



University
of Basel

MSc Infection Biology

Specialized Master's degree programme at the
Swiss Tropical and Public Health Institute (Swiss TPH)



Swiss TPH



In Brief:

MSc Infection Biology Programme

The MSc Infection Biology programme in a nutshell

Infection biology focuses on **host-pathogen interactions** and aims to understand **molecular, cellular, immunological** or **evolutionary mechanisms** through which **pathogens colonize their hosts, cause disease** or **develop drug resistance**.

Thematic focus:

Poverty-related infectious diseases such as malaria, tuberculosis, Chagas disease or schistosomiasis.

Research focus:

MSc students perform an individual research project (12-month) in one of the laboratories at Swiss TPH.



Swiss TPH 

Introducing Swiss TPH

Swiss TPH

1943: Swiss Tropical Institute (STI) founded at Socinstrasse 57 in Basel by Prof. Rudolf Geigy

2009: STI integrated the Institute of Social and Preventive Medicine (ISPM; University of Basel) to become the **Swiss Tropical and Public Health Institute (Swiss TPH)**



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2022: Swiss TPH moved to the brand-new building “Belo Horizonte” in Allschwil





Swiss TPH – a holistic approach to improving global health

Our Vision:

To make the world a healthier place

Our Mission:

*Improving the health and well-being of people – locally, nationally and internationally – through **excellence in research, services and education***

Our People:

~950 staff and students from 87 nations



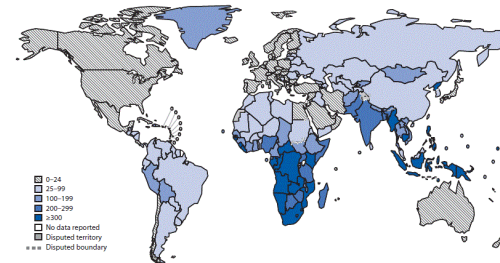
Swiss TPH – A focus on poverty-related infectious diseases

People living in low-income populations are most heavily affected by infectious diseases:

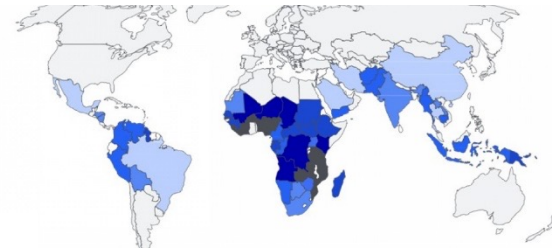
- Tuberculosis
- Malaria
- HIV/AIDS
- Neglected Tropical Diseases:
 - parasitic worm infections (Helminthiases)
 - Leishmaniases
 - Chagas disease
 - ...

- over half of the world's population affected
- hundreds of millions of cases each year
- millions of deaths each year

Tuberculosis in 2017



Malaria in 2017





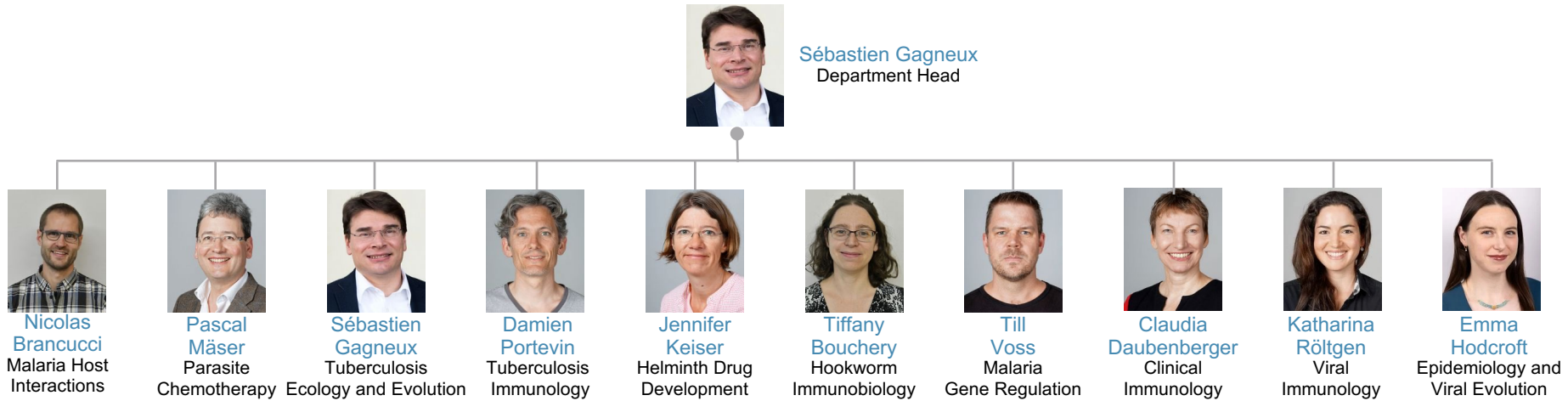
Swiss TPH



Introducing the Department of
Medical Parasitology and Infection
Biology (MPI)

