

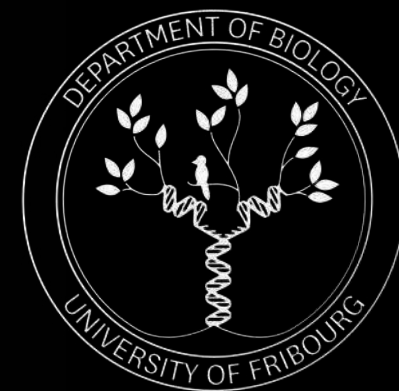
MASTER WEEK 2021

Alessandro Puoti

*"combining biomolecules and cell function"*



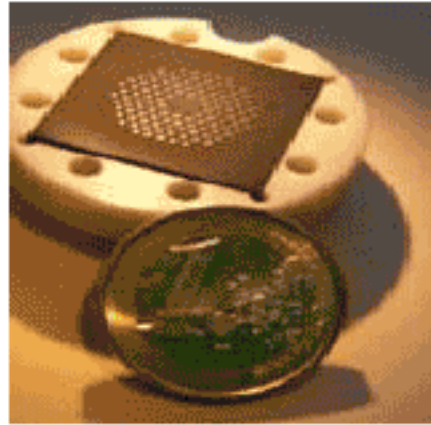
**MASTER IN  
MOLECULAR LIFE AND HEALTH  
SCIENCES**



# Molecular medicine

Fundamental research provides the basis for therapeutics

## *In vitro* Diagnostics



Leverage novel molecular technologies for early detection of disease

## Molecular Imaging



Visualize and localize molecular processes *in vivo* for diagnosis and therapy

- new molecular markers
- new targets for synthetic and biological drugs
- new techniques to understand life in health and disease



# There is an urgent need for competent people to carry out basic and applied research, but also to evaluate the benefits and potential dangers of modern Life technologies

November 2018

## Scientist in China defends human embryo gene editing

He Jiankui uses Hong Kong summit to reply to critics of his Crispr-Cas9 trials altering baby DNA for HIV resistance

February 2019

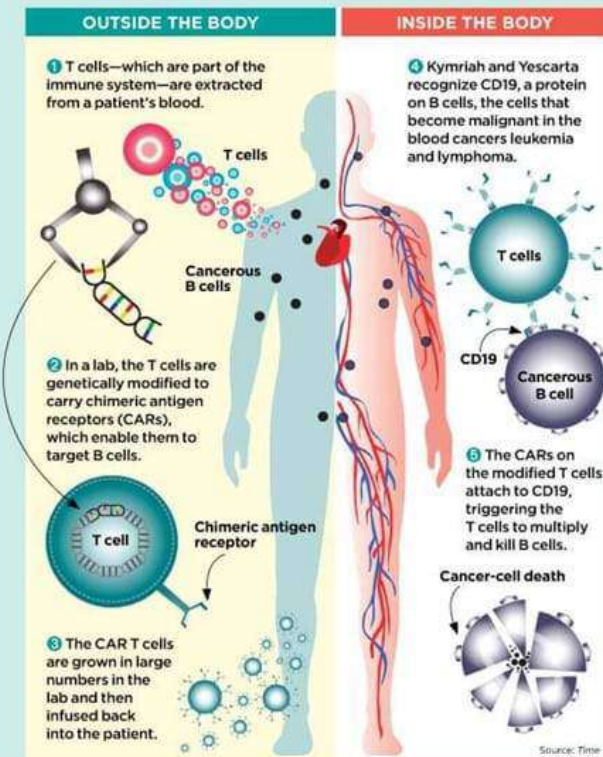
## La naissance de deux macaques relance le débat sur le clonage

Une équipe chinoise vient de cloner les tout premiers primates jamais obtenus grâce à la technique utilisée en 1996 pour la brebis Dolly. Le clonage humain n'a jamais été aussi proche. De quoi relancer un vaste débat scientifique, médical et éthique

