



Universität  
Basel

Departement  
Umweltwissenschaften



# MSc Animal Biology

Master's degree program at the Department of  
Environmental Sciences



Dieter Ebert  
Zoologie  
Universität Basel



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# MSc Animal Biology

Master's degree program at the Department of  
Environmental Sciences

- The Master's degree program Animal Biology provides a theoretical and practical training. The graduates acquire an in-depth knowledge of this sub-discipline of biology and demonstrate their ability to plan their own research project independently and to present the results in oral and written forms.
- The Zoology section within the Department of Environmental Sciences promotes higher education and research in organismal animal biology, particularly in the fields of zoology, evolutionary biology, genetics, behavior, and developmental biology. It forms strong synergies with existing strengths in the life sciences, the largest focal area of the University of Basel. Research is strongly supported with bioinformatics and statistics.
- Direct admission with a Bachelor of Science (BSc) in Biology from the University of Basel. Other Swiss or foreign degrees from an education institution recognized by the University of Basel require approval by the examination commission of the Faculty of Science.

Dieter Ebert  
Zoologie  
Universität Basel

# structure of master program

- Duration: normally 3 semesters (1.5 years)
- Credits: 90 ECTS (50 CP for Master's thesis, 10 CP for Master's examination, 30 CP for in-depth professional studies)
- Master thesis is about 1 year. Full integration in research group
- Language: English
- Start of program: fall or spring term (preferably fall term)
- Application deadline: 30 April (for fall semester)

See also: <http://www.evolution.unibas.ch/teaching/master/master.htm>

# 30 CP for in-depth professional studies\*

example of courses:

- Advanced evolutionary biology
- Evolutionary genetics
- The evolution of host-parasite interactions
- Statistical data analysis for biologists
- Diverse seminars related to Zoology and Evolution
- Guarda summer school in evolutionary biology
- Fieldwork in different countries (e.g. Italy, Finland, Africa)

\* 18 CP from master program; 12 CP can be freely chosen

See also: <http://www.evolution.unibas.ch/teaching/master/master.htm>

# Examples for field courses



Group of Walter Salzburger  
field-work in African lakes

Group of Lukas Schärer  
Adriatic Sea



Group of Valentin Amrhein  
research station *Petite Camargue Alsacienne*



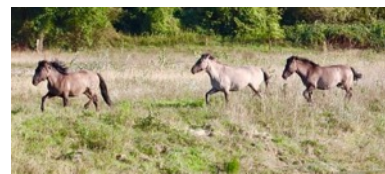
Group of Dieter Ebert, Finland

# The master thesis

- Takes about 1 year of full time work.
- May be in any field related to zoology and evolution
- The master thesis is usually done in a research group in “zoology”\*
- The following slides introduce the working groups of zoology at the University of Basel

\* *Department of Environmental Sciences, section Zoology*

# Research groups and topics in Zoology & Evolution



## Walter Salzburger

- Speciation
- Genomics
- Molecular evolution



## Lukas Schärer

- Sex in hermaphrodites
- Sexual selection & conflicts
- Mating behavior
- Sperm competition

## Valentin Amrhein

- Bird song and migration
- Species distribution modeling
- Biodiversity monitoring

## Dieter Ebert

- Coevolution
- Host–parasite interactions
- Evolutionary genomics
- Evol. in metapopulations



