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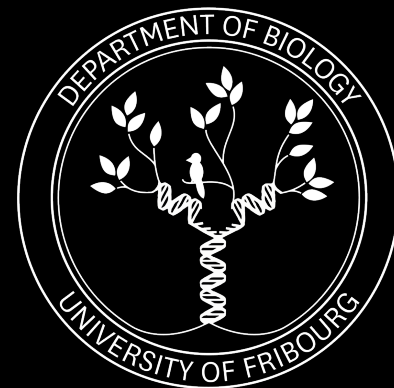
UNIVERSITÉ DE FRIBOURG  
UNIVERSITÄT FREIBURG

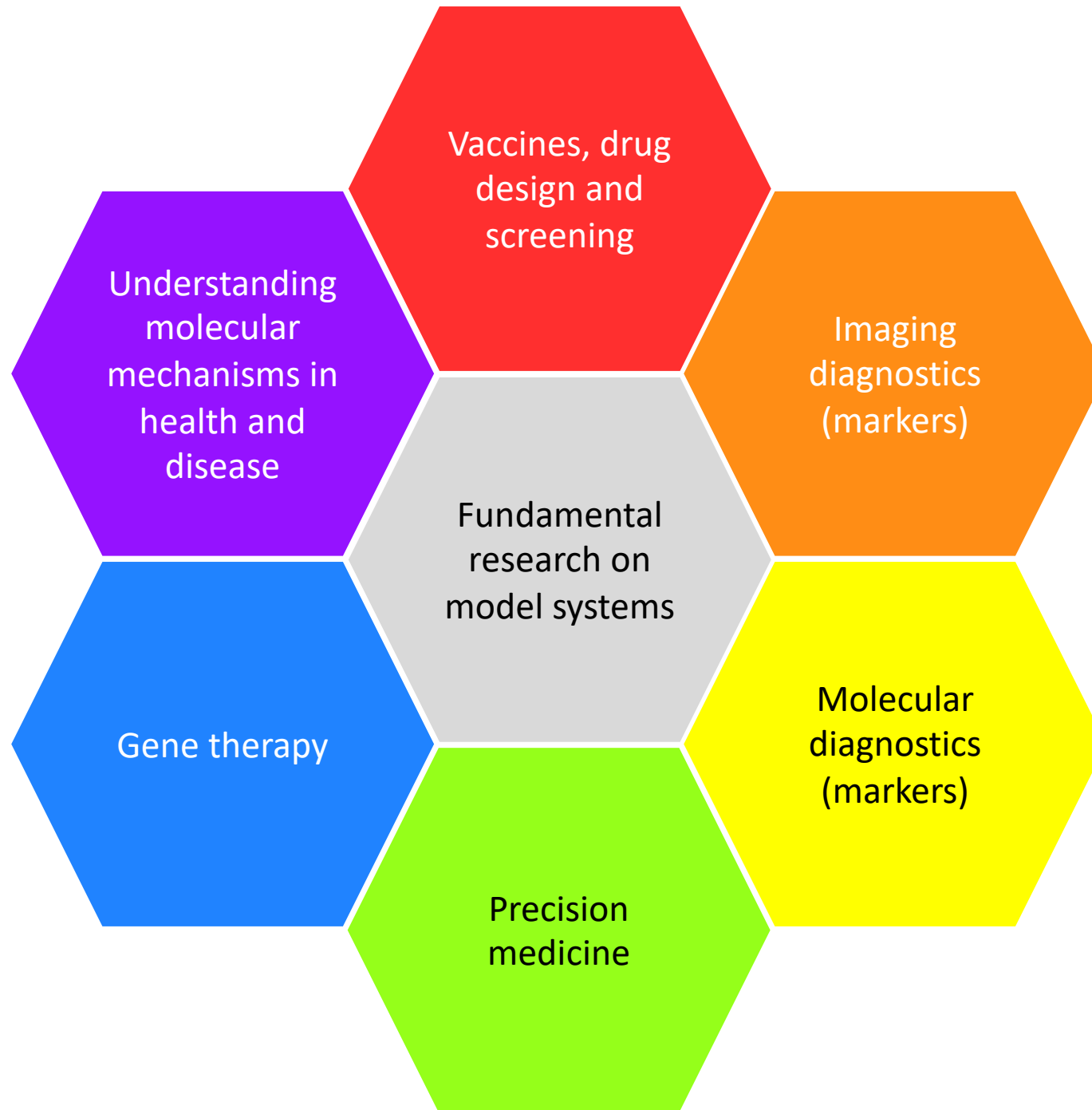
*"combining biomolecules and cell function"*