October 2018

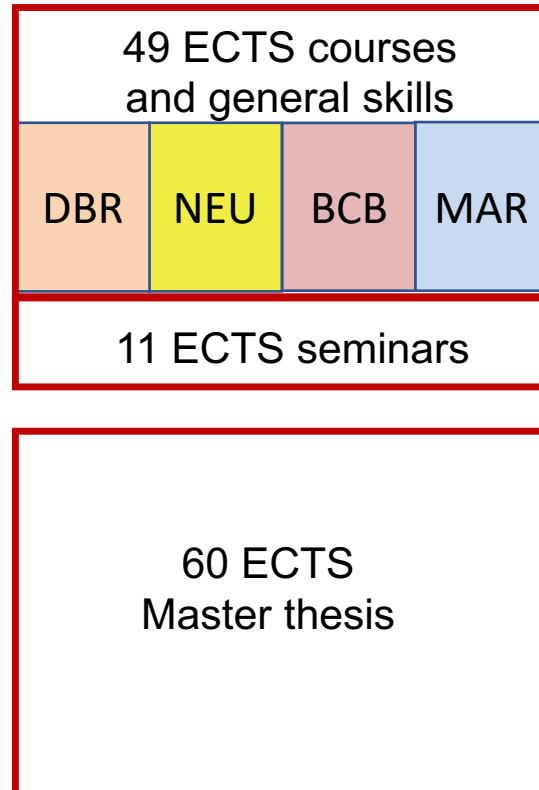
### ARMING A BODY TO DO BATTLE WITH CANCER

Kymriah and Yescarta, the CAR T treatments approved by the FDA, help key cells in a patient's immune system destroy blood cancer cells. Here's how they work:

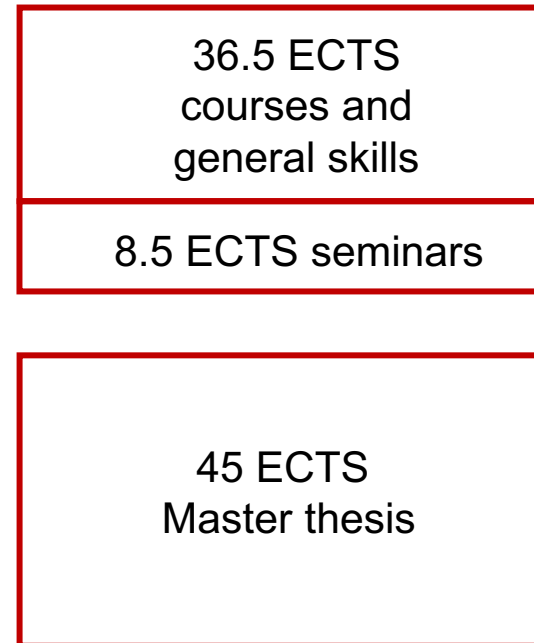


# MSc in Molecular Life and Health Sciences: 5 study programs

**120 ECTS**  
**4 options**



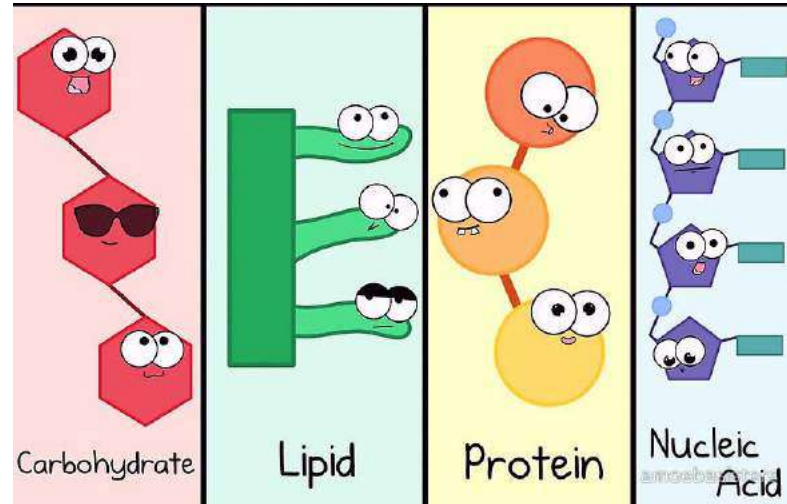
**90 ECTS**  
**Teaching**



DBR : Developmental Biology and Regeneration  
NEU: Neurobiology  
BCB: Biochemistry and Cell Biology  
MAR: Marine Biology

# Ex-cathedra lectures

for example:



Advanced courses to complement what you have learned at BSc level:

SBL.10010

Altered carbohydrate metabolism in disease

(Spring, 1 ECTS)

SBL.10011

Structure, function and diseases of lipid metabolism

(Spring, 1 ECTS)

SBL.00453

Protein homeostasis

(Fall, 1 ECTS)

SBL.00115

The RNA World

(Fall, 1.5 ECTS)

SBL.00130

Nuclear organization and chromosome dynamics

(Fall, 1 ECTS)

# “Soft skills”

SBL.00420

Career profiling in Life Sciences

(Spring, 1 ECTS)

SBL.00129

BeFri Retreat in cell and developmental biology

(Spring, 1 ECTS)

