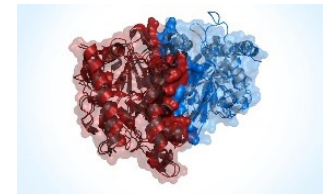
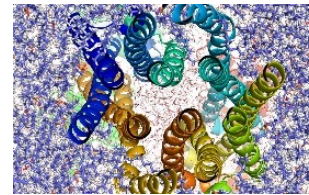
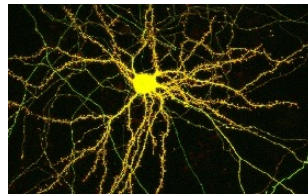
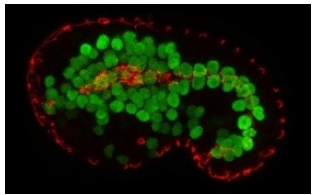
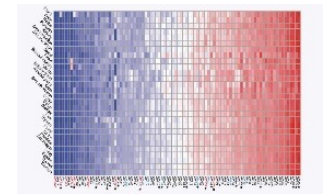
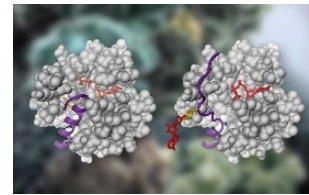
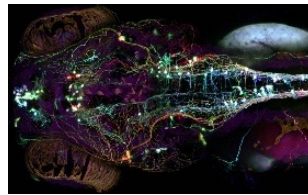
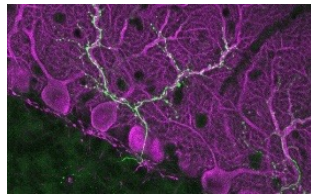
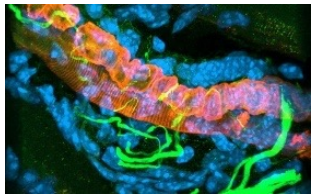
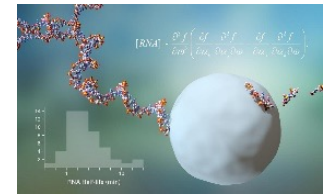
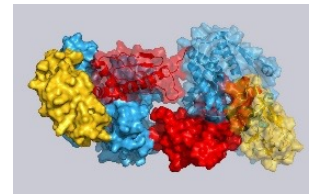
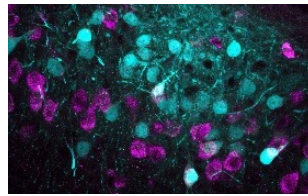
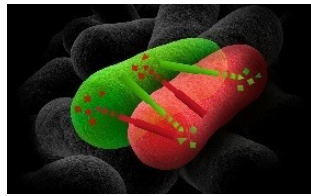
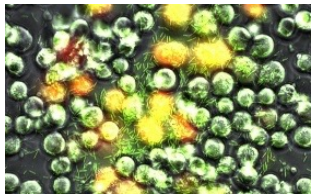


MASTER IN MOLECULAR BIOLOGY



Biozentrum, University of Basel



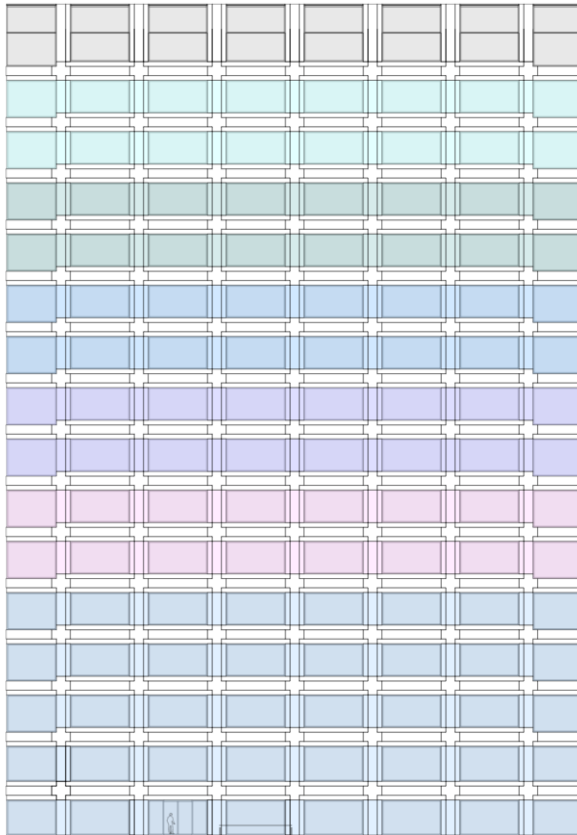
Biozentrum, University of Basel



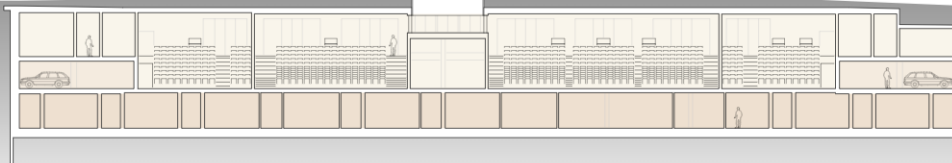
Biozentrum, University of Basel



Biozentrum, University of Basel



- OG 14** Spang | Hondele | Affolter | Mango
- OG 13** Hall | Proteomics CF | Handschin | Rüegg
- OG 12** Scheiffele | Doetsch
- OG 11** Schier | Arber | Donato | Kempf
- OG 10** Basler | BSL3 | FACS CF | Drescher | Pieters
- OG 09** Dehio | Bumann | Diard | Jenal
- OG 08** Van Nimwegen | Schwede | Neher | Zavolan
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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