MASTERDAYS 2024  
Alessandro Puoti

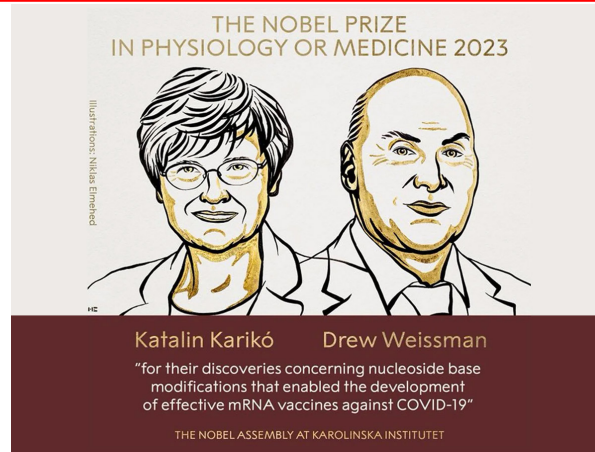
**MASTER IN  
MOLECULAR LIFE AND HEALTH  
SCIENCES**





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

November 2023



February 2019

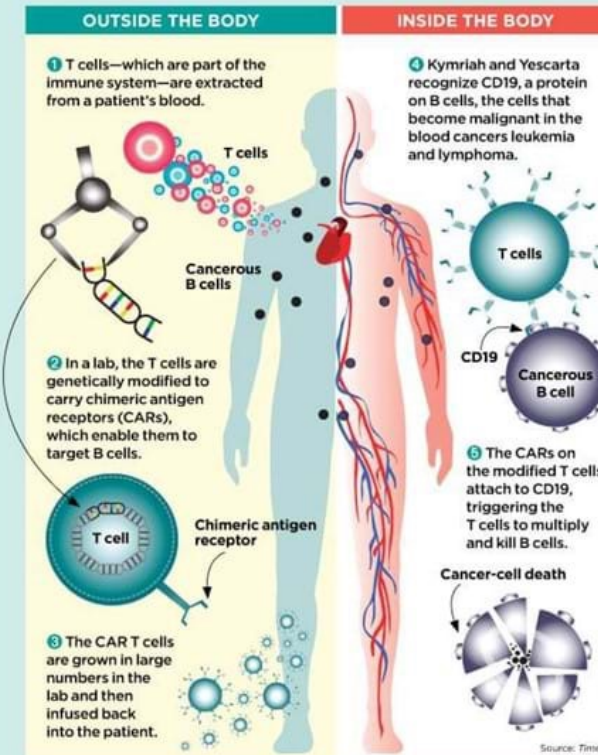
## La naissance de deux macaques relance le débat sur le clonage

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

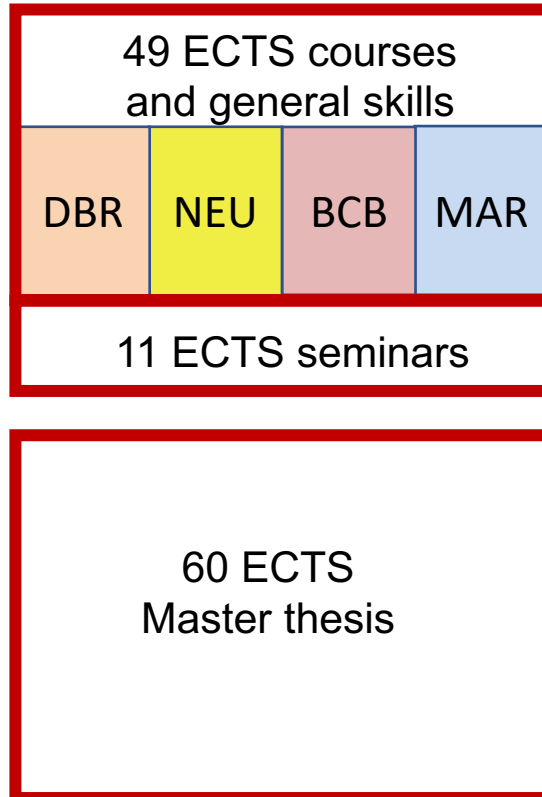
Kymriah and Yescarta, the CAR T treatments approved by the FDA, help key cells in a patient's immune system destroy blood cancer cells. Here's how they work:



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

**120 ECTS**

**4 options**



DBR : Developmental Biology and Regeneration

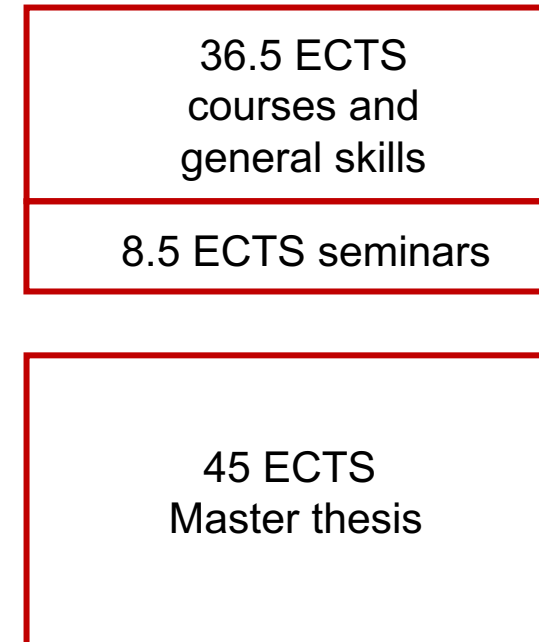
NEU: Neurobiology

BCB: Biochemistry and Cell Biology

MAR: Marine Biology

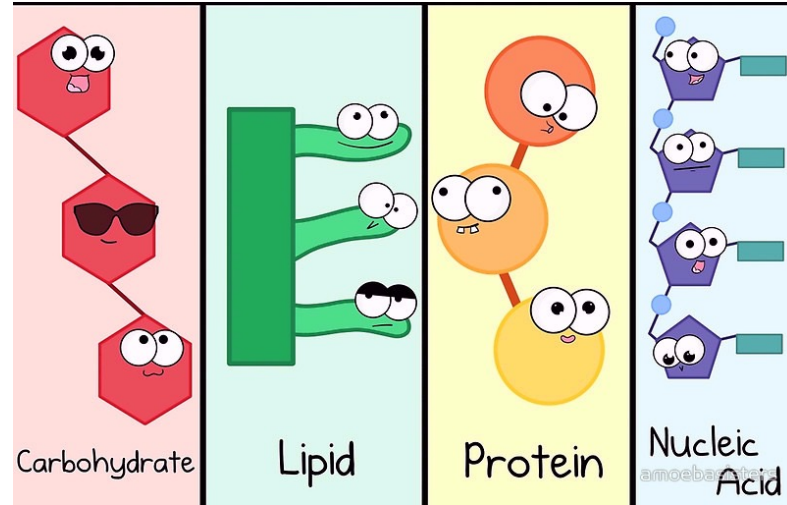
**90 ECTS**

**Option Teaching**



# 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

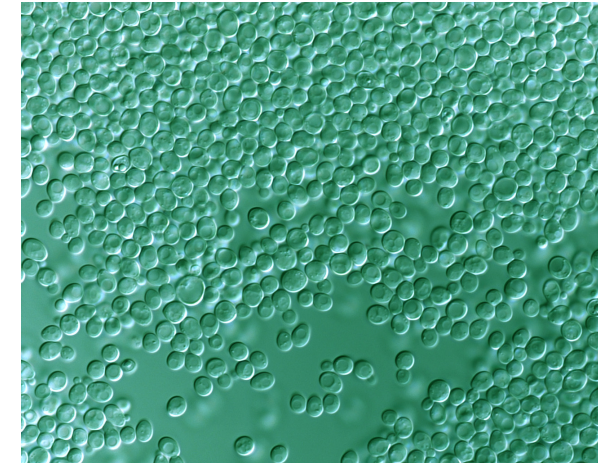
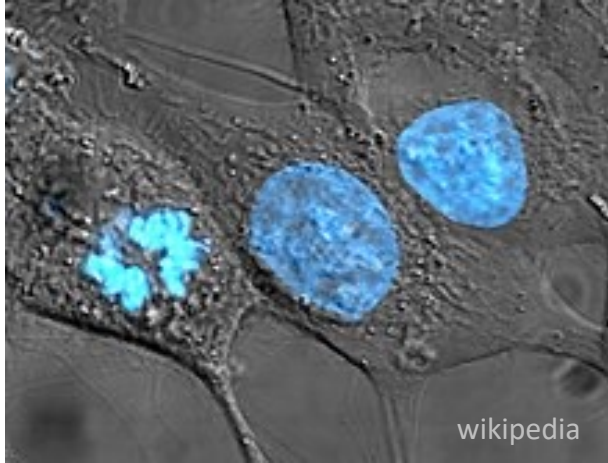
(Fall, 1.5 ECTS)

