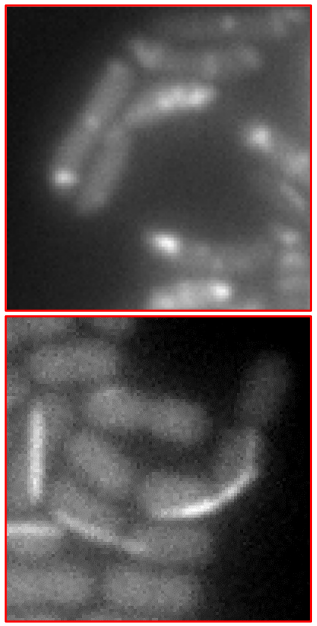
T6SS dynamics in *V. cholerae*, *E. coli* killing, prey sensing by *P. aeruginosa*



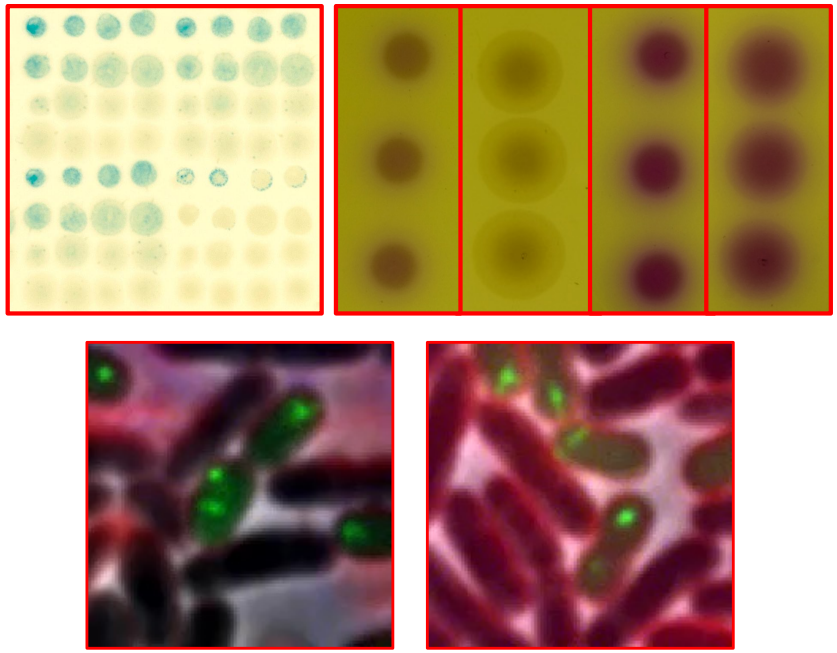
Structure of the sheath solved by cryo-EM