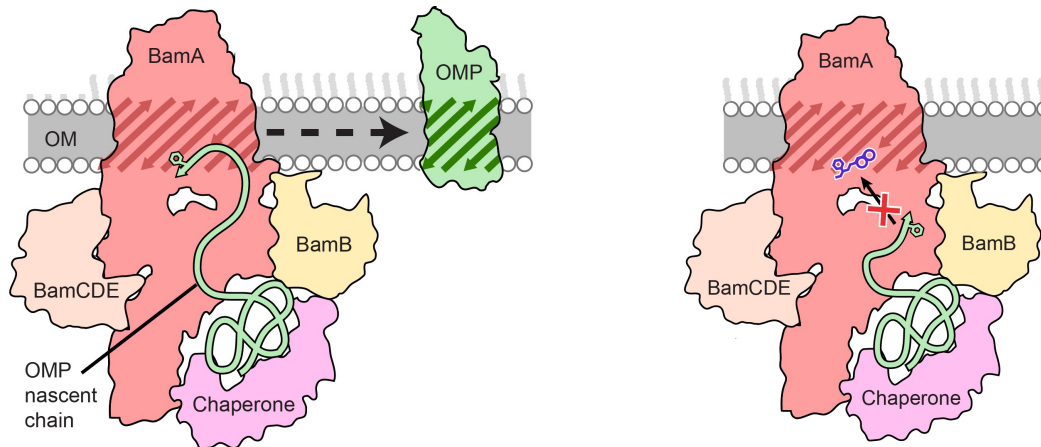
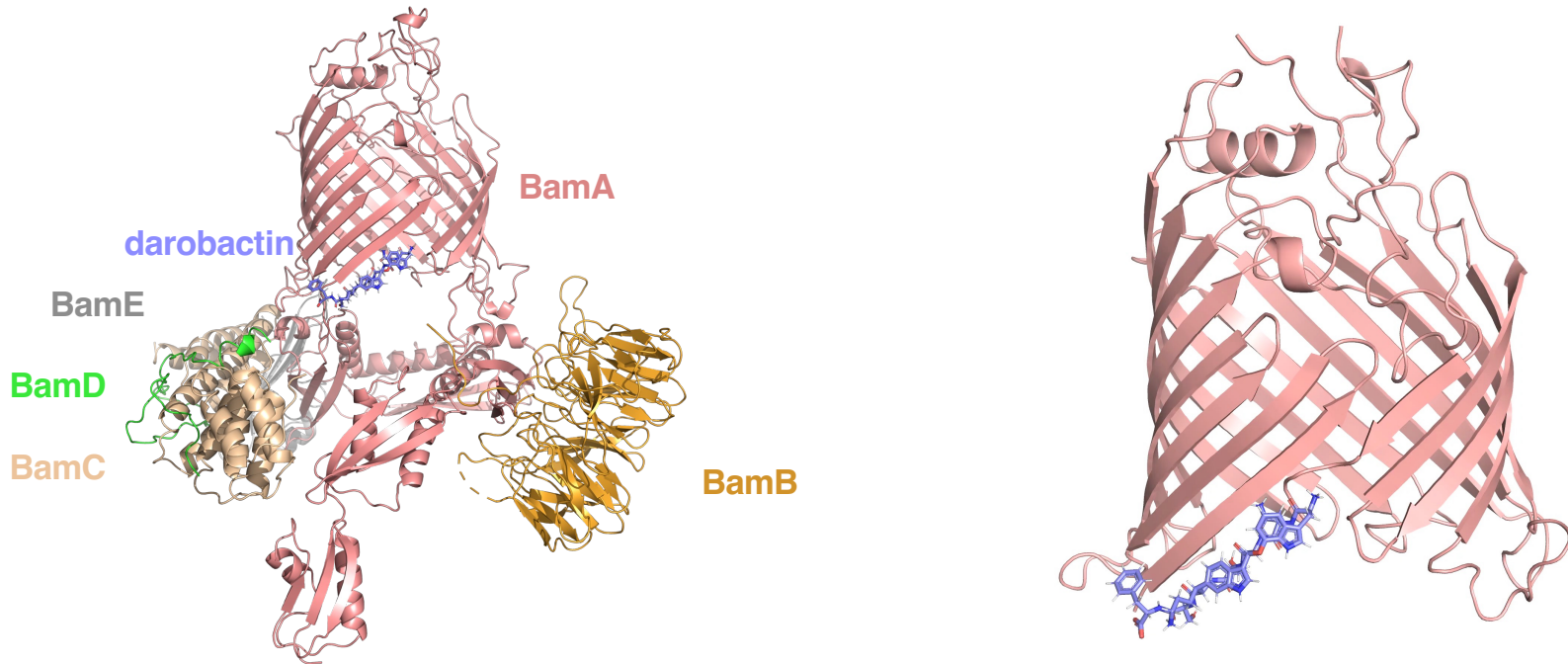
Biozentrum, University of Basel