## Daniel Berner

- Local adaptation
- Speciation
- Evolutionary genomics

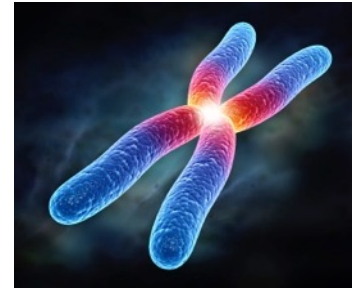
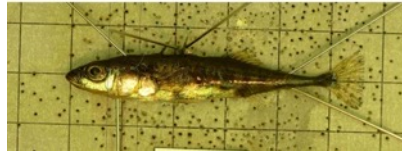
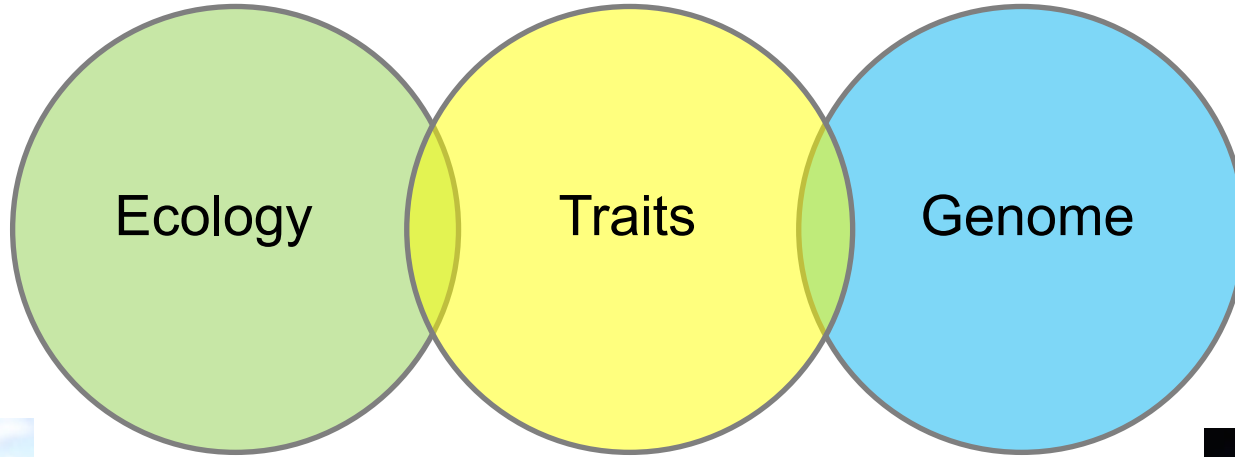


## Patrick Tschopp

- Development
- Evolution of skeletons
- Regulatory evolution

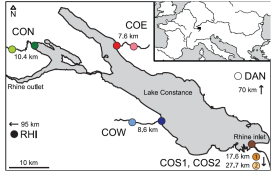
# Research group Daniel Berner

How does biodiversity evolve?





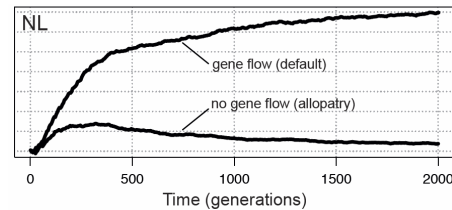
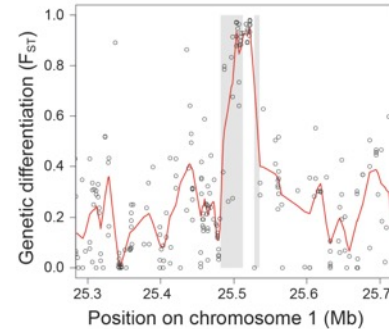
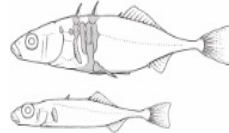
- Field research