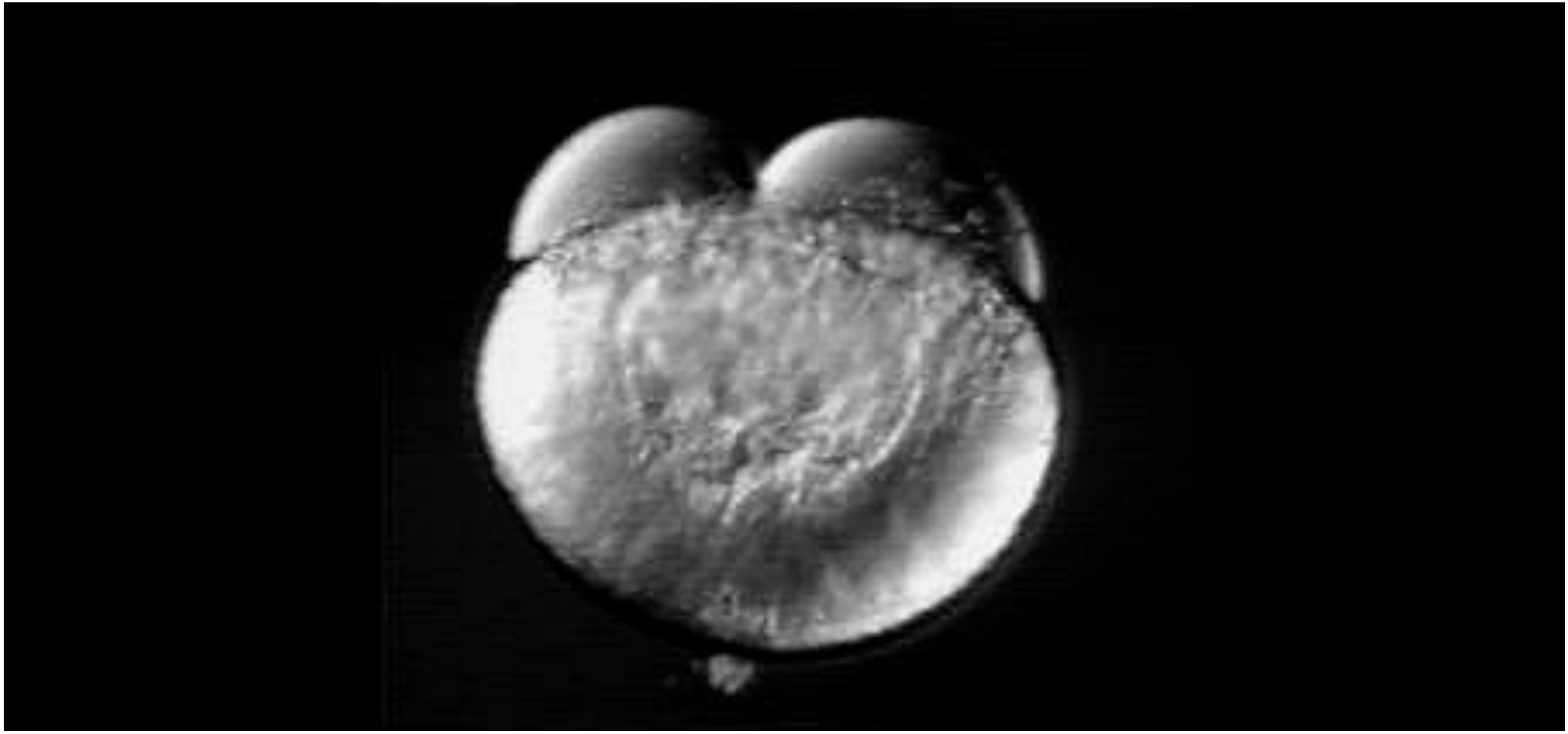
Structure/function



Screens – mechanisms of target cell killing

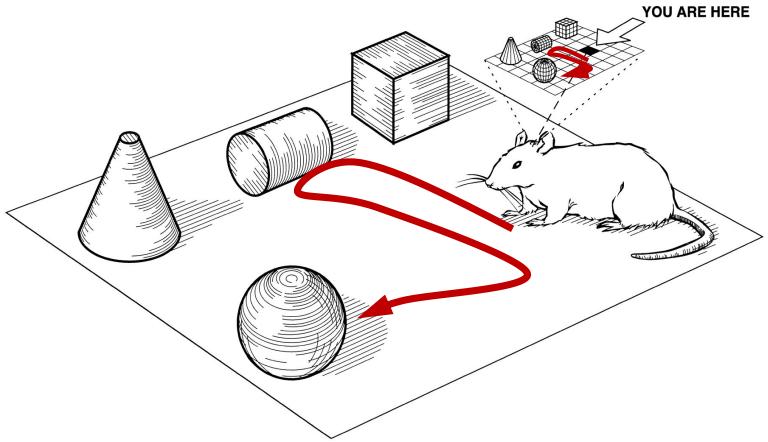


Embryo development

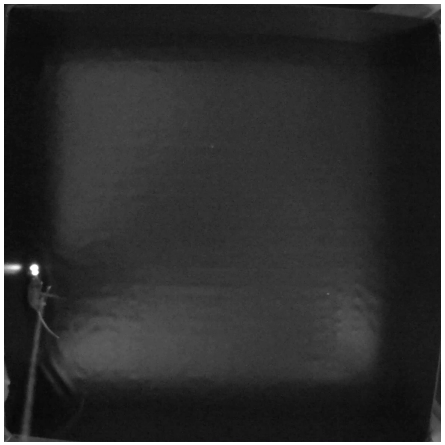


A sense of space in the brain: the cognitive map

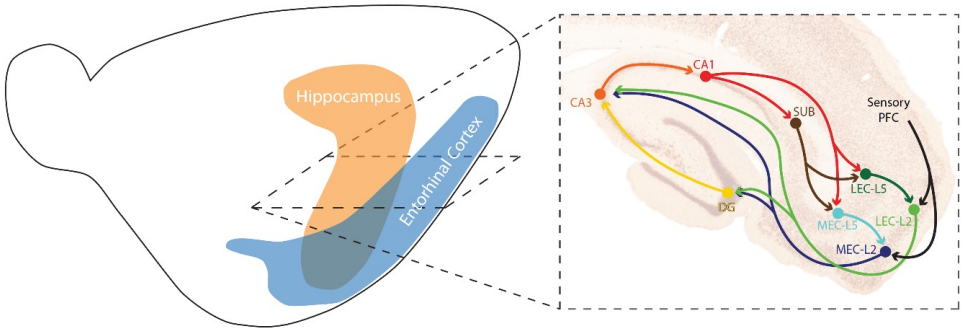
Rats can find shortcuts through mazes