SBL.00130

Nuclear organization and chromosome dynamics

(Fall, 1 ECTS)

# 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)
SBL.10004	Ethics in stem cell research	(Spring, 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)



If you wish:

Mentoring of BSc students

( 30 CHF / hour)

# One example : Option Neurobiology

## 2.1.2 Option Neurobiology

[Version 2021, validation packages : PV-SBL.0001201, PV-SBL.0001200]

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 and elective courses

- Courses listed in the table in section 3. Upon approval by the study advisor, courses from the MSc in Environmental Biology or outside the University of Fribourg.

### 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



# One example : Option Neurobiology (continued)

## 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				
				19.5

## Minimum ECTS credits from recommended and elective courses

19.5

## 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>

## Total ECTS points in thesis-related activities

11

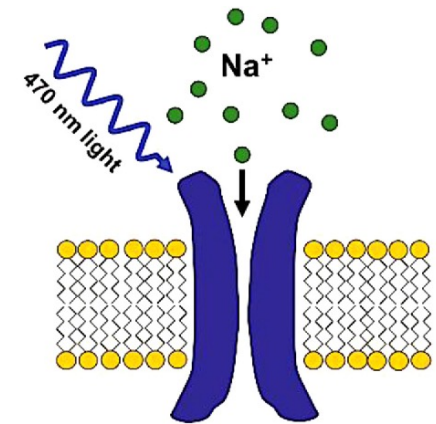
## SBL.05001 Master thesis

3 sem.

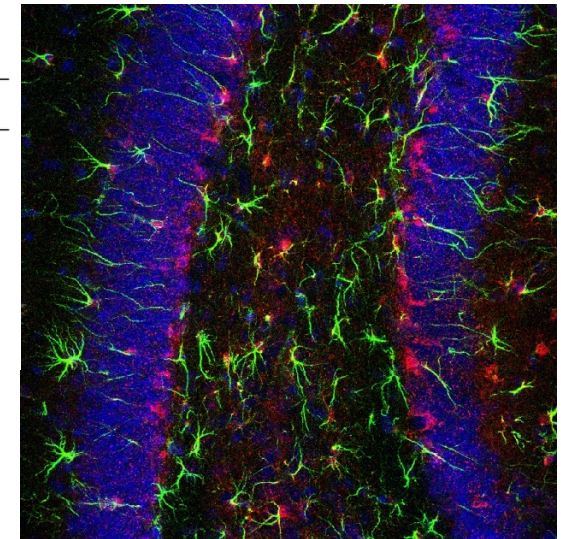
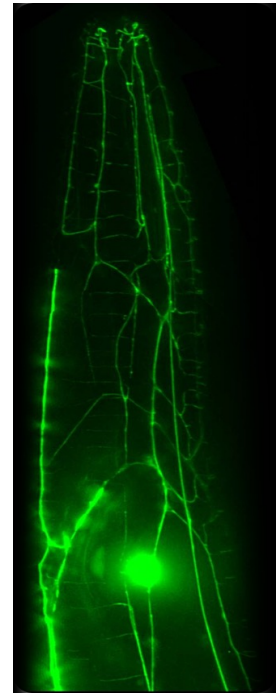
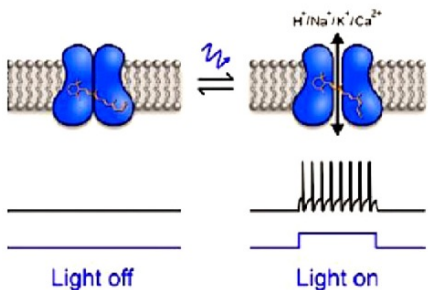
60

## TOTAL

120



Channelrhodopsin



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



UNIVERSITÉ DE FRIBOURG  
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Department of Biology

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## News & Events

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## Activity Reports



↓ [Activity Report 2019-20](#)



↓ [Activity Report 2017-18](#)



↓ [Activity Report 2015-16](#)



↓ [Activity Report 2021-22](#)