- Laboratory experiments



- Genomics

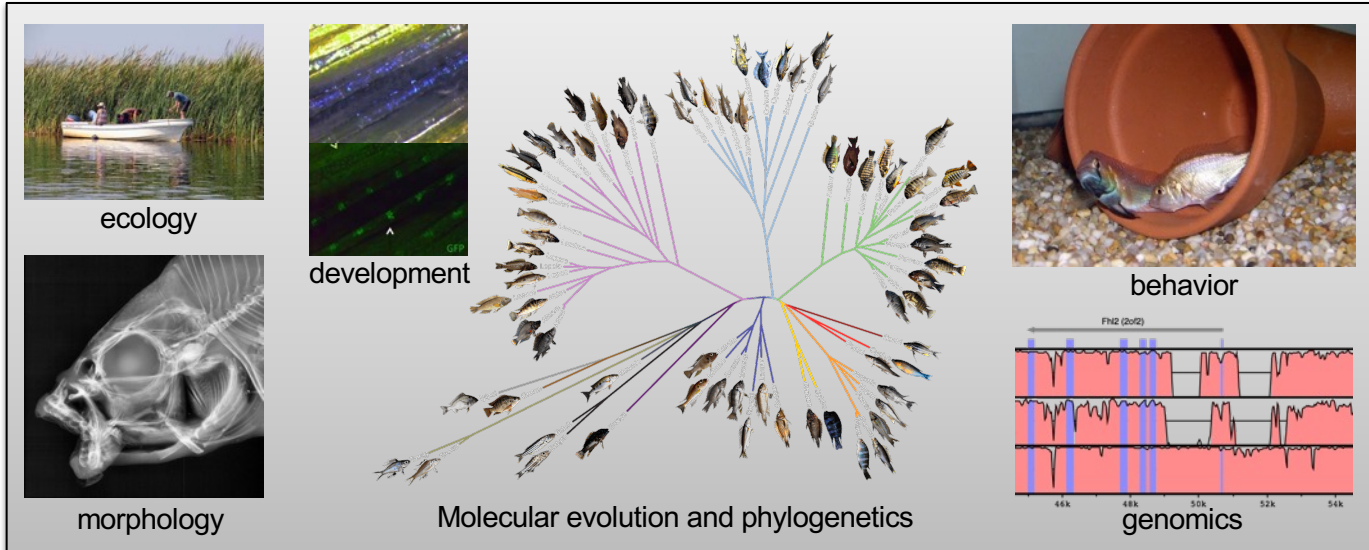


- Computer simulations



Research Group Walter Salzburger

# Adaptive Radiation and Speciation



How does organismal diversity emerge?

Why are some groups more species-rich than others?

What is the molecular basis of adaptation and innovation?