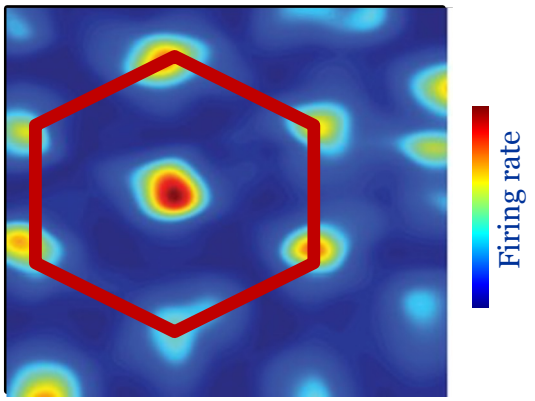


The neural correlates of the cognitive map: the Grid Cell

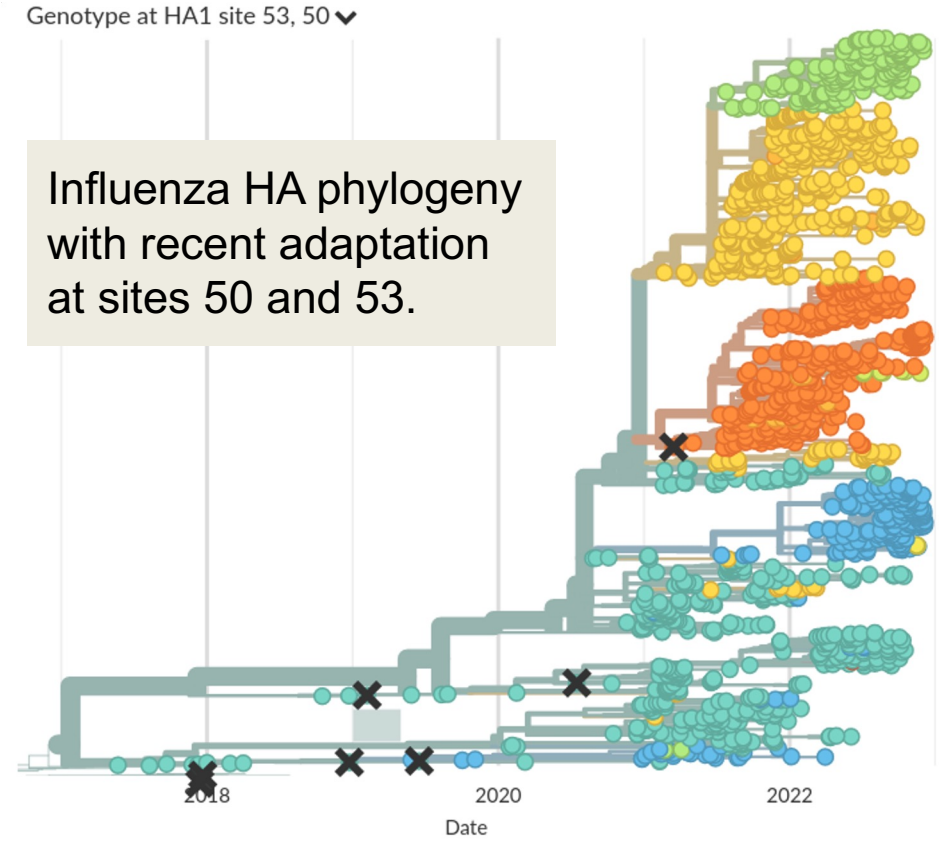


The hippocampus as a cognitive map

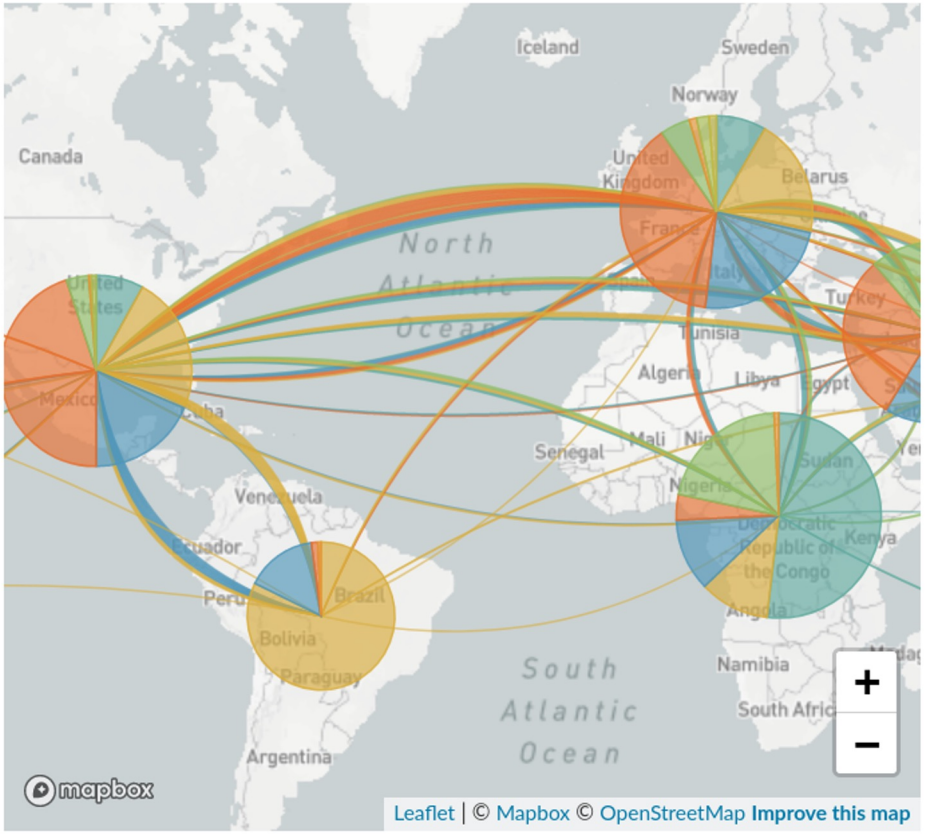




Computational analysis of virus evolution and spread



Influenza HA phylogeny with recent adaptation at sites 50 and 53.