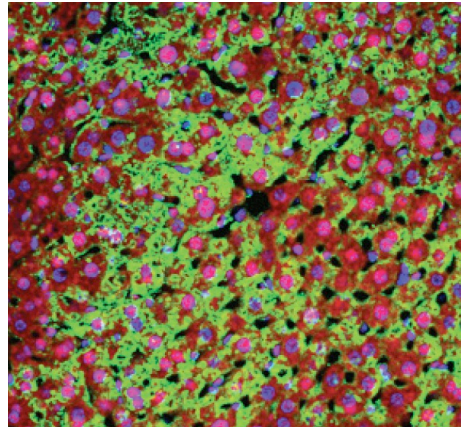
# Option Biochemistry and Cell Biology

Circadian clock and sleep

**How is life influencing sleep and health**



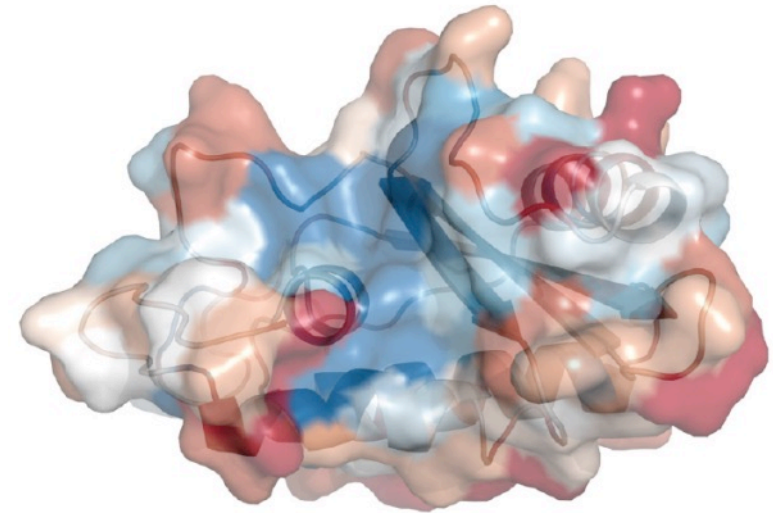
Prof. Urs Albrecht



Prof. Roger Schreiner

Protect yourself - take a cap

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



# Option Biochemistry and Cell Biology



Prof. Joern Dengjel

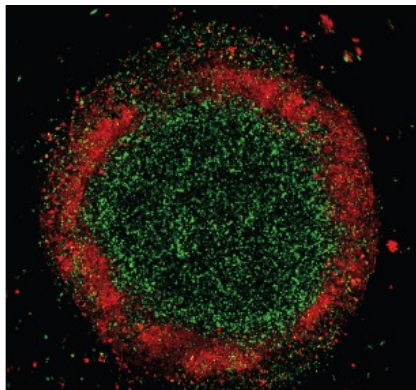
Cellular Recycling

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