Research Group Walter Salzburger

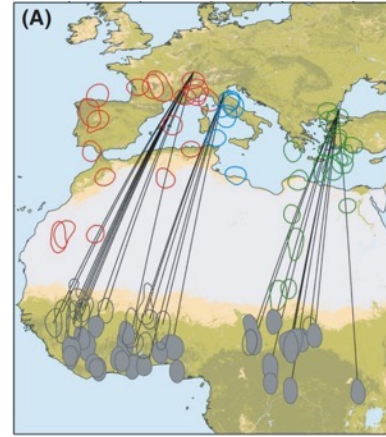
# Adaptive Radiation and Speciation



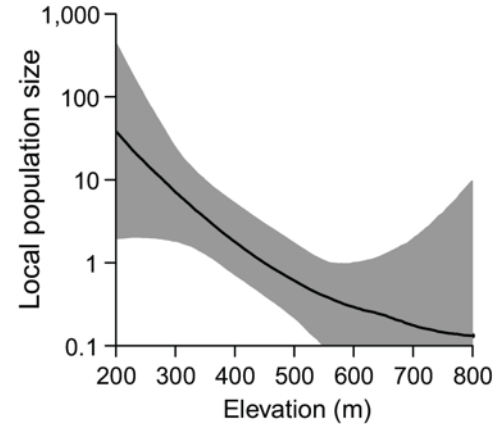
**East African cichlid fish**

# Research group of Valentin Amrhein

Bird song  
and migration



Species  
distribution  
modeling



## Research group of Valentin Amrhein



Biodiversity monitoring

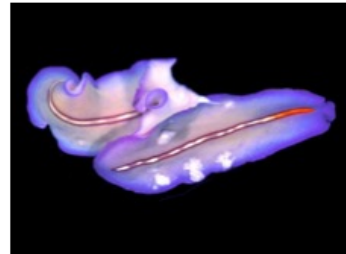
Quantitative methods

# Research Group of Lukas Schärer

## the evolution of sexual systems

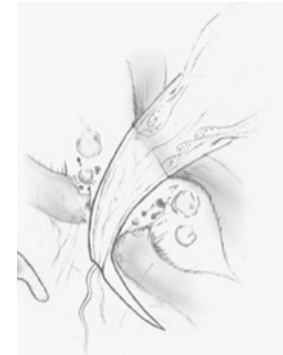
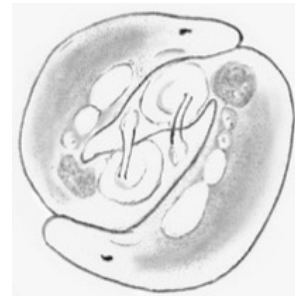
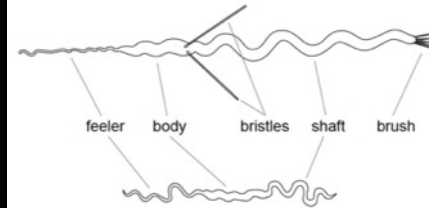
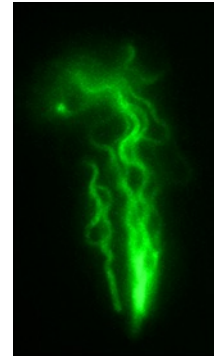
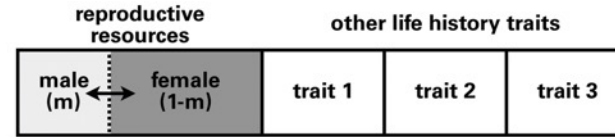
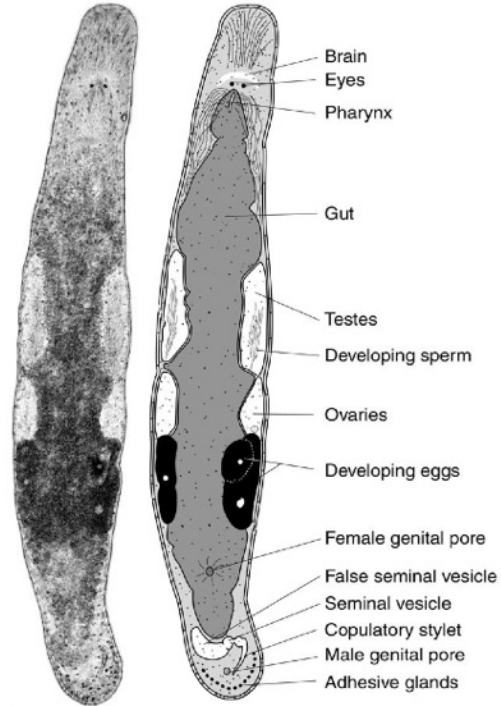
### Three main sexual systems

- gonochorism
  - individuals are male or female throughout their lives
- sequential hermaphroditism
  - individuals start life in one sex and change to the other sex later in life
- simultaneous hermaphroditism
  - individuals are both male and female at the same time



# Research Group of Lukas Schärer

## *Macrostomum lignano*: a hermaphroditic model organism

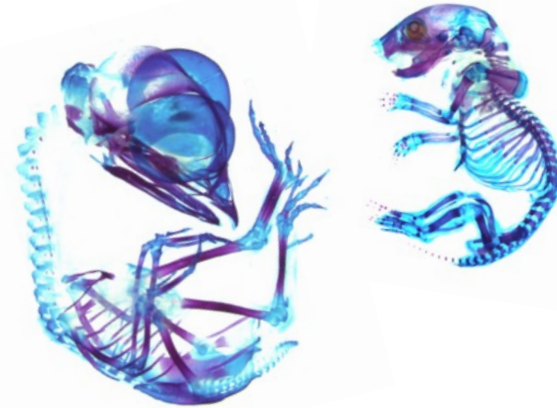


- this transparent worm with fluorescent sperm permits to study sex in hermaphrodites

# How does evolution modify development to generate morphological diversity?



Larousse, 1922



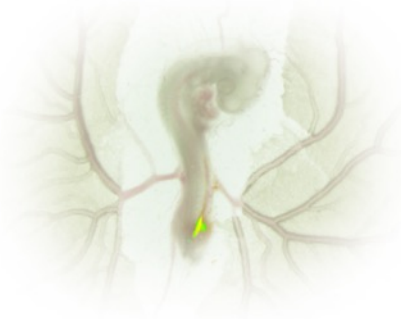
Patrick Tschopp  
**Laboratory of  
Regulatory Evolution**