- Develop methods to analyze and visualize evolution of pathogens
- Predictions of what strains will dominate the future to optimize vaccines
- Respiratory viruses are model system of host-pathogen co-evolution

Master of Science in Molecular Biology: Key Features

- **Spend 3 semesters / 1.5 years in one of the labs at Biozentrum on a research project**

- Course structure and ECTS
  - Master thesis 50
  - Master examination 10
  - in-depth professional studies 30

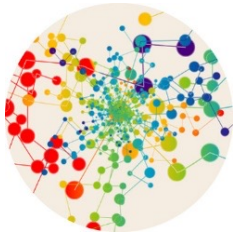
  total: 90 credit points

- Start of program
  - anytime possible upon mutual agreement with supervisor

- Language
  - English

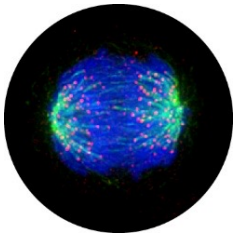
Research at the Biozentrum: Main Research Areas

We investigate how molecules and cells create life − from atom to organism



Computational and Theoretical Biology

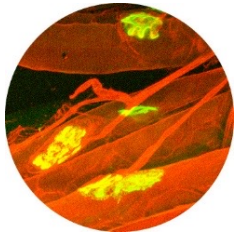
Microbiology, Infection Biology and Immunology



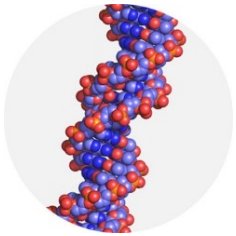
Developmental, Regenerative and Stem Cell Biology

Molecular and Cellular Biology

Evolution and Ecology



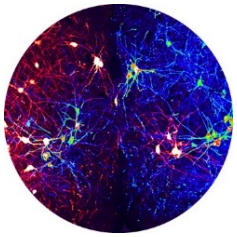
Molecular Medicine, Physiology, Metabolism and Aging



Genetics and Genomics

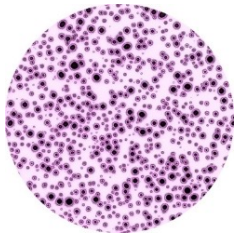
Multicellular Dynamics

Research: Main Research Areas

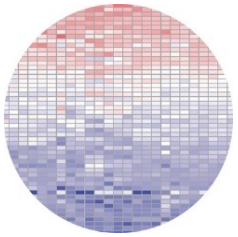


Neuroscience

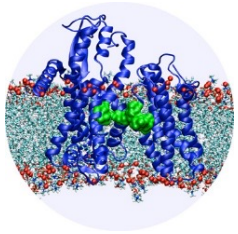
Structural Biology, Biochemistry and Biophysics