Nutrient and Cell Proliferation

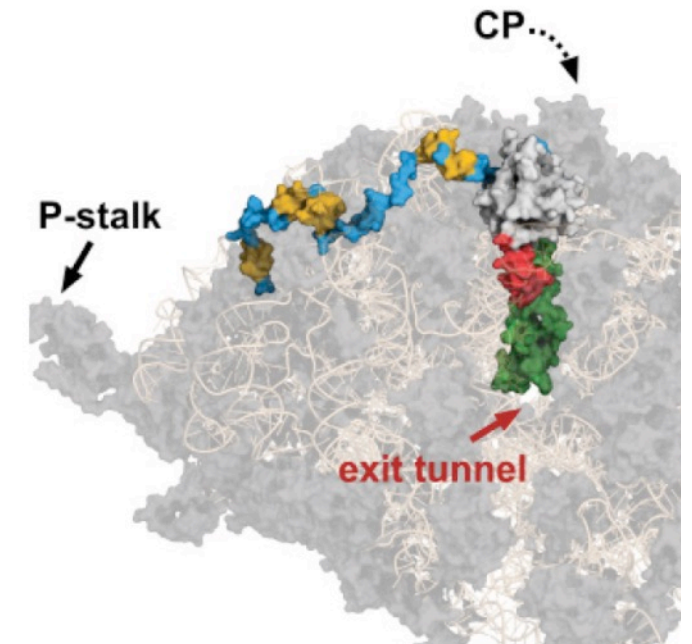
**Rag-time for baker's yeast**



Prof. Dieter Kressler

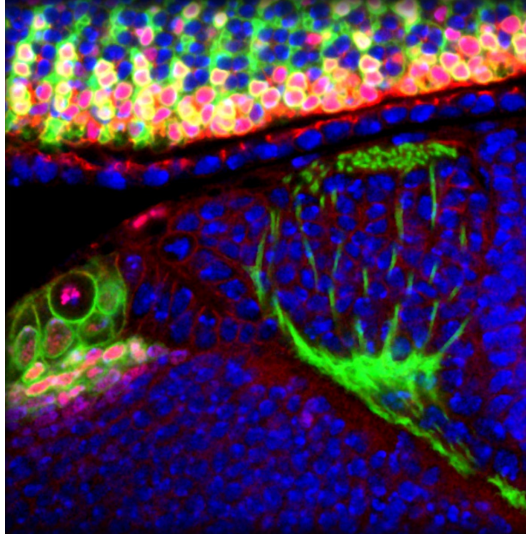
Ribosome Origami

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



Prof. Claudio De Virgilio

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

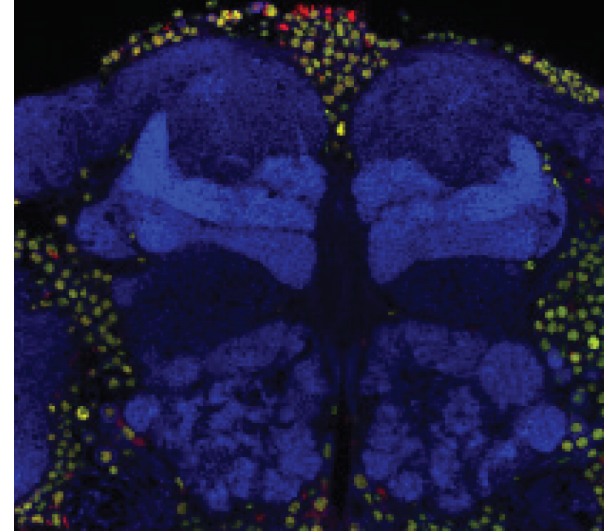


# Option Neurobiology

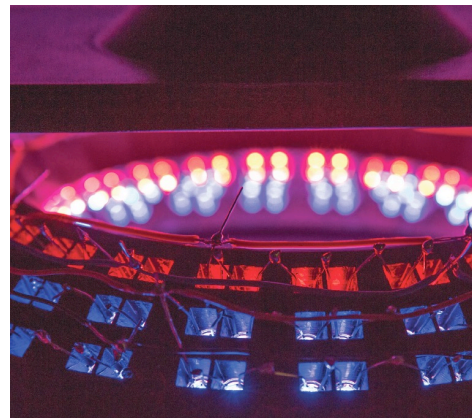


Neurogenetics and behaviour

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