SBL.00127/8

BeFri Colloquia in cell and developmental biology

(Spring, 3 ECTS)

SBL.10004

Ethics in stem cell research

(Spring, 1 ECTS)



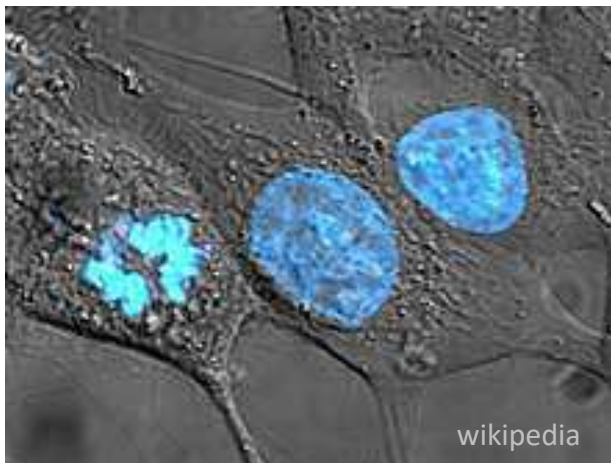
If you wish:

Mentoring of BSc students

( 30 CHF / hour)



# Health and disease-related courses



for example:

SBL.10001	Modeling human disease in experimental genetic systems	(Spring, 2 ECTS)
SBL.10002	From bench to bedside	(Spring, 0.5 ECTS)
SBL.00414	Cell fate and tissue regeneration	(Fall, 1 ECTS)
SBL.10003	Health-related topics in developmental biology	(Spring, 2 ECTS)
SME.07200	Infection, inflammation and cancer	(Fall, 3 ECTS)

## For additional information on the curricula:

- curriculum summary on the Master week web page
- finalized study plans will be available this summer
- contact us

**Overview**

- 4 semesters – 120 ECTS
- Teaching language: English
- 5 options:
  - Developmental Biology and Regeneration (120 ECTS)
  - Neurobiology (120 ECTS)
  - Biochemistry and Cell Biology (120 ECTS)
  - Marine Biology (120 ECTS)
  - Teaching (90 ECTS)

**Useful links**

- ↓ [Curriculum summary](#)
- [The programme](#)
- [Study advisor: Alessandro Puoti](#)
- [Department of Biology](#)

# One example : Option Neurobiology

## 11.2 Option Neurobiology

[Version 2021, validation packages: PV-SBL.xxx, PV-SBL.yyy]

### 11.2.1 Study programme

Code		Semester	tot. h.	ECTS
<b>General skills (obligatory)</b>				
SBL.00501	Introduction to data analysis	AS	10	1
SBL.30001	Introduction to R	AS	3 days	2
SBL.00427	Visual communication of data	SS	8	1
<b>Obligatory courses</b>				
SBL.00114	Experimental genetics	AS	8	1
SBL.00115	The RNA world	AS	12	1.5
SBL.00117	Neurogenetics (BeFri lecture)	AS	28	3
SBL.00118	BeNeFri workshop "Frontiers in neurosciences"	AS block	18	1.5
SBL.00119	Molecular genetics of model organism development (BeFri lecture)	AS	28	3
SBL.00123	Cellular and genetic networks (BeFri lecture)	SS	28	3
SBL.00125	Light and fluorescence microscopy for life sciences	AS	28	3
SBL.00127	BeFri research colloquium in cell and developmental biology I	SS	12	1.5
SBL.00128	BeFri research colloquium in cell and developmental biology II	SS	12	1.5
SBL.00129	BeFri research retreat in cell and developmental biology	SS	2 days	1
SBL.10001	Modelling human disease in experimental genetic systems	SS	20	2
SBL.10002	From bench to bedside	SS	5	0.5
SBL.00416	Biological rhythms	SS	8	1
SBL.00428	Optogenetics and photopharmacology	SS	8	1
SME.05001	Neurobiology seminars	AS	5	0.5
SME.06001	Neurobiology seminars	SS	5	0.5
<b>Total ECTS credits in obligatory courses</b>				<b>29.5</b>