Physics of Life



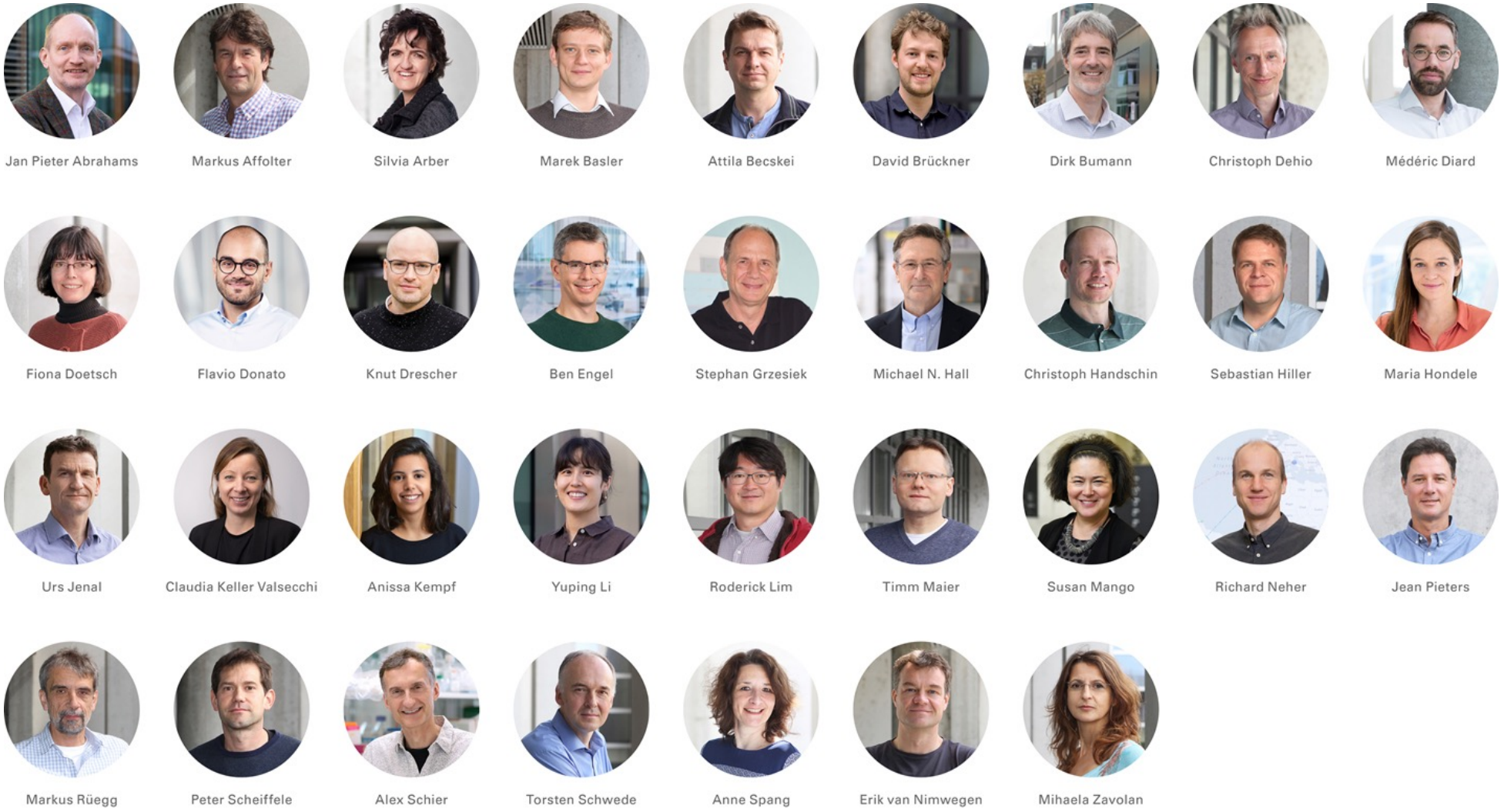
Systems and Synthetic Biology



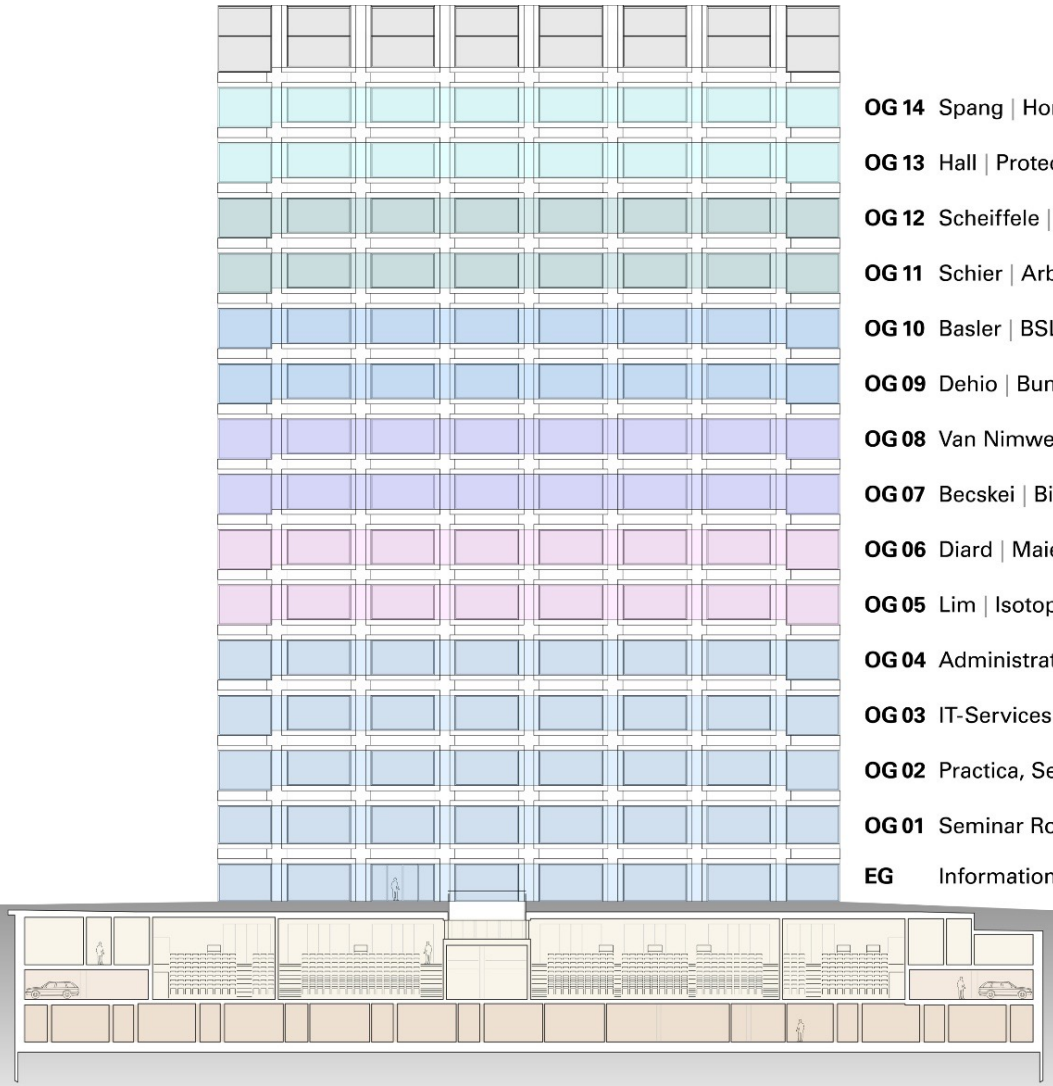
Signaling and Gene Regulation

Master of Science in Molecular Biology: Research Groups

Research groups at the Biozentrum: 34 research groups



Biozentrum, University of Basel



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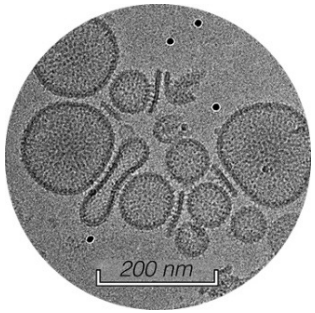
Biozentrum Technology Platforms