Biozentrum, University of Basel

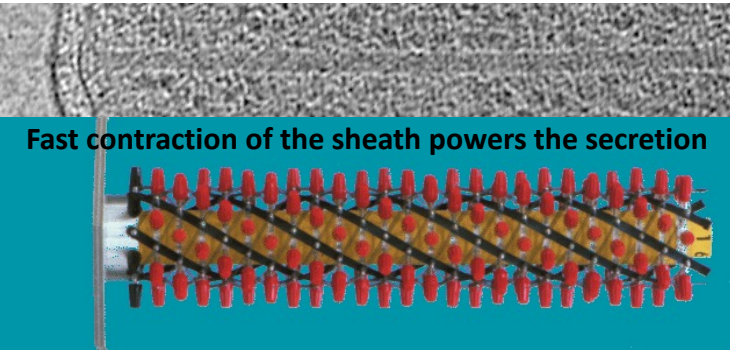


The antibiotic darobactin

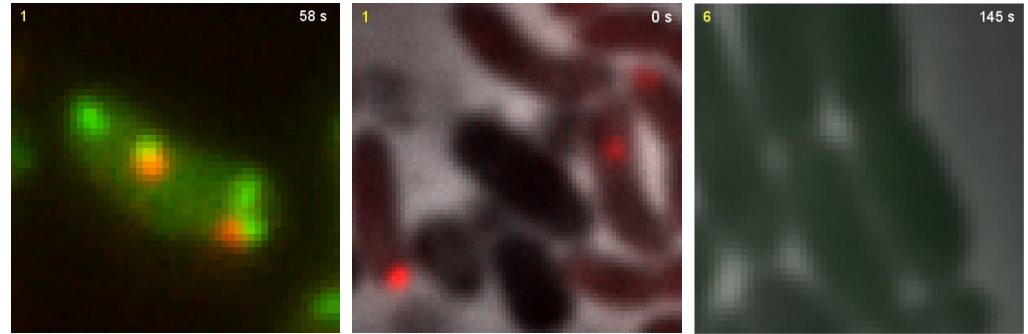


Structure, function and dynamics of Type VI secretion systems

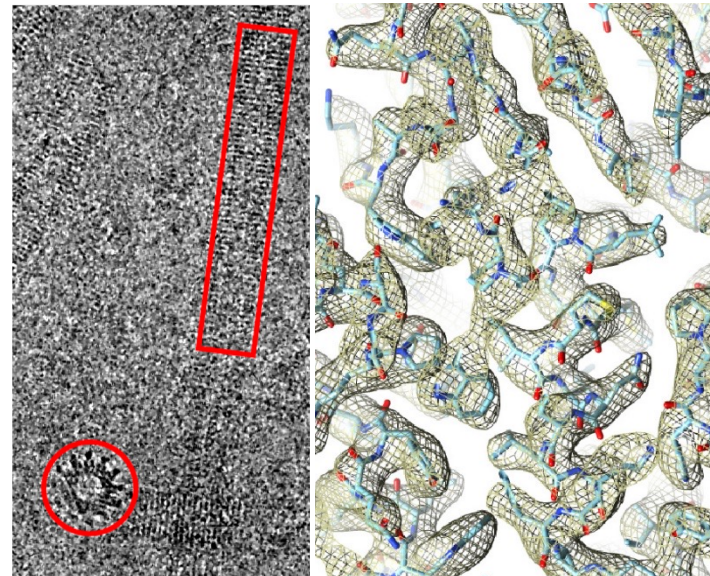
Cryo-electron tomography of T6SS



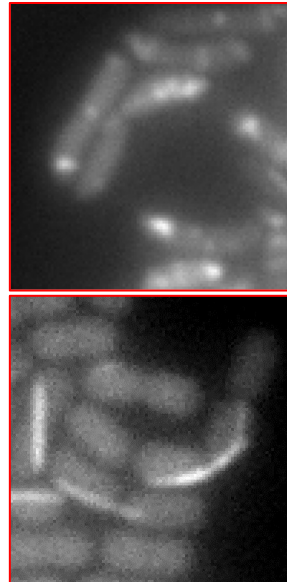
T6SS dynamics in *V. cholerae*, *E. coli* killing, prey sensing by *P. aeruginosa*



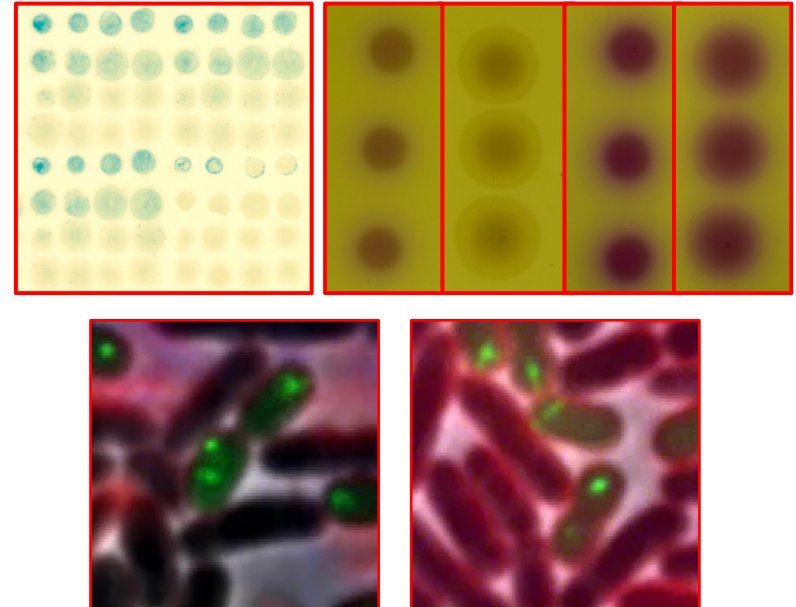
Structure of the sheath solved by cryo-EM



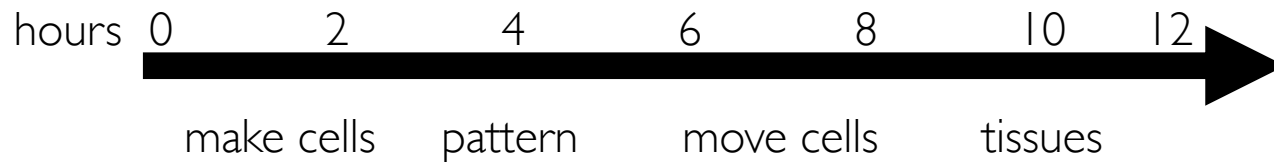
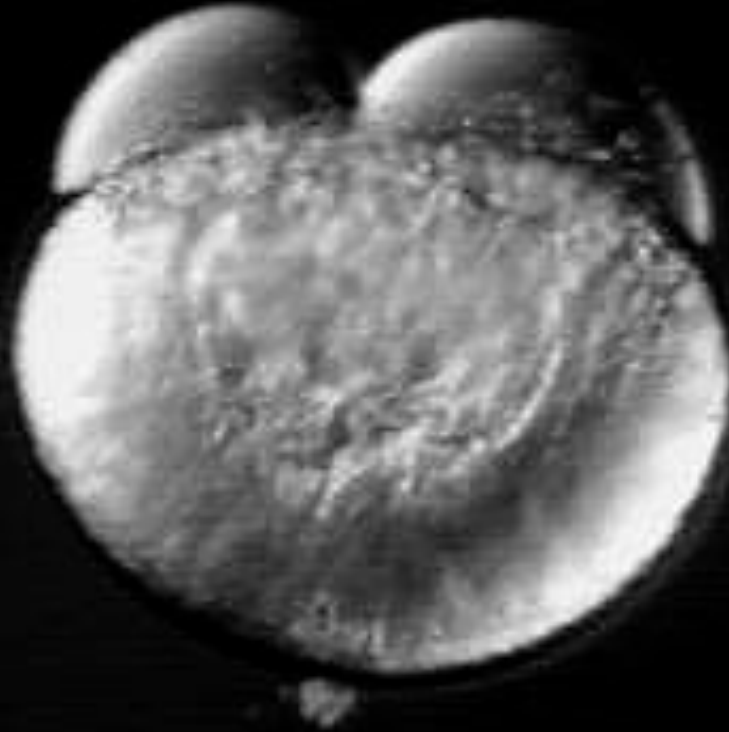
Structure/function