### Recommended courses

SBL.10003	Health-related topics in developmental biology	SS	20	2
SBL.10004	Ethics in stem cell research	SS	8	1
SBL.10006	Developmental biology of marine animal models	AS	8	1
SBL.10008	Omics approaches in marine sciences	AS	8	1
SBL.00126	Established and emerging organisms for marine science	SS, block course	10 days	6
SBL.00130	Nuclear organization and chromosome dynamics	AS	8	1
SBL.00411	Signalling and transport	AS	8	1
SBL.00412	Introduction to protein structure and function	AS	8	1
SBL.00414	Cell fate and tissue regeneration	AS	8	1
SBL.00415	Cell proliferation	SS	8	1
SBL.00419	Advanced imaging	SS	8	1
SBL.00420	Career profiling in life sciences	SS	8	1
SBL.00429	Animal models of regeneration	SS	20	2
SBL.00451	Introduction to mass spectrometry and proteomics	AS	8	1
SBL.00452	Advanced quantitative proteomics (incl. practical course)	SS	12	1
SBL.00453	Protein homeostasis: translation, quality control and degradation	AS	12	1
SBC.04202	Eucaryotic cell growth control	AS	12	1.5
SBC.04203	Genotyping (practical course)	AS	90	2.5
SBC.07104	Introduction to protein structure and protein homology modelling#	SS	14	1.5
SBC.07105	Introduction to docking of small molecules to large macromolecules and molecular graphics#	SS	14	1.5

### Elective courses from the section medicine \*

SME.07100	Models for human diseases	AS	28	3
SME.07200	Infection, inflammation and cancer	AS	28	3
SME.07300	Central nervous system regeneration and repair	AS	28	3
SME.07202	Hot topics in cancer research	AS	28	3

\* prerequisites: human physiology and anatomy

**Minimum ECTS credits from recommended and elective courses**

**19.5**



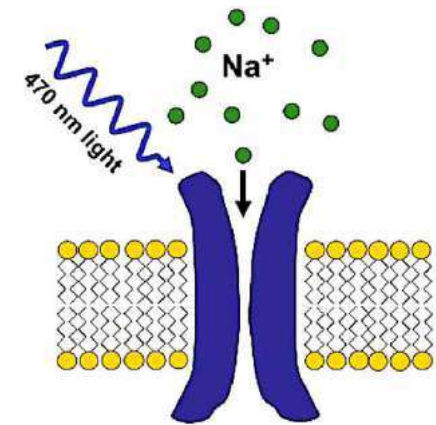
# One example : Option Neurobiology (continued)

## Thesis-related activities

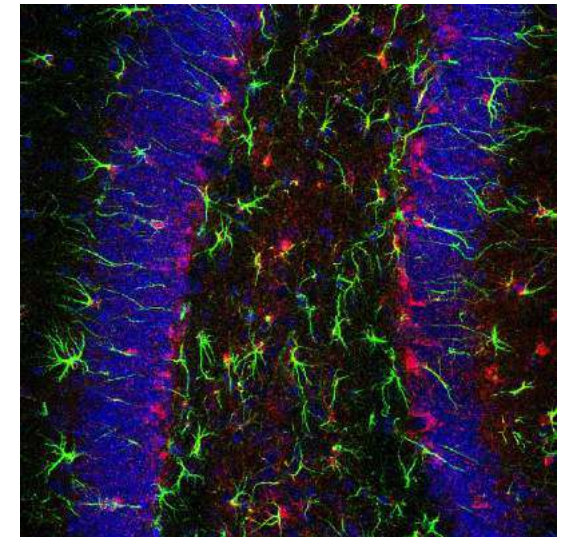
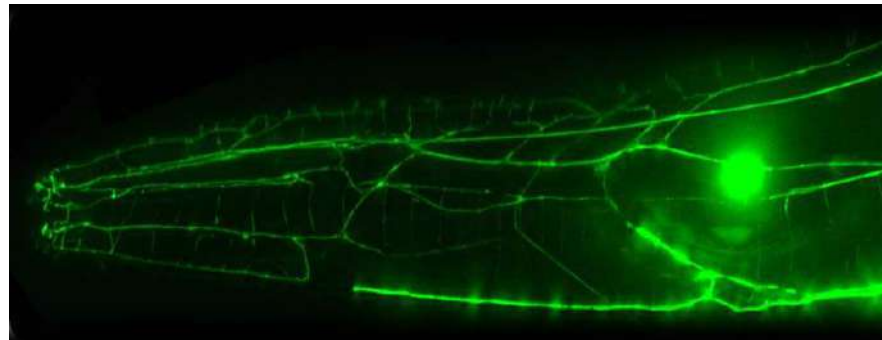
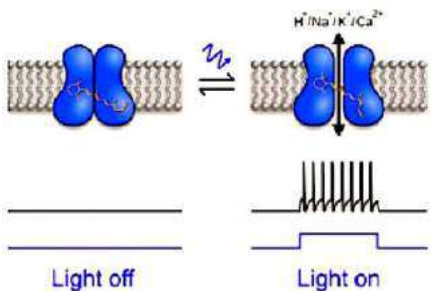
SBL.10103	Research group meetings	3 sem.	3x14	3
SBL.10105	Research seminars in molecular life and health sciences	3 sem.	3x14	3
SBL.00431	Seminars in biology	4 sem.	4x10	2
SBL.10100	Journal club in molecular life sciences	3 sem.	3x14	3
<b>Total ECTS points in thesis-related activities</b>				<b>11</b>