Support of the research with state-of-the art technology and expertise



BioEM Lab

Investigation of structures using electron microscopy

Biophysics Facility

Measurement of interactions, stability and size of molecules

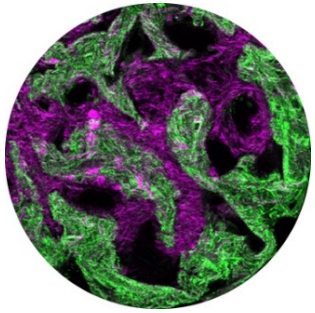
BSL-3 Laboratory

Biosafety lab to study highly contagious bacteria and viruses

FACS Core Facility

Flow cytometry and cell sorting

Biozentrum Technology Platforms

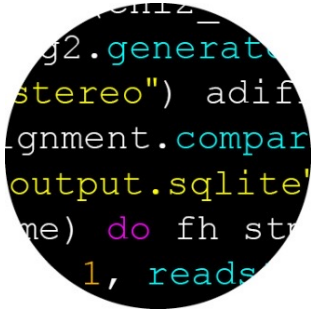


Imaging Core Facility

Light microscopy and imaging analysis

Proteomics Core Facility

Analysis of proteins using mass spectrometry



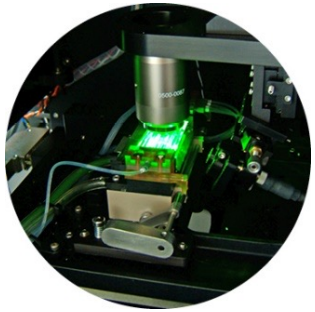
Research IT

Bridging Research and IT

Research Instrumentation Facility

Catalyzing instrument development

Associated University Facilities



Genomics Facility Basel

Sequencing techniques in genomics and epigenomics

Life Sciences Training Facility

Deep-sequencing and microarray technologies

sciCORE

High-performance computing and data management

Technology Ventures

NXI Therapeutics (2021)
Development of a new generation of immunosuppressive drugs for autoimmune diseases and organ transplantation.

SEAL Therapeutics AG (2021)
Development of an innovative gene therapy for the treatment of congenital muscular dystrophy.

Aukera Therapeutics GmbH (2021)
Development of therapies for mTOR-related tumors.

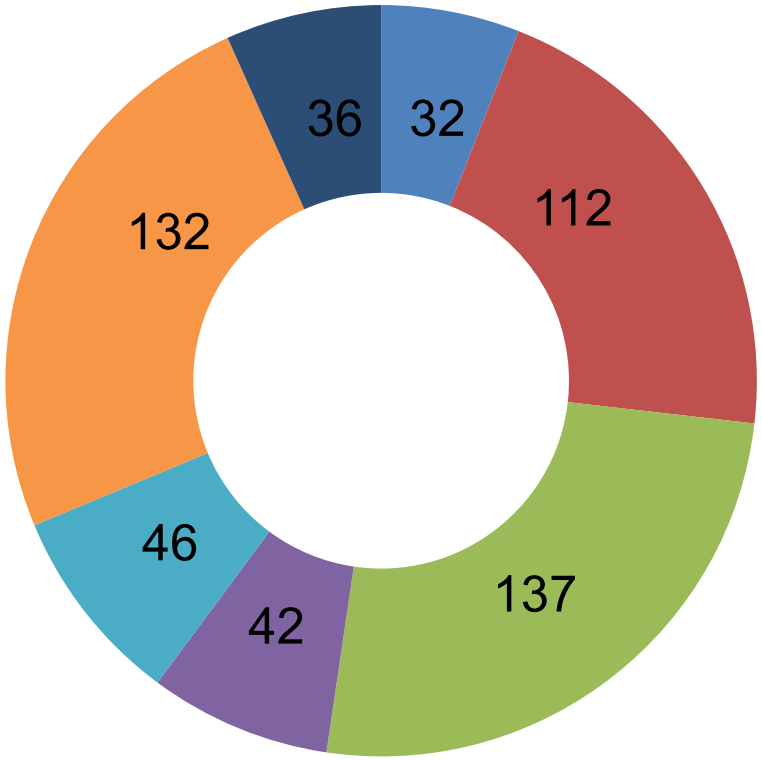
T3 Pharmaceuticals AG (2015)
Simple and fast method for the targeted delivery of therapeutic proteins into cells. Development of the technology for its use in cancer treatment.

Technology Ventures

ARTIDIS AG (2014)
Novel nanotechnology for tissue diagnostics, cancer diagnostics and prognosis.

Santhera Pharmaceuticals AG (2000)
Development and commercialization of drugs for the treatment of rare diseases.