Screens – mechanisms of target cell killing

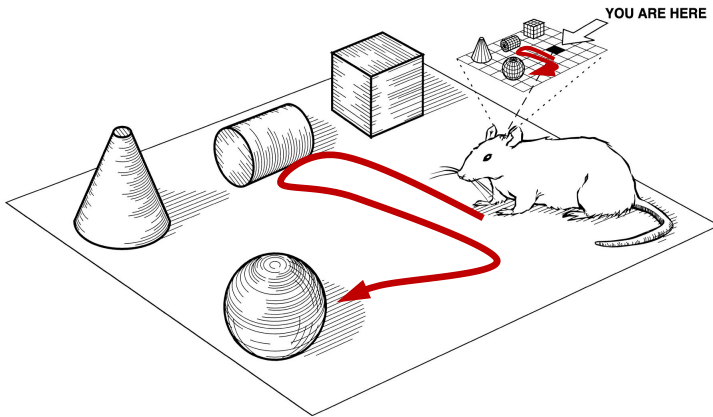


Embryo development

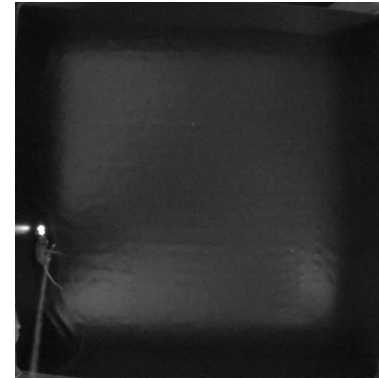


A sense of space in the brain: the cognitive map

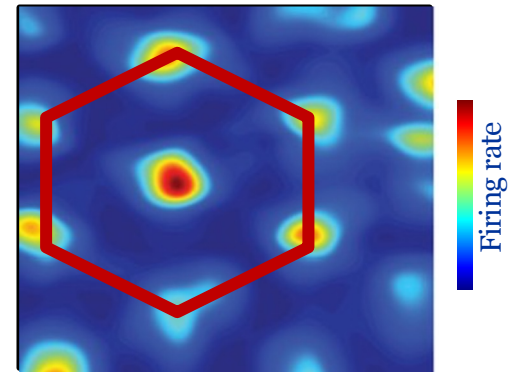
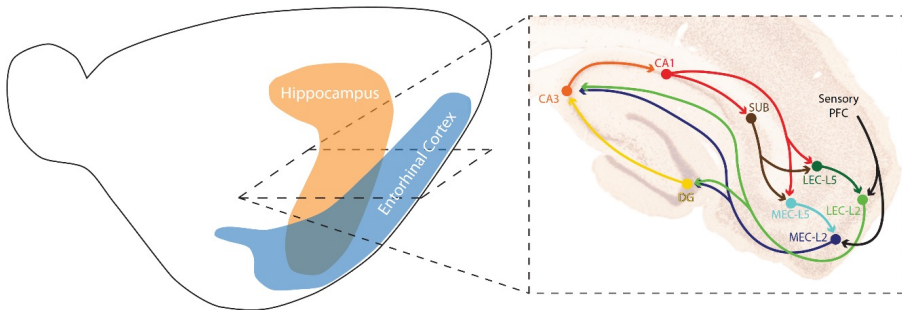
Rats can find shortcuts through mazes



The neural correlates of the cognitive map: the Grid Cell



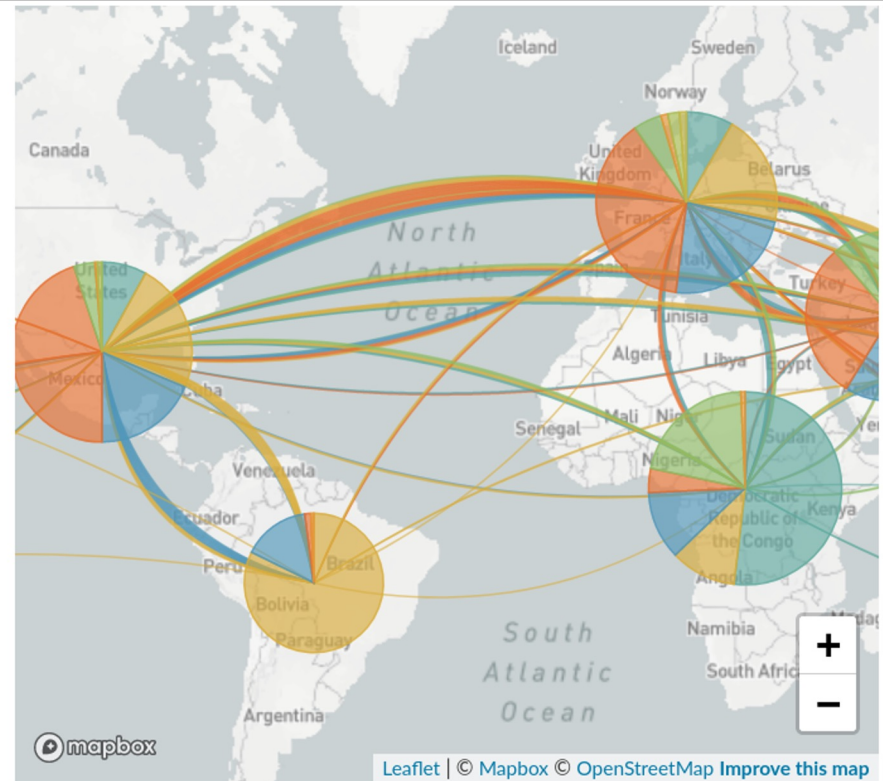
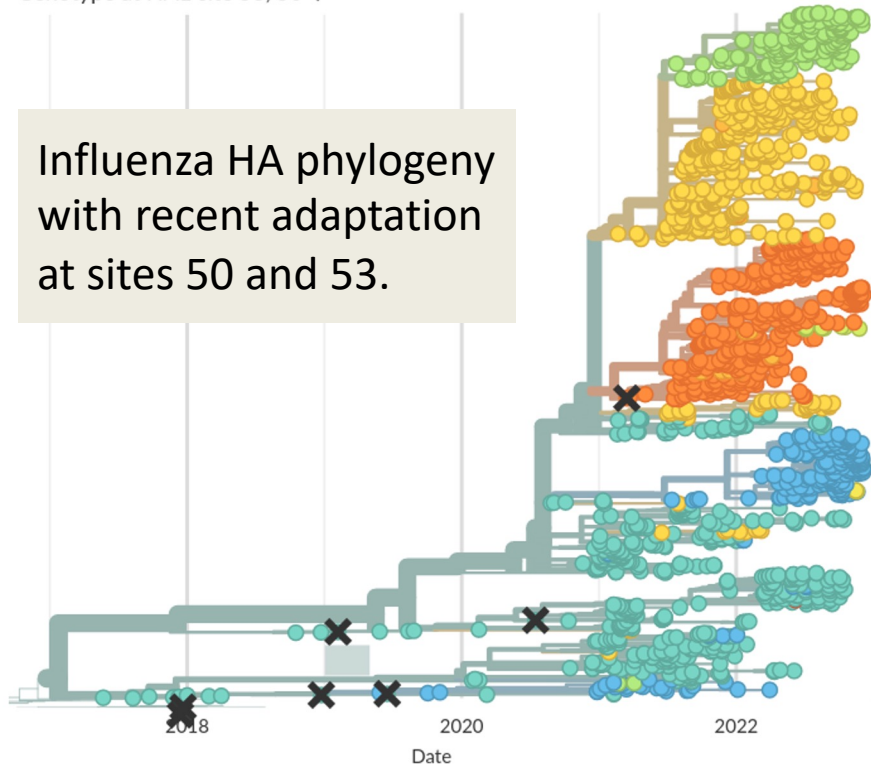
The hippocampus as a cognitive map