SBL.05001	<b>Master thesis</b>	3 sem.	<b>60</b>
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<b>TOTAL</b>			<b>120</b>
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Channelrhodopsin



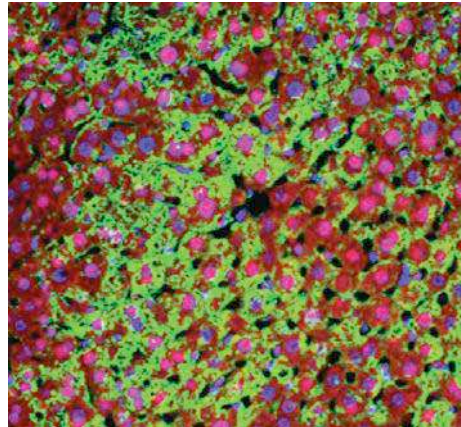
# Biochemistry and Cell Biology

Circadian clock and sleep

**How is life influencing sleep and health**



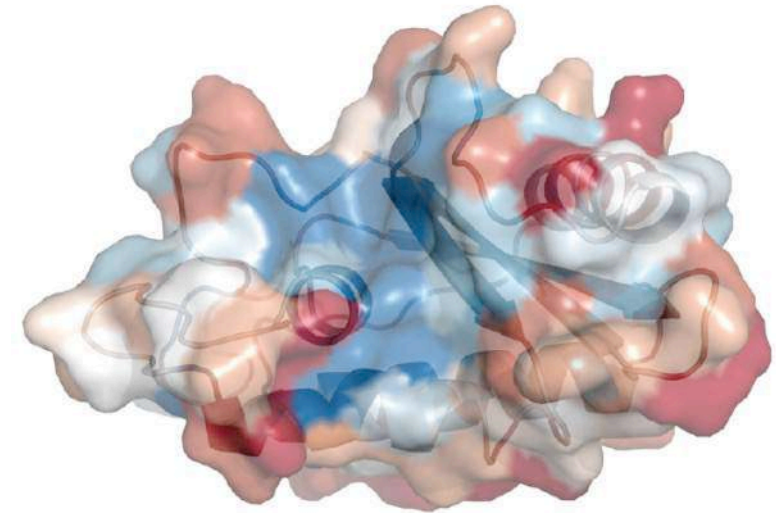
Prof. Urs Albrecht



Prof. Roger Schneiter

Protect yourself - take a cap

**What are CAP superfamily proteins exactly doing, apart from binding lipids ?**





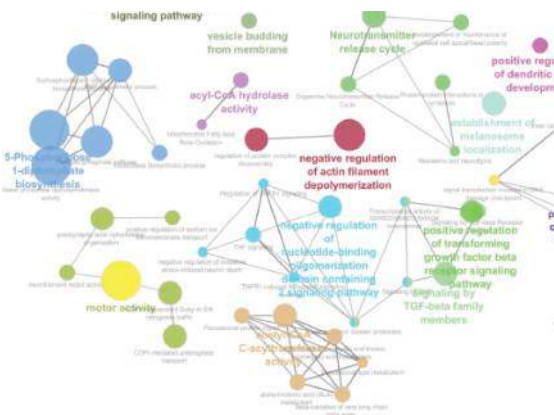
# Biochemistry and Cell Biology



Prof. Joern Dengjel

Cellular Recycling

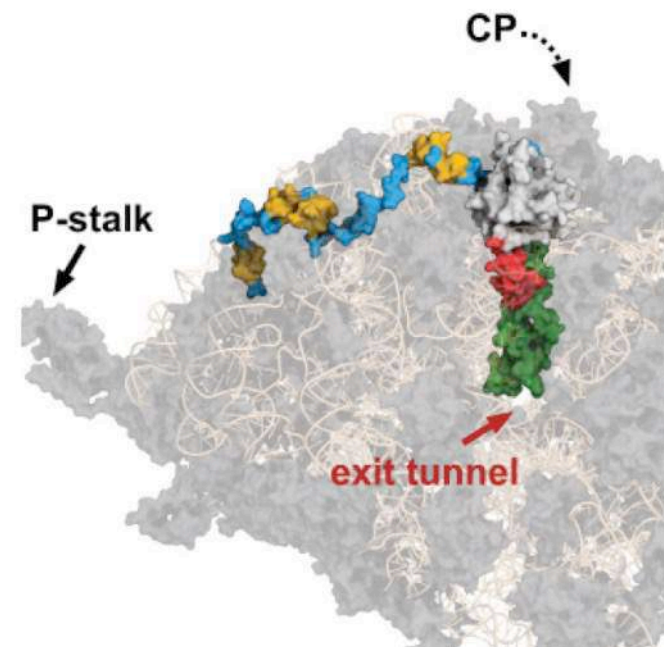
**How does a cell decide what to degrade when and where?**