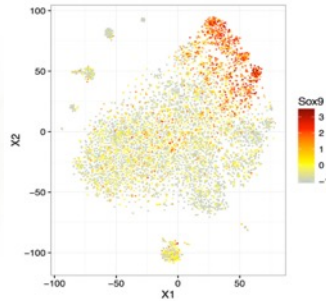


# MODEL : Gen-regulation and pattern formation during the development of the skeleton

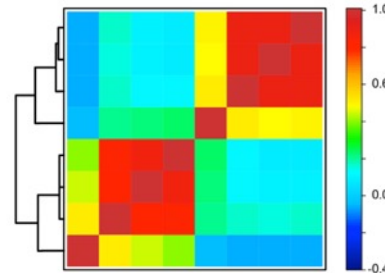
## METHODS :



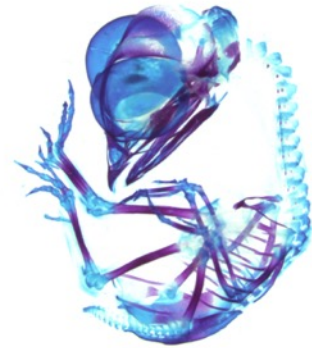
Experimental embryology



FACS-sorting and Next Generation -sequencing



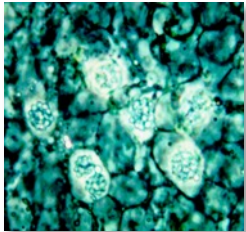
Bioinformatics and modeling

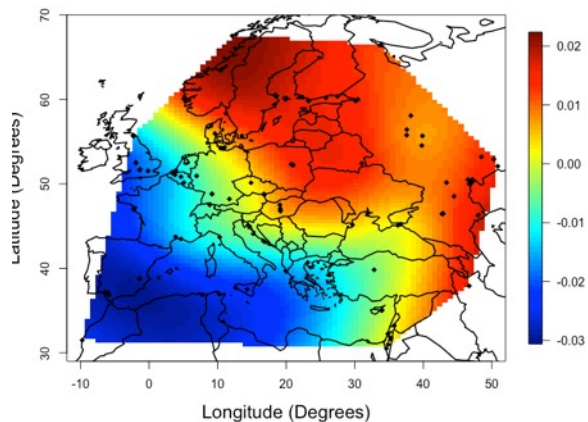
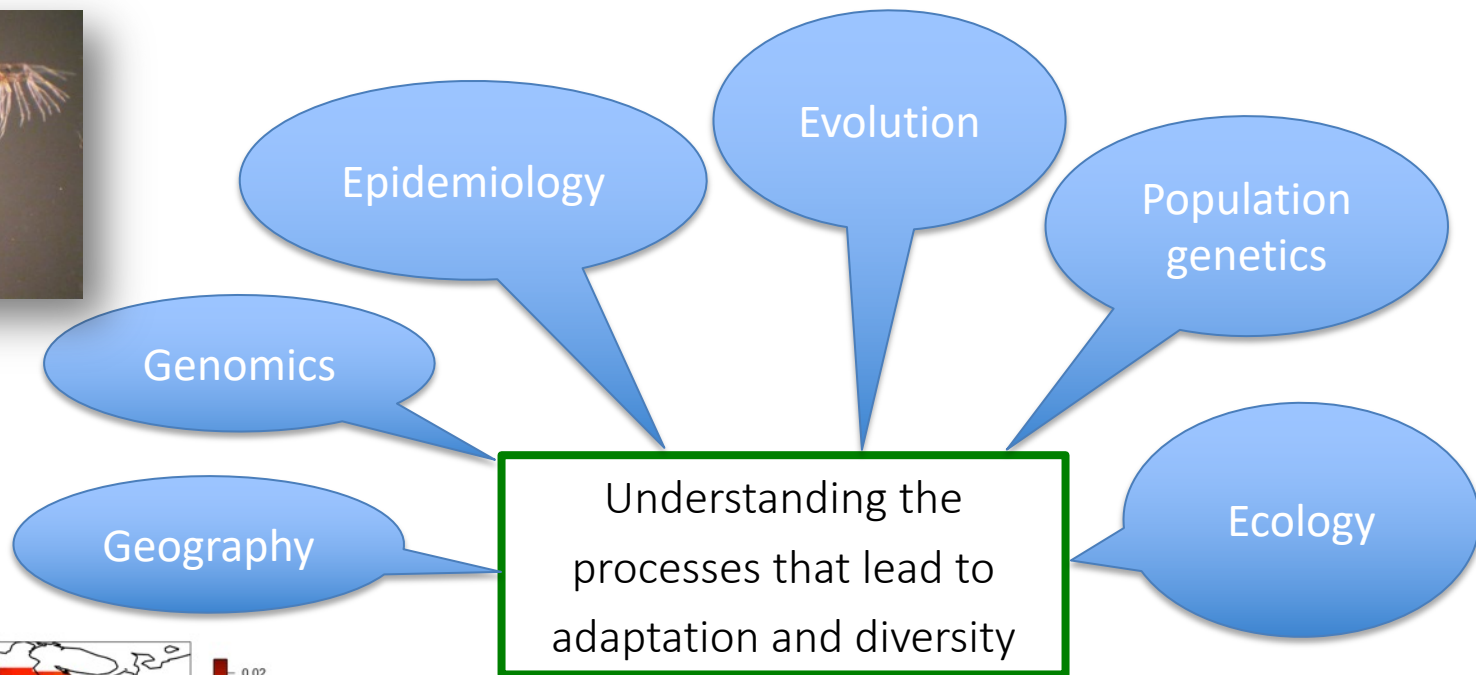