Computational analysis of virus evolution and spread

Genotype at HA1 site 53, 50 ▾

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

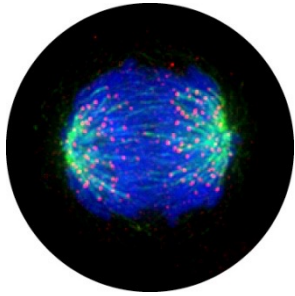
Master of Science in Molecular Biology: Key Features

- **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

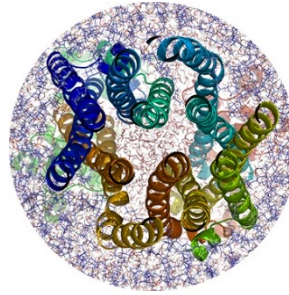
total: 90 credit points
- **Start of program**
 - anytime possible upon mutual agreement with supervisor
- **Language**
 - English

Research: Main Research Areas

Searching to understand the mechanisms of life: From atom to organism



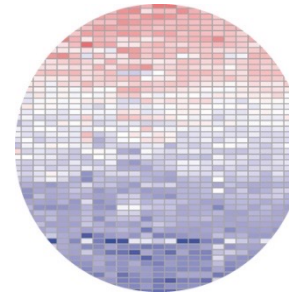
**Growth &
Development**



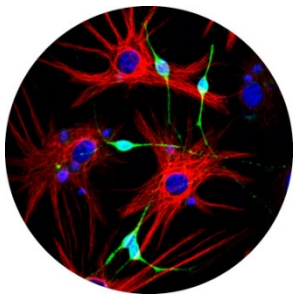
**Structural Biology
& Biophysics**



Infection Biology



**Computational &
Systems Biology**



Neurobiology

Research Area Growth & Development

The molecular basis for:



Affolter

- cell growth and cell division
- organ development, stem cells
- diseases
 - cancer
 - autism
 - muscle diseases
 - tuberculosis



Doetsch



Hall



Handschin



Hondele



Jenal



Mango



Pieters



Rüegg



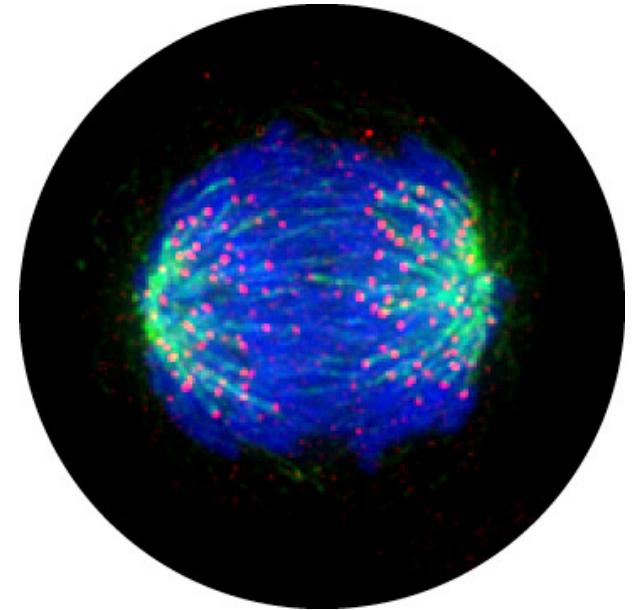
Scheiffele



Schier



Spang



Research Area Infection Biology

Mechanisms of acute and chronic infections by pathogenic bacteria



Basler



Bumann



Dehio



Diard



Drescher



Jenal



Pieters

- improved control of infectious diseases such as
 - Tuberculosis
 - Salmonella
- new anti-infectives and vaccines
- cellular metabolism and its modulation
- Inflammation



Research Area Neurobiology

Development and function of the nervous system and the molecular logic of neuronal diversity