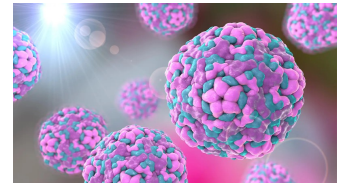
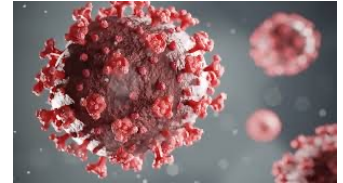
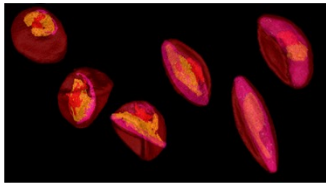
The MPI Department – Infection Biology Research

- ten research groups
- basic research and drug/vaccine R&D on poverty-related infectious diseases
- **home of the MSc Infection Biology Programme**



The MPI Department – Infection Biology Research

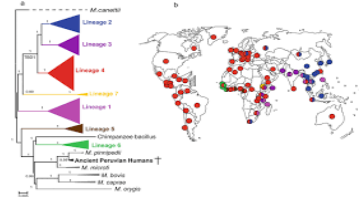
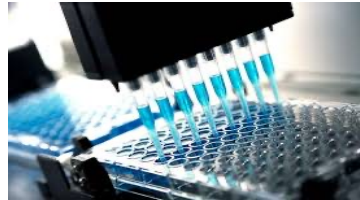
- ten research groups
- basic research and drug/vaccine R&D on poverty-related infectious diseases
- home of the MSc Infection Biology Programme
- malaria, tuberculosis, sleeping sickness, Chagas disease, Leishmaniases, parasitic worm infections, SARS-CoV2 and other respiratory viruses



The MPI Department – Infection Biology Research

Our research interests:

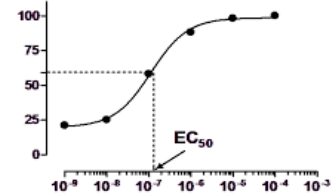
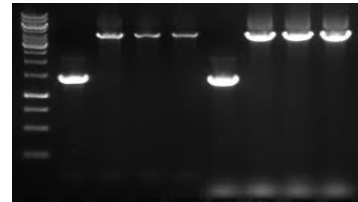
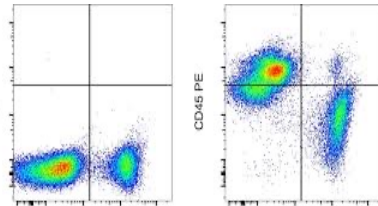
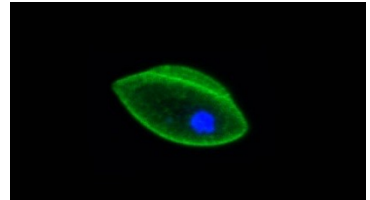
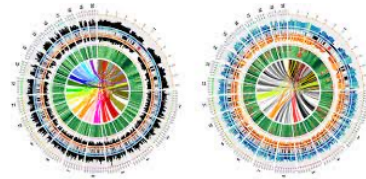
- pathogen biology
- host-pathogen interactions
- mechanisms of drug resistance and drug mode-of-action
- mechanisms of native, adaptive and vaccine-induced immunity
- molecular/genomic epidemiology
- discovery and development of drugs, vaccines and diagnostics



The MPI Department – Infection Biology Research

Our methodologies:

- *in vitro* pathogen culture systems
- genetic manipulation/genome engineering
- molecular and cell biology
- biochemistry
- whole genome sequencing and other –omics approaches
- immunology
- microbiology
- microscopy
- cellular assays
- drug assays
- bioinformatics
- biostatistics
- ...





Swiss TPH



In Detail:

MSc Infection Biology Programme

Main goals of the MSc Infection Biology Programme

To understand **the phenomenon of infection and host-pathogen interaction** from a molecular, immunological, cell biological and evolutionary viewpoint.

To understand different concepts and approaches in **drug and vaccine discovery and development**.

To understand basic concepts in **bioinformatics** and acquire skills for **computational data analyses**.