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

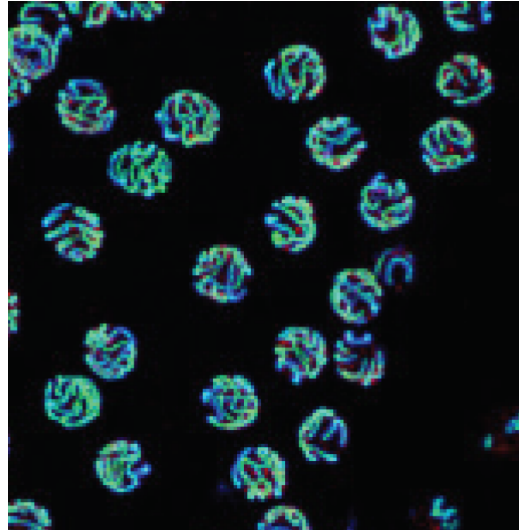


# Option Developmental Biology and Regeneration



Prof. Chantal Wicky

Chromatin and development  
**Packaging matters**

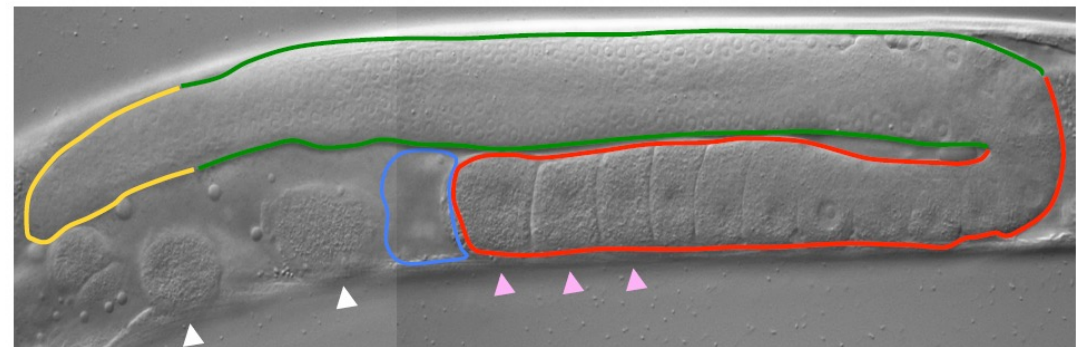
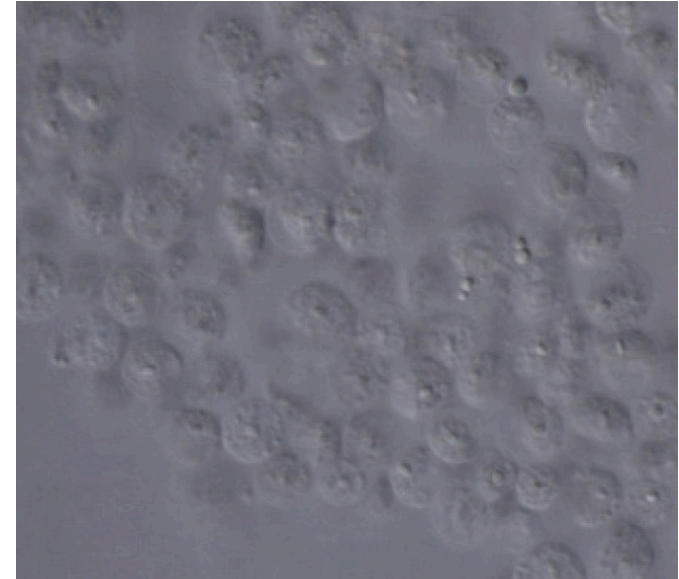


RNA Biology and Development

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



Prof. Alessandro Puoti

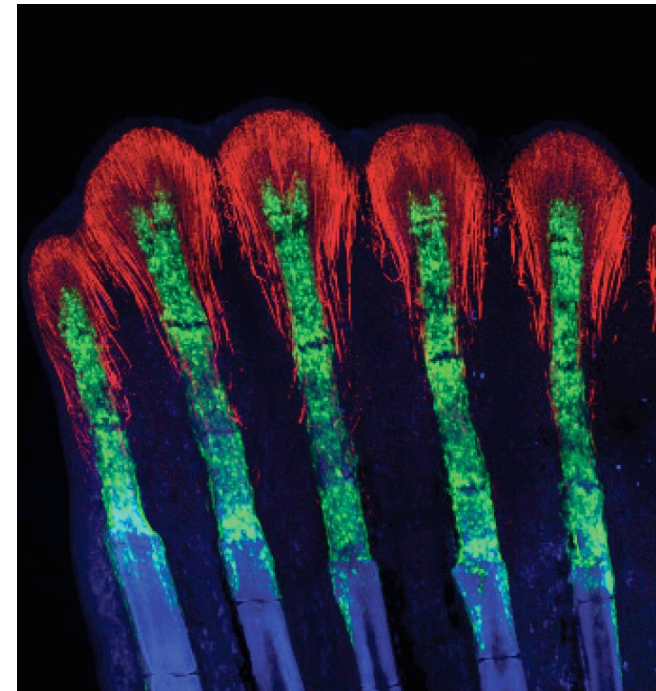
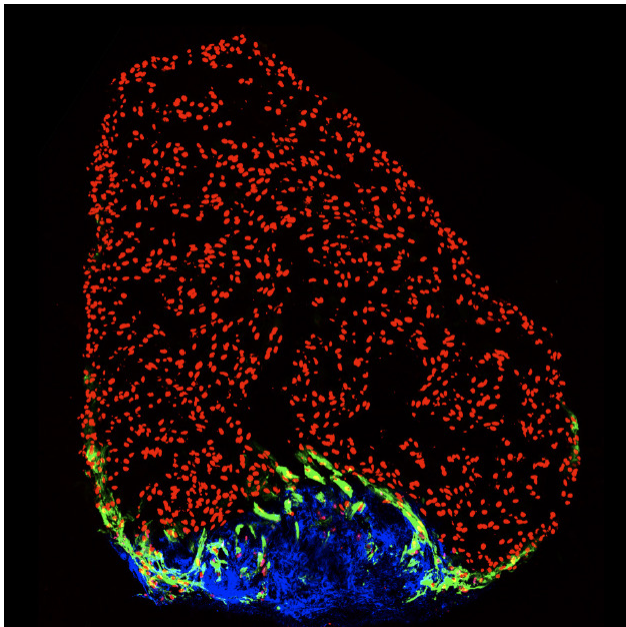