Pattern formation in the vertebrate skeleton

# Research group Dieter Ebert

Evolution, ecology and genomics of host-parasite interactions



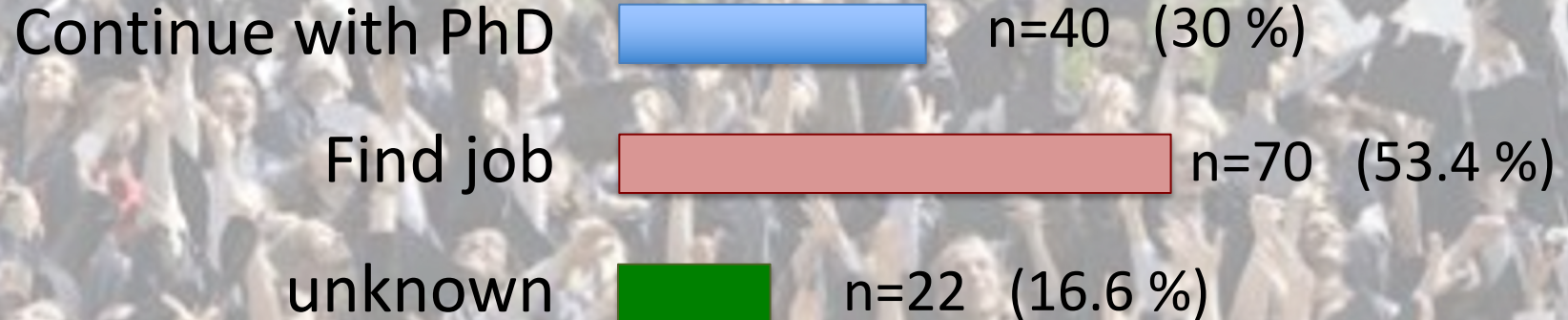


### Research topics:

- Coevolution and host-parasite interactions
- Local adaptation
- genetic polymorphisms
- Evolution of genetic systems
- Metapopulation dynamics
- Biogeography