Members of Staff 2023: 537



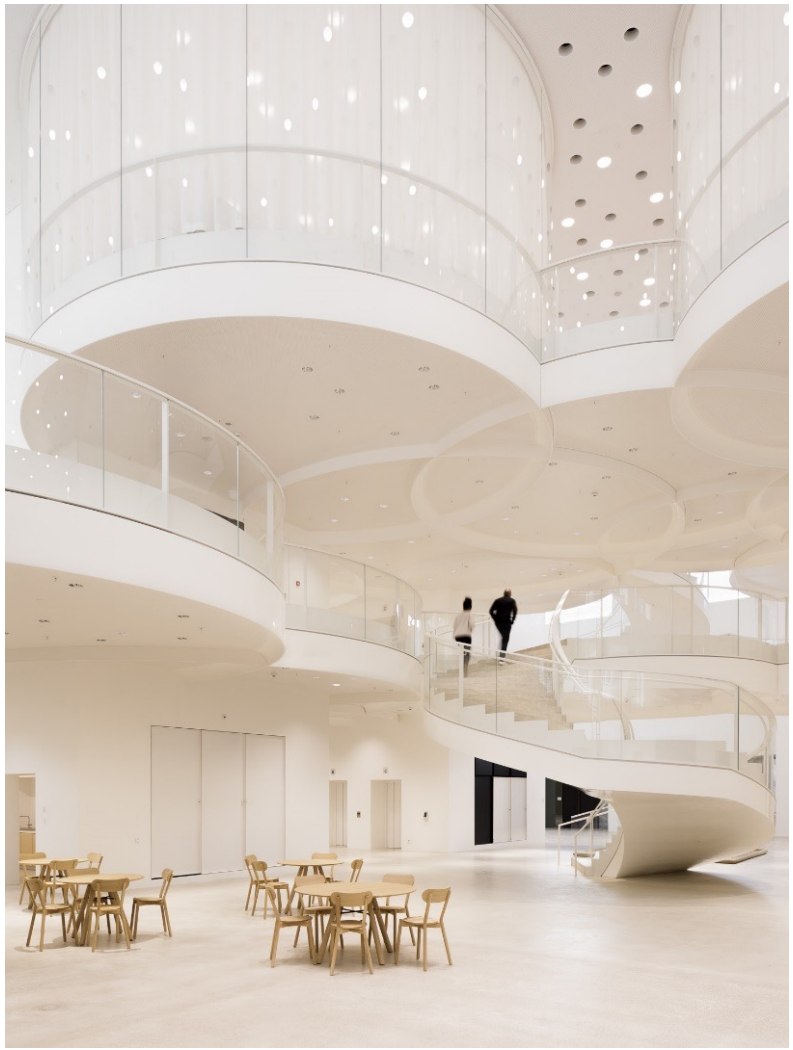
- professors
- postdoctoral researchers
- PhD students
- master students
- scientific staff
- laboratory / technicians
- administration

scientists from more than 40 countries

Largest department in the Faculty of Science at the University of Basel

The Biozentrum – The Center for Molecular Life Sciences

- A new future-oriented home state-of-the-art infrastructure for groundbreaking research.
- One of the world's leading institutes in molecular biology.
- Consistently publishing over 200 high-impact scientific articles annually in leading journals.
- Strong focus on:
  - A research-driven and discovery-oriented approach.
  - Personalized mentorship for students.
- A key collaborator for academia and industry, driving innovation through patents and spin-offs.



Master of Science in Molecular Biology: Admission

BSc in Biology

Duration: 3 years

Choice of majors:

- **Molecular Biology ***
- Animal and Plant Sciences
- Integrative Biology

**** access to Master's degree program Molecular Biology***

BSc in Computational Sciences

Duration: 3 years

Choice of majors:

- **Computational Biology ***
- Computational Chemistry
- Computational Mathematics
- Computational Methods
- Computational Physics

**** access to Master's degree program Molecular Biology***

MSc in Molecular Biology

Duration: 1.5 years

The Master program focuses on introducing students in cutting-edge research:
→ hands-on laboratory work for their Master thesis
→ advanced courses in molecular biology.

Master of Science in Molecular Biology: Admission

- **Students of the University of Basel**
  - degrees which allow for **direct admission**:
    - BSc in Biology, Major in Molecular Biology
    - BSc in Computational Sciences, Major in Computational Biology

  → no official application needed
  → students will be informed by the Student Office Biology

- **Students of other Swiss and international Universities**
  - degrees approved by the Faculty of Science and the Biology Teaching Committee
    - **additional requirements** of up to 60 credit points **possible**
  - application deadlines
    - 30 April for fall semester
    - 30 November for spring semester

  → application: www.unibas.ch/anmeldung
  → binding information: www.unibas.ch/zulassung

Master of Science in Molecular Biology: Credit Point Details

A total of 30 CP is required, consisting of:

- 18 CP from courses of the Master program Molecular Biology
  - specialization in the selected core area
  - Biozentrum Graduate Teaching Program
  - in consultation with the supervisor of the thesis

- 12 CP chosen freely
  - any course offered at University Basel
  - work outside regular courses
    - poster or presentation in a meeting
    - literature study
    - participation in the University's self-administration
    - tutoring activities

Master of Science in Molecular Biology: Research Groups

- **Department of Biomedicine (DBM): 70 research groups**

  Research areas:

  – Immunology and Infectious Diseases
  – Neurosciences
  – Cancer Biology
  – Tissue Development and Regeneration

- **Friedrich Miescher Institute for Biomedical Research (FMI): 21 research groups**