Prof. Dieter Kressler

Ribosome Origami

**Piecing together the puzzle of life: priming ribosomal proteins for assembly**



Nutrient and Cell Proliferation

**Rag-time for baker's yeast**



Prof. Claudio De Virgilio



# Research activities: lab homepage or/and the **biennial report**

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- Contact



↓ Activity Report 2017-18



↓ Activity Report 2015-16

The 2019-20 activity report will be available here in April 2021

# “Fachschaft Biologie”: Students’ association (BSc and MSc)

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Fachschaft de Biologie de l'université de Fribourg  
@biologie.unifr

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**Bio-apéro (online)**

**GENERAL MEETING**  
Wednesday 3 march 2021  
18:30 ONMSTEAMS

**ETH Zürich**  
ZÜRICH LIFE SCIENCE DAY 2021

**Fachschaft de Biologie de l'université de Fribourg**  
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Page created - October 4, 2013

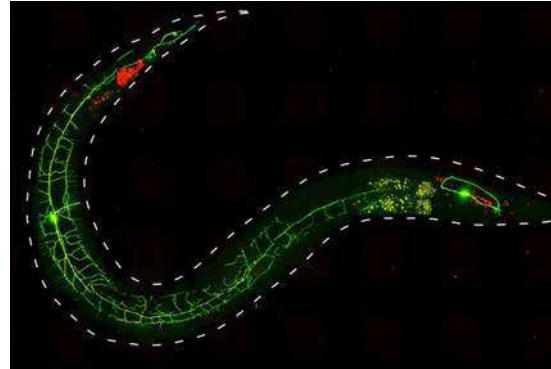
**People** >

# Research groups in “Zoology”

**Simon Sprecher**  
**Boris Egger**



**Chantal Wicky**  
**Alessandro Puoti**  
**Dominique Glauser**



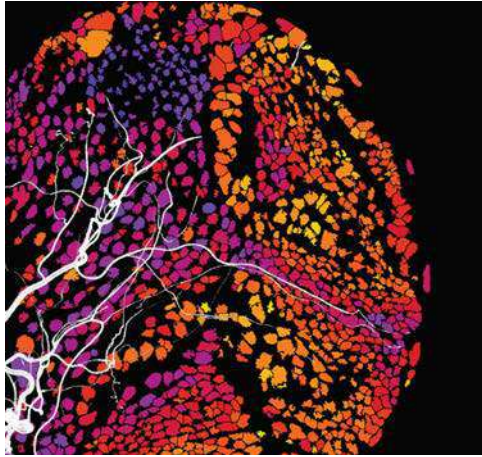
**Anna Jazwinska**  
**Simon Blanchoud**





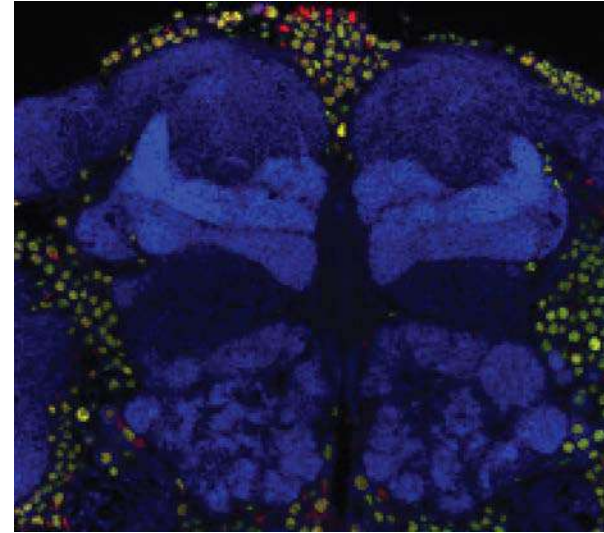
# Neurobiology

Neural stem cells and development  
**Building brains in flies**

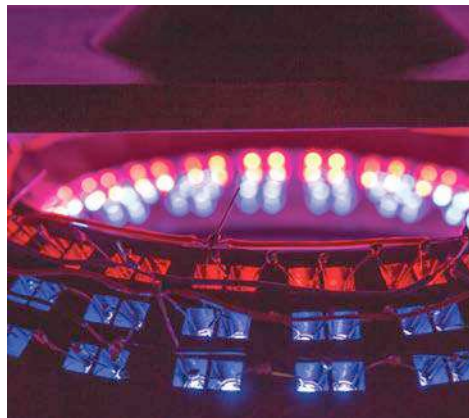


Neurogenetics and behaviour

**How the nervous system encodes the surrounding world**



Nociception and plasticity  
**A small worm teaching us how to shut off pain signal**