# Master in Animal Biology and what next?

Statistics of the last 15 years  
Total number = 132



# Master in Animal Biology and what next?

Continue with PhD



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Basel

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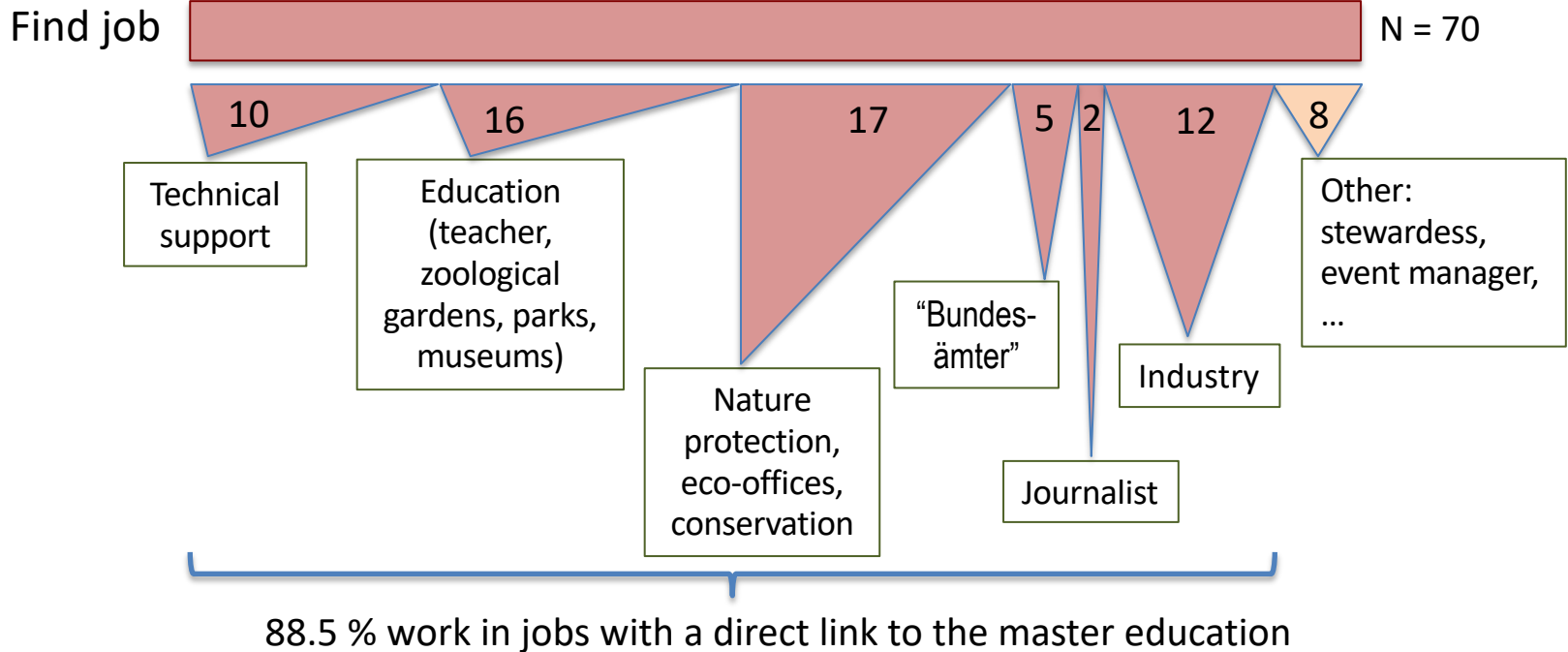
Zürich  
Lausanne  
Genf  
Fribourg  
Bern

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Abroad

- USA
- UK
- Germany
- France
- Belgium
- Island
- Israel
- Sweden
- Australia

# Master in Animal Biology and what next?



# How to register for the Master program?

Basler BSc  
Students: - Absichtserklärung at end of BSc  
(URL: [www.philnat.unibas.ch](http://www.philnat.unibas.ch),  
link to Dokumente, Bachelorstudium  
link to pdf Absichtserklärung

Other: - Application to Admission office (Zulassungsbüro) of the  
University of Basel

Further  
information

- visit our websites: [Student Office Biology](#) or [Zoology section at the Departement of Environmental Sciences](#)
- contact the program coordinator Prof. Dr. Dieter Ebert per mail: [dieter.ebert@unibas.ch](mailto:dieter.ebert@unibas.ch)
- <http://www.evolution.unibas.ch/teaching/master/master.htm>