# Option Developmental Biology and Regeneration



Organ regeneration

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



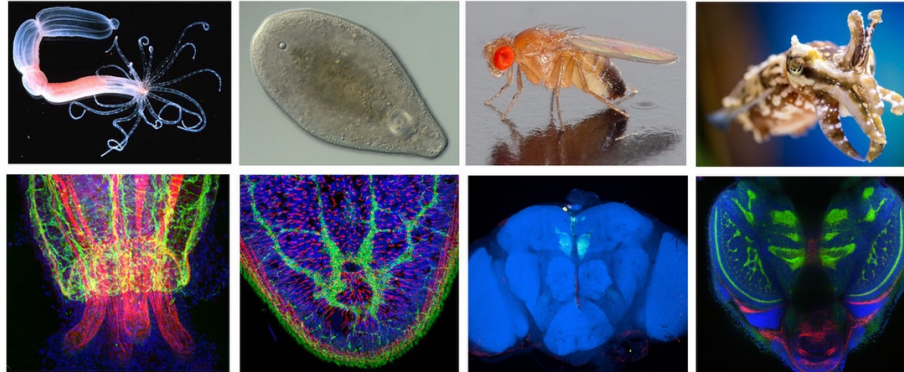
# Option Marine Biology



Prof. Simon Sprecher

Neurogenetics and behaviour

## How the nervous system encodes the surrounding world

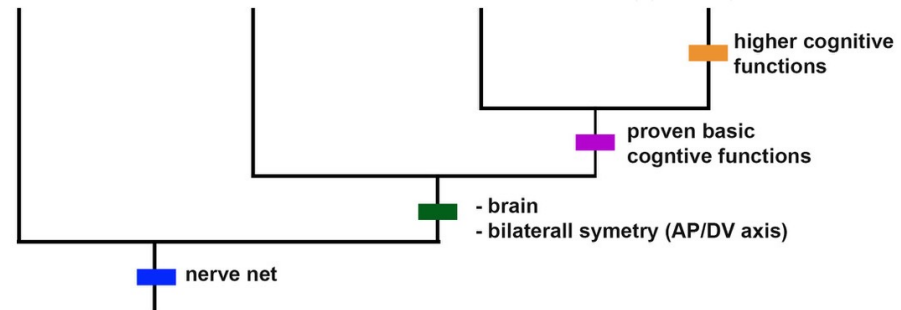


**Cnidarians**  
*Nematostella vectensis*

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

**Arthropods**  
*Drosophila melanogaster*

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





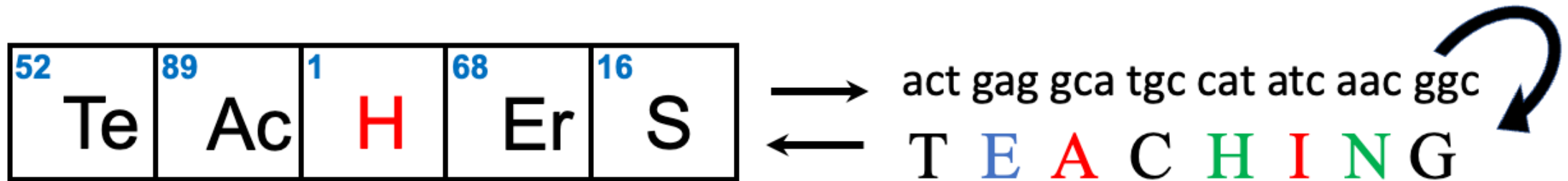
# Option Teaching

**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 or Mono).
- We ask students taking this 90-ECTS option to complete their Master studies with additional 30 ECTS of their second teaching domain.
- Students who will teach only biology (Mono) can take one of the 120-ECTS research options.
- The 120-ECTS options are also accessible to students with 2 teaching domains.