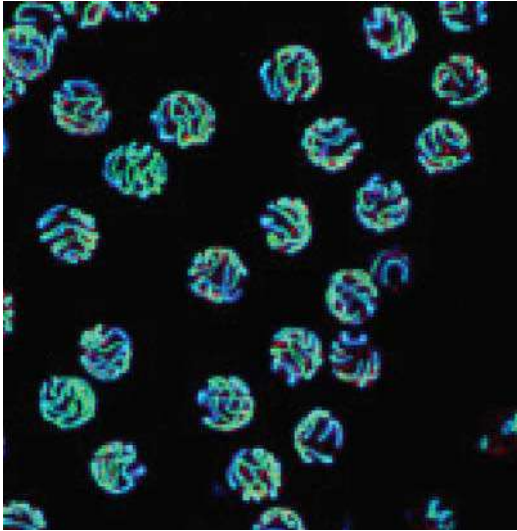


# Developmental Biology and Regeneration



Prof. Chantal Wicky

Chromatin and development  
**Packaging matters**

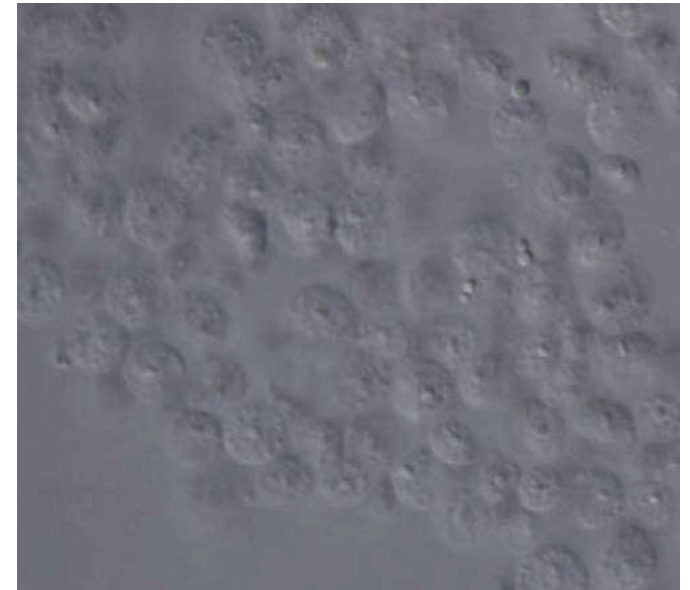


RNA Biology and Development

**How do germ cells choose their destiny?**



Prof. Alessandro Puoti





# Developmental Biology and Regeneration



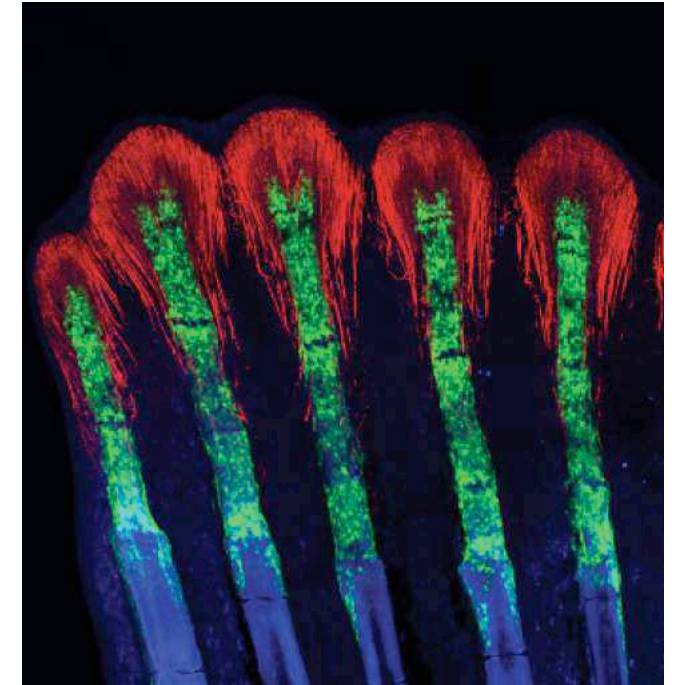
Marine biology and regeneration

**Bringing the oceans to Fribourg**



Organ regeneration

**Zebrafish repair their broken hearts and regrow amputated appendages**





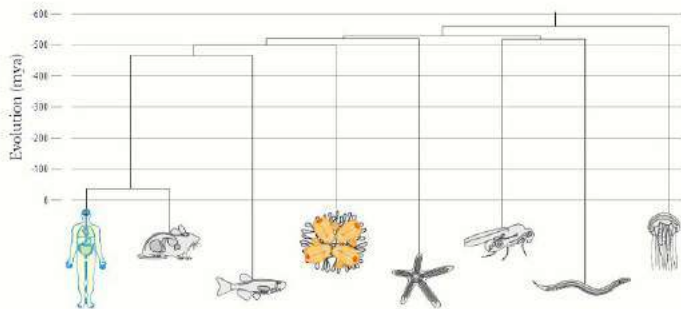
# Marine Biology



Dr Simon Blanchoud

Marine biology and regeneration

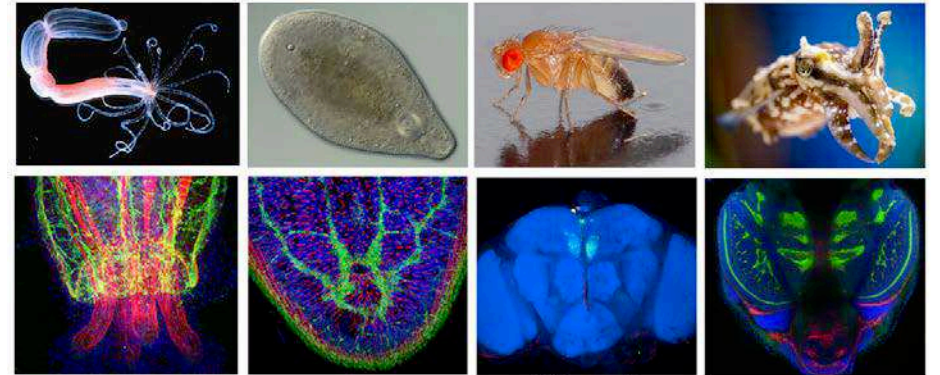
## Bringing the oceans to Fribourg



Prof. Simon Sprecher

Neurogenetics and behaviour

## How the nervous system encodes the surrounding world

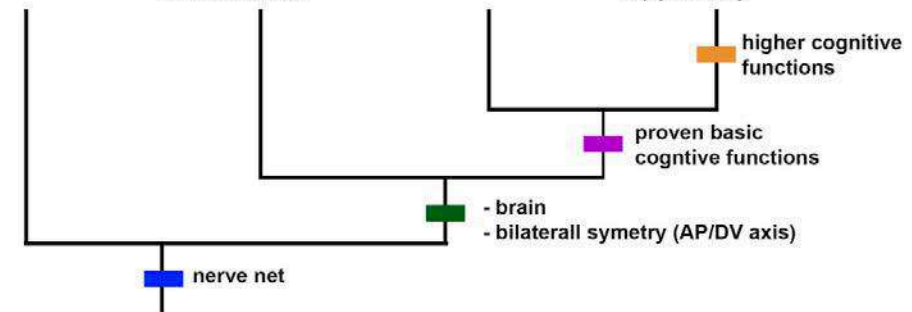


**Cnidarians**  
*Nematostella vectensis*

**Xenacoelomorphs**  
*Isodiametra pulchra*  
*Symsagittifera roscoffensis*  
*Xenoturbella bocki*

**Arthropods**  
*Drosophila melanogaster*

**Cephalopods**  
*Sepia bandensis*  
*Loligo vulgaris*  
*Euprymna berryi*



# Option “Teaching”

- 90 ECTS** : 19 ECTS of mandatory courses taken from the four research options
- 17.5 ECTS of recommended and elective courses (both MLHS and EB Masters, BeNeFri network)
- 8.5 ECTS of seminars
- 45 ECTS Master thesis (same choice of departmental research groups as for the 120 ECTS options)



This option grants access to the higher education for secondary level II (DEEM / LDM) with the teaching domain “Biology” (Domain 1).

Students taking this 90-ECTS option must complete their Master studies with additional 30 ECTS of their second teaching domain.

Students who will teach only biology (Mono) take one of the 120 ECTS research options.