To have a good understanding of **molecular, cellular, immunological, bioinformatic and epidemiological methods** for the analysis of host-pathogen interactions.

To be able **to plan and carry out laboratory experiments** in order to address a scientific hypothesis, to **analyze the results** achieved and to **report them orally and in writing**.

To obtain an overview on the **current research literature in the field of infectious disease research**.

Admission criteria

The following degrees of a Swiss University allow for direct admission:

Bachelor of Science (BSc) in **Biology, Biochemistry, Medicine, Veterinary Medicine or Pharmaceutical Sciences**

Students with a BSc degree obtained from other Universities and/or in a related discipline will be assessed individually.

Further admission criteria:

A **minimum average mark of 5.0** (unrounded) for all eligible BSc degrees (Swiss grading system 1 to 6, where 6=max/4=pass)

OR

proof of study achievements of **≥15 ECTS in infection biology/microbiology.**

Study structure

| | |
|-----------------------------------|--|
| Duration: | 3 semesters in total: 1 st semester: lectures and course work 2 nd /3 rd semester: individual research project, some lectures/course work, MSc thesis write-up, MSc final exam |
| Credits: | 90 CPs (30 CPs for in-depth professional studies, 50 CPs for MSc thesis, 10 CPs for MSc examination) |
| Language: | English |
| Start of program: | Autumn semester (September) |
| Application deadline: | 30 April |
| Number of students in the course: | usually 10-15 |

Study structure – Module 1 “Foundations in Infection Biology”

| Mandatory course work (19 ECTS) | Course number | Semester | CPs | Main responsibility |
|--|---------------|----------|-----------|---------------------|
| Concepts in Molecular Epidemiology | 28872-01 | AS1 | 2 | M. Kwiatkowski |
| Drug Discovery and Development for Parasitic Diseases | 11652-01 | AS1 | 2 | S. Gagneux |
| Evolution of Host-Pathogen Interactions | 28394-01 | AS1 | 2 | J. Keiser |
| Immunology of Infection | 11650-01 | AS1 | 2 | D. Ebert |
| Introduction to Bioinformatics | 28880-01 | AS1 | 2 | C. Daubenberger |
| Molecular Infection Biology | 12384-01 | AS1 | 2 | J. Utzinger |
| Transferable Skills | 51775-01 | AS1 | 1 | P. Mäser |
| Biostatistics (lecture with exercises) | 28893-01 | AS1 | 3 | T. Voss |
| Interdisciplinary Research in Epidemiology and Infection Biology | 11647-01 | AS2 | 1 | T. Voss |
| Topics in Host-Pathogen Interactions | 67320-01 | SS | 2 | T. Voss |
| TOTAL | | | 19 | |

Study structure – Module 2 “Electives in Infection Biology”

| Freely selectable course work (0-11 ECTS) | Course number | Semester | CPs |
|--|---------------|--------------|-------------|
| Techniques in Molecular Parasitology | 18420-01 | AS (January) | 4 |
| Advances in Infection Biology, Epidemiology and Global Public Health | 69293-01 | AS/SS | 1 |
| Medical Entomology | 48620-01 | SS | 2 |
| Advanced Immunology of Infection | 67319-01 | SS | 2 |
| Essentials in Drug Development and Clinical Trials | 20458-01 | SS | 2 |
| Exercise: Immunology of Infection | 11651-01 | AS | 2 |
| Epidemiological Concepts | 11655-01 | AS | 3 |
| Medical Parasitology and Neglected Tropical Diseases | 34889-01 | AS | 3 |
| Malaria Epidemiology and Control | 28874-01 | SS | 2 |
| Recent Progress in Infection Biology | 39402-01 | SS | 1 |
| Infection and Cell Biology I | 22826-01 | AS | 2 |
| Infection and Cell Biology II | 21506-01 | SS | 2 |
| Molecular Virology | 12412-01 | AS | 2 |
| Infection Biology - From in vitro models to human patients | 30638-01 | AS | 1 |
| New approaches to tackle antibiotic resistance | 14466-01 | AS | 1 |
| TOTAL | | | 0-11 |

Study structure – Module 3 “General Electives”