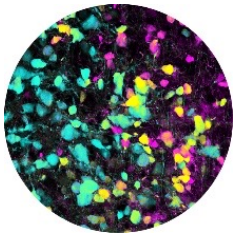
  Research areas:

  – Genome Regulation
  – Multicellular Systems
  – Neurobiology

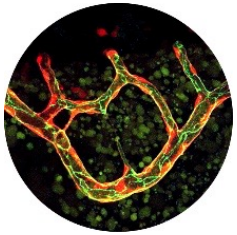
In special cases, it is possible to carry out the thesis in other institutions

Biozentrum Graduate Teaching Program

Cycle A: Infection Biology

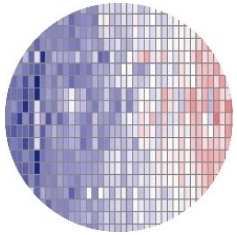


Cycle B: Neuroscience

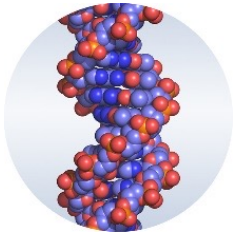


Cycle C: Growth and Development

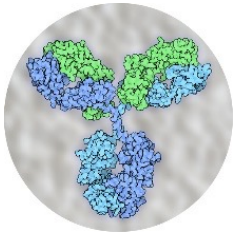
Cycle D: Structure and Function of Macromolecules



Cycle E: Computational and Systems Biology



Cycle G: Gene Expression and Epigenetics



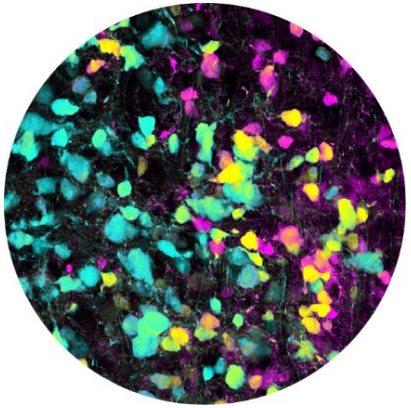
Cycle H: Molecular Medicine

Cycle I: Practical and Experimental Skills

Biozentrum Graduate Teaching Program: Examples

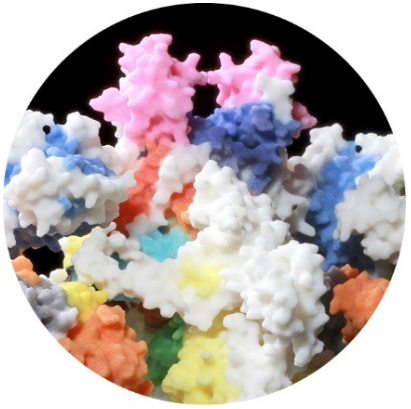
Cycle B: Neuroscience

- B1: Developmental Neuroscience
- B2: Signaling in the Nervous System
- B3: Genes and Behavior
- B4: Neurological Diseases
- B5: Neurex
- B6: Circuit Dissection of Behaviors



Cycle D: Structure and Function of Macromolecules

- D1: Molecular and Cellular Structural Biology I
- D2: Biophysics of Molecules and Cells I
- D3: Molecular and Cellular Structural Biology II
- D4: Molecular and Cellular Structural Biology III
- D5: Biophysics of Molecules and Cells
- D6: Structural Biology and Biophysics I
- D7: Structural Biology and Biophysics II



Feedback from Students

Artan Ademi

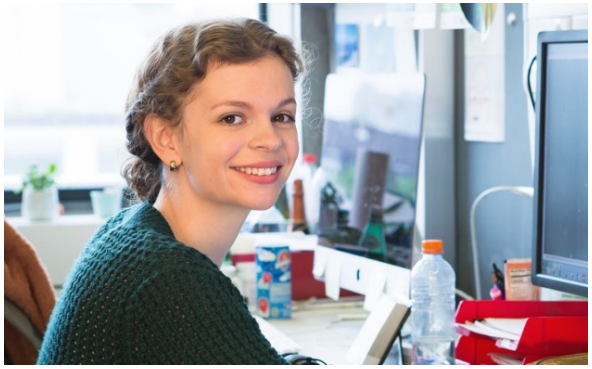
Masters in Prof. Anne Spang's group

Specialisation: Cell and Developmental Biology

"The correct distribution of proteins and mRNA molecules is vital to a cell's survival. We are aiming to understand the mechanisms determining their localization, as this will provide important information for developmental and stem cell biology.

A PhD student had previously already investigated how they are arranged during cell division prior to daughter cell cleavage. I am now continuing this project and study the behavior of certain genes in yeast cells, which he had not yet looked at."

Feedback from Students



Fabienne Estermann

Masters in Prof. Urs Jenal's group

Specialisation: Infection Biology

"I am working with *Pseudomonas aeruginosa*, a hospital germ that is spreading rapidly due to its resistance to antibiotics and is classified by the WHO as one of the three "priority 1" pathogens for which new antibiotics are urgently needed.

I am investigating how Pseudomonas behaves on surfaces and how it colonizes different areas, i.e. whether it lands and then leaves again, or whether it stays and how it makes this decision."

Master completed in June 2019

Join us to boldly go where no one has gone before

- Specific information:
  - http://bio.unibas.ch
  - www.biozentrum.unibas.ch

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