Arber



Doetsch



Donato



Kempf



Rüegg

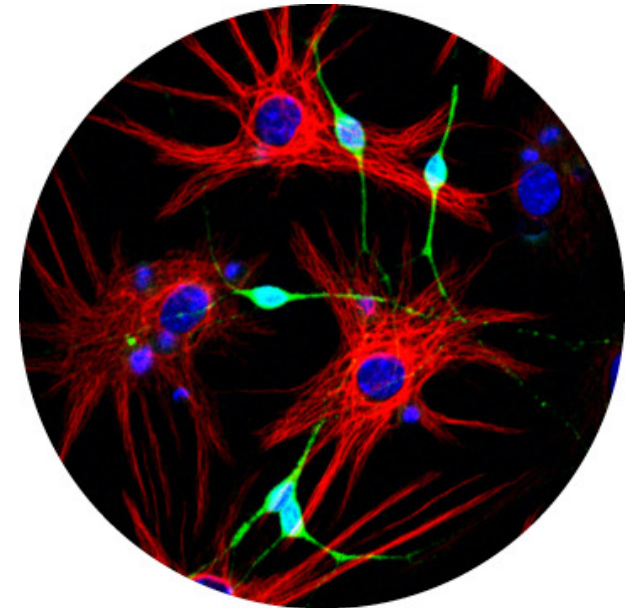


Scheiffele



Schier

- development/assembly of the functional brain (neuronal connections)
- control of the locomotor system
- diseases: mental disorders and neuromuscular diseases



Research Area Structural Biology & Biophysics

Structure, function and the dynamic behavior of biomolecules and their complexes:



Abrahams



Drescher



Engel



Grzesiek



Hiller



Lim

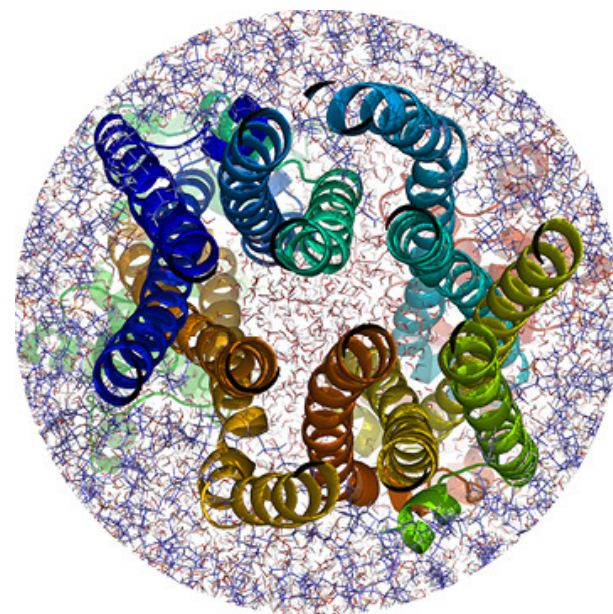


Maier



Perez

- molecules at atomic resolution
- membrane proteins, molecular machines, cellular assemblies, and many more
- techniques:
 - nuclear magnetic resonance spectroscopy (NMR)
 - X-ray crystallography
 - electron microscopy
 - atomic force microscopy (AFM)



Research Area Computational & Systems Biology

Comprehensive perspective on the behavior of complex biological systems:



Becskei



Neher



Schwede

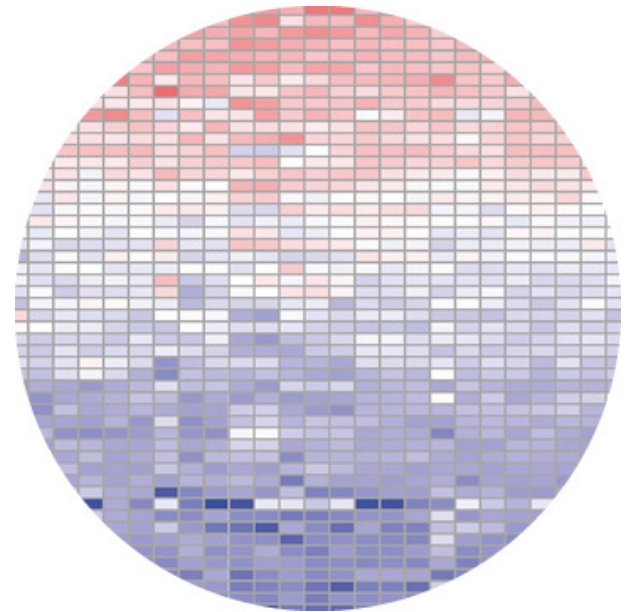


van Nimwegen



Zavolan

- monitoring/processing of large scale datasets
- models and simulations
- computational prediction of protein structure
- gene regulatory networks and genome evolution