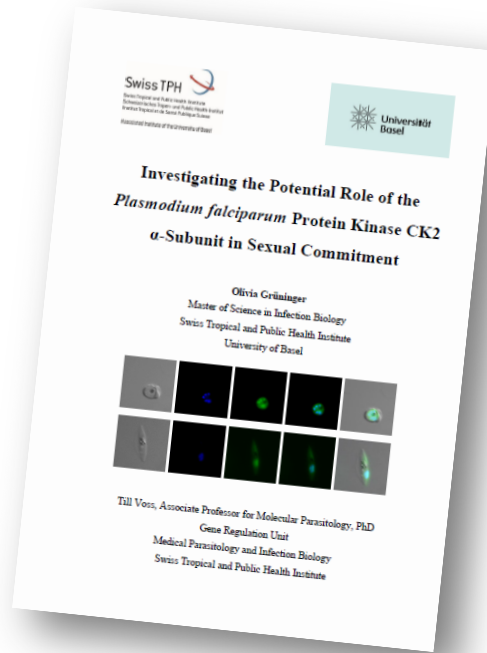
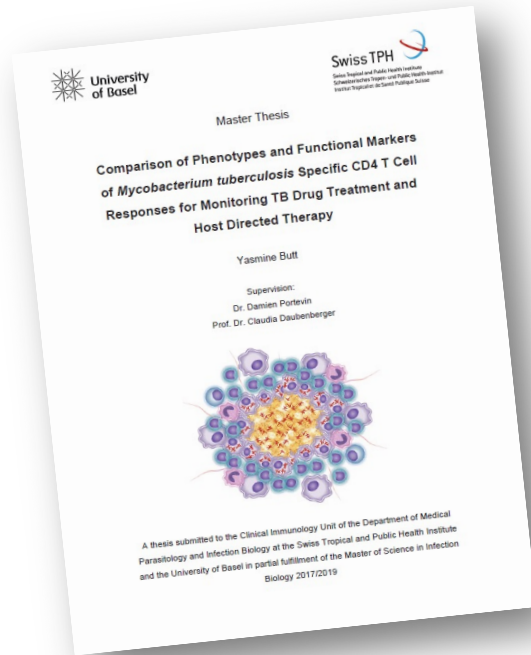
| Freely selectable course work (0-11 ECTS) | Semester | CPs | Main responsibility |
|---|----------|-------------|---------------------|
| Lectures and other courses outside the MSc Infection Biology study programme* | | | |
| ... | | | |
| ... | | | |
| ... | | | |
| ... | | | |
| TOTAL | | 0-11 | |

* Lectures/courses outside the University of Basel: only upon application to the Teaching Commission and ≥ 3 ECTS/lecture

Study structure – Individual research project/thesis work

| | |
|--------------------------------|--|
| Project topics: | Individual research project, embedded within ongoing research activities |
| Project announcements: | 1 st semester (AS1; October/November) |
| Project selection by students: | 1 st semester (AS1; December) |
| Project start: | 2 nd semester (~February) <i>(note that ≥ 12 ECTS out of the “Foundations in Infection Biology” Module are required to begin with a MSc research project)</i> |
| Project duration: | 12 months (including write-up and final exam) |
| Place of project realisation: | One of the MPI research groups (additional internal/external options possible) |
| Project supervision: | Prof/head of research team (main supervisor) Additional Prof/PD/lecturer (second supervisor) PhD students/postdocs/scientists/technicians |

Some examples of previous MSc Infection Biology projects



Some examples of previous MSc Infection Biology projects



Career opportunities

Holders of a Master of Science in Infection Biology usually work in **academia or industry in laboratory-oriented basic or applied research** in the fields of **Infection Biology and further disciplines of the Life Sciences and the Medical and Pharmaceutical Sciences**

Further career opportunities are in the fields of **education, science communication** as well as in **governmental and non-governmental organisations or foundations**

Further studies/degrees:

- PhD/doctorate
- teaching diploma for secondary schools

Further information

<https://bio.unibas.ch/de/studium/msc-infection-biology>

<https://www.swisstph.ch/en/study-with-us/bachelor-and-master/msc-in-infection-biology>

Degree profile: [link to pdf](#)

Consultation hours: any time by e-mail or Zoom with the programme coordinators

Contact the programme coordinators: Prof. Till Voss (till.voss@swisstph.ch) or Prof. Pascal Mäser (pascal.maeser@swisstph.ch)

Contact the administrative programme coordinator: Pascal Gschwind (pascal.gschwind@swisstph.ch;
or phone +41 61 284 83 60)

The MSc Infection Biology Programme is the right choice for you if you are interested and passionate about

infectious diseases

working in a laboratory

drugs and vaccines

Life Sciences

genes, proteins, genomes, cells

team work

pathogens

bioinformatics

scientific discoveries

interdisciplinary research

immunity

multinational and multicultural environment

molecular aspects of life

creepy creatures





Thank you very much for your interest in the MSc
Infection Biology Programme - we hope to
welcome you soon as one of our students