

Wahlpflichtbereich „Angewandte Molekularbiologie“

Bt-BM01, Bt-BM02



Technische
Universität
Braunschweig

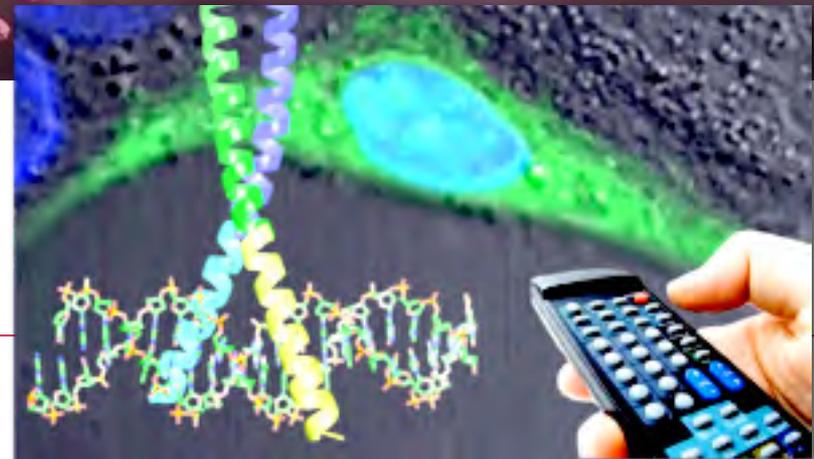
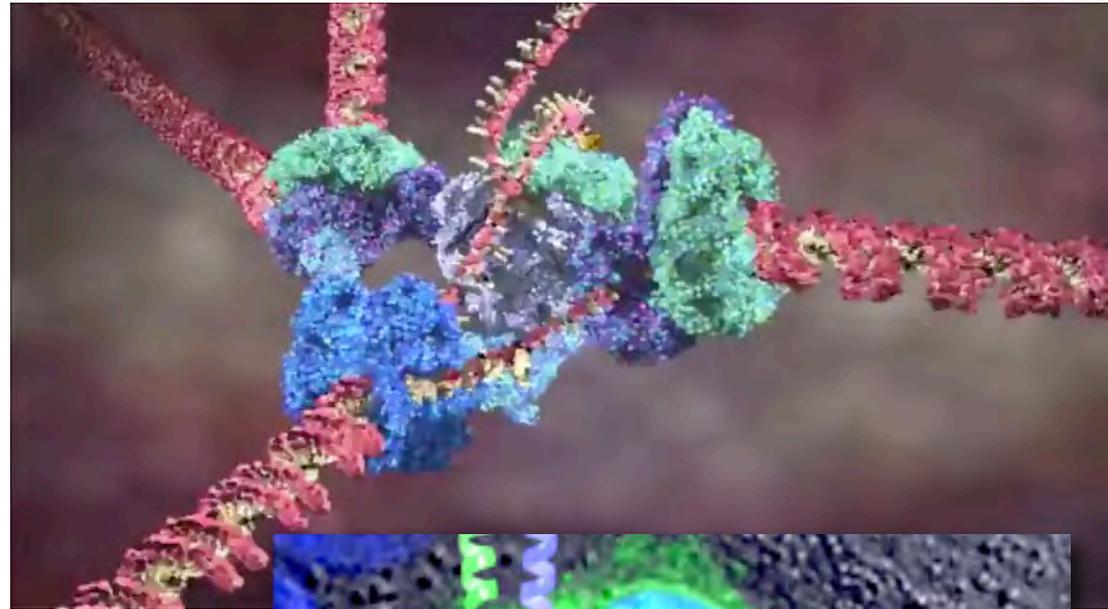
„Klassische“ Biotechnologie

Technologie rund um die Herstellung von Biomasse und Biomolekülen



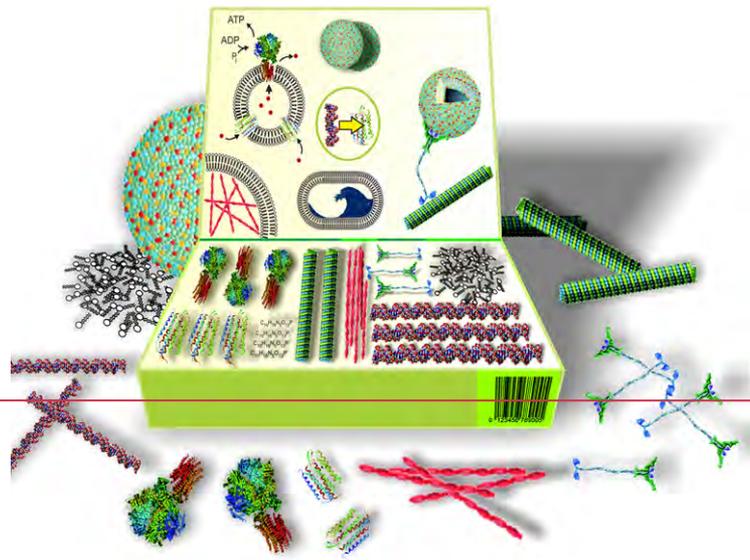
Angewandte Molekularbiologie/ Molekulare Biotechnologie

Technologie des Bastelns mit / an den Organismen / Molekülen selbst