Master of Science in Molecular Biology: Research Groups

- Biozentrum: 32 research groups



Jan Pieter
Abrahams



Markus
Affolter



Silvia
Arber



Marek
Basler



Attila
Becskei



Dirk
Bumann



Christoph
Dehio



M d ric
Diard



Fiona
Doetsch



Flavio
Donato



Knut
Drescher



Benjamin
Engel



Stephan
Grzesiek



Michael N.
Hall



Christoph
Handschin



Sebastian
Hiller



Maria
Hondele



Urs
Jenal



Anissa
Kempf



Roderick
Lim



Timm
Maier



Susan
Mango



Richard
Neher



Camilo
Perez



Jean
Pieters



Markus
R ugg



Peter
Scheiffele



Alex
Schier



Torsten
Schwede



Anne
Spang

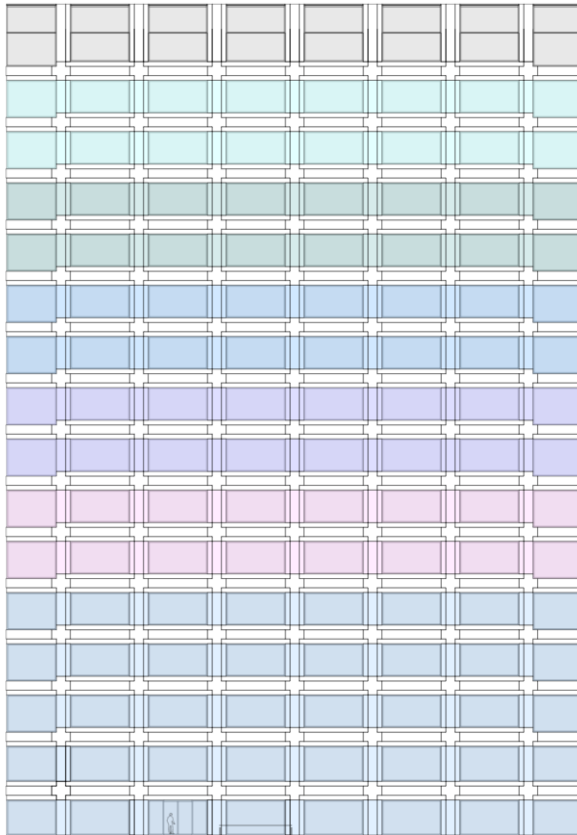


Erik
van Nimwegen

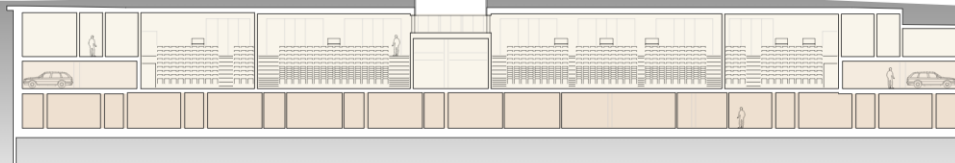


Mihaela
Zavolan

Biozentrum, University of Basel



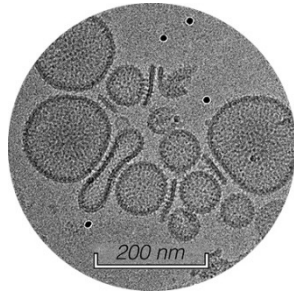
- OG 14** Spang | Hondele | Affolter | Mango
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- UG 02** Underground car park
- UG 03** Technology | AFM | NMR | BioEM

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

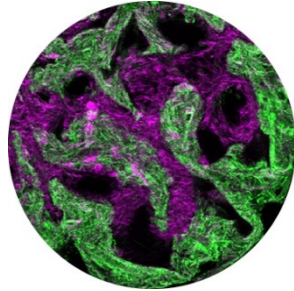
Biosafety lab to study highly contagious bacteria and viruses



FACS Core Facility

Flow cytometry and cell sorting

Biozentrum Technology Platforms



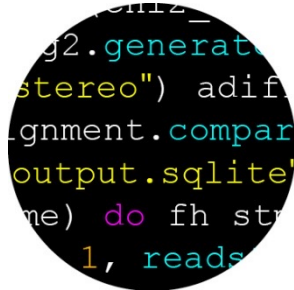
Imaging Core Facility

Light microscopy and imaging analysis



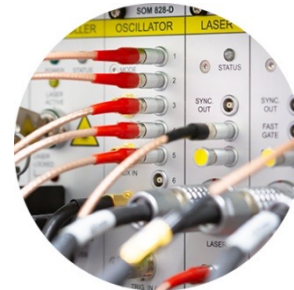
Proteomics Core Facility

Analysis of proteins using mass spectrometry



Research IT

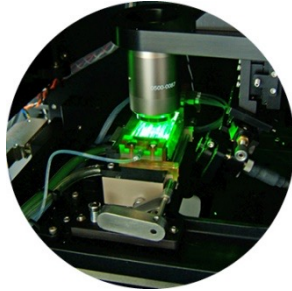
Bridging Research and IT



Research Instrumentation Facility

Catalyzing instrument development

Associated University Facilities



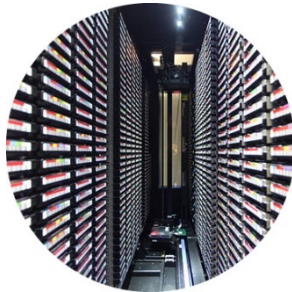
Genomics Facility Basel

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)

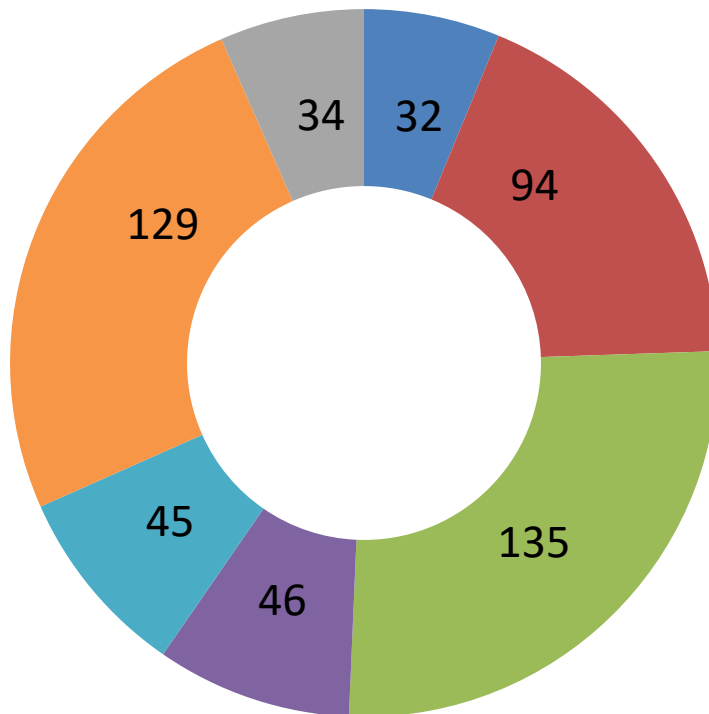
Novel nanotechnology for tissue diagnostics, cancer diagnostics and prognosis.



Santhera Pharmaceuticals AG (2000)

Development and commercialization of drugs for the treatment of rare diseases.

Members of Staff 2022: 515



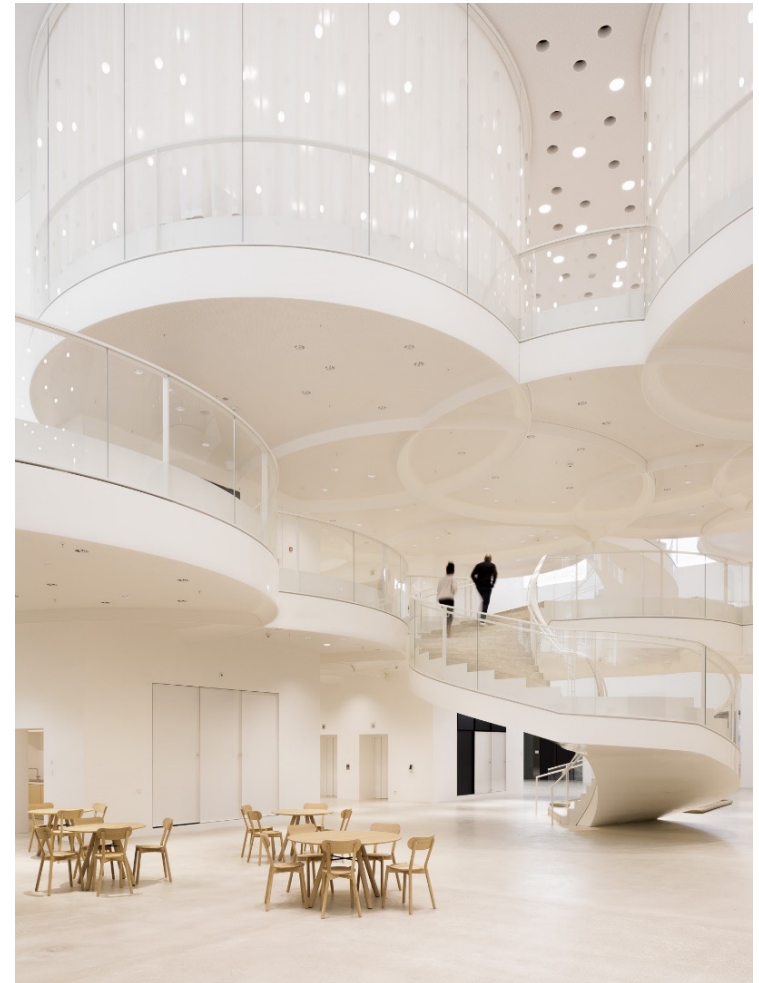
- Professors
- Postdoctoral researchers
- PhD students
- Master students
- Scientific staff
- Laboratory / Technicians
- Administration

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

- new future-oriented home with state-of-the-art infrastructure for leading-edge research
- one of the worldwide leading institutes in molecular biology research
- regularly more than 200 scientific publications/year – many in top-tier journals
- emphasizes
 - strong research orientation
 - close guidance of its students
- important partner for academia and industry, source of patents and spin-offs



Master of Science in Molecular Biology: Admission

Bachelor's Degree in Biology

Duration: 3 years

3 majors:

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

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

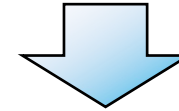
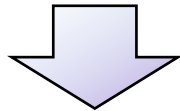
Bachelor's Degree in Computational Sciences

Duration: 3 years

5 majors:

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

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



Master of Science in Molecular Biology

Duration: 1.5 years

Master program introduces students to research:

Work in laboratory on Master thesis / 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

- 30 CP needed
 - 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): 32 research groups

Research areas (examples):

Angiogenesis	Experimental Hematology	Pediatric Immunology
Cancer Immunology	Genodermatoses	Tissue Engineering
Cardio Biology	Hepatology	Transplantation Virology
Childhood Leukemia	Immunobiology	Tumor Biology
Diabetes Research	Molecular Virology	

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

Research areas:

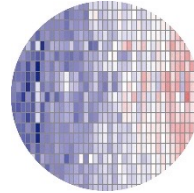
Genome Regulation	Multicellular Systems	Neurobiology
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In special cases, it is possible to carry out the thesis in other institutions

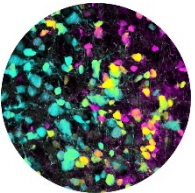
Biozentrum Graduate Teaching Program



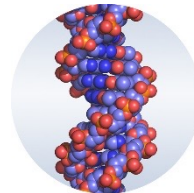
**Cycle A: Infection
Biology**



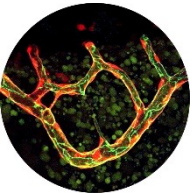
**Cycle E: Computational
and Systems Biology**



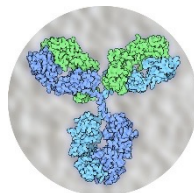
Cycle B: Neuroscience



**Cycle G: Gene Expression
and Epigenetics**



**Cycle C: Growth and
Development**



**Cycle H: Molecular
Medicine**



**Cycle D: Structure and
Function of
Macromolecules**

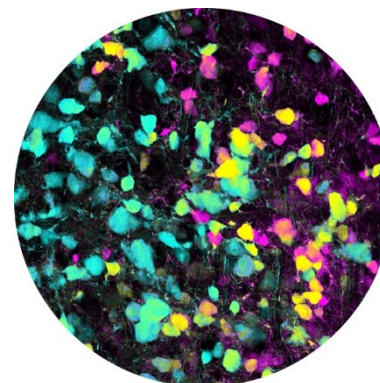


**Cycle I: Practical and
Experimental Skills**

Biozentrum Graduate Teaching Program: Examples

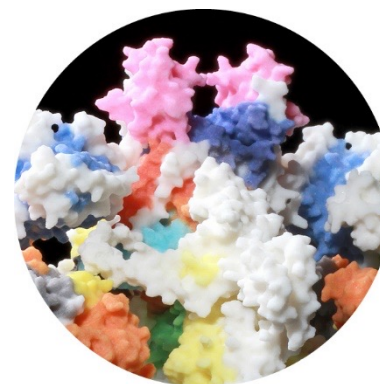
Cycle B: Neuroscience

- 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: Interactions and Structures and Dynamics of Soluble Proteins
- D2: Molecular Biophysics I
- D3: Large scale protein production of functional proteins
- D4: Molecular Structure, Function, and Dynamics of Membranes and Membrane Proteins
- D5: Molecular Biophysics II
- D6: Structural Biology and Biophysics I
- D7: Structural Biology and Biophysics II



Feedback from Students



Artan Ademi

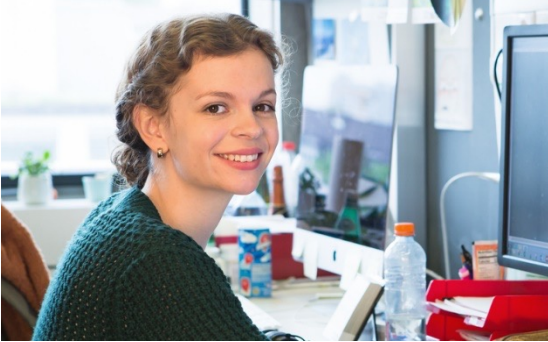
Masters in Prof. Anne Spang's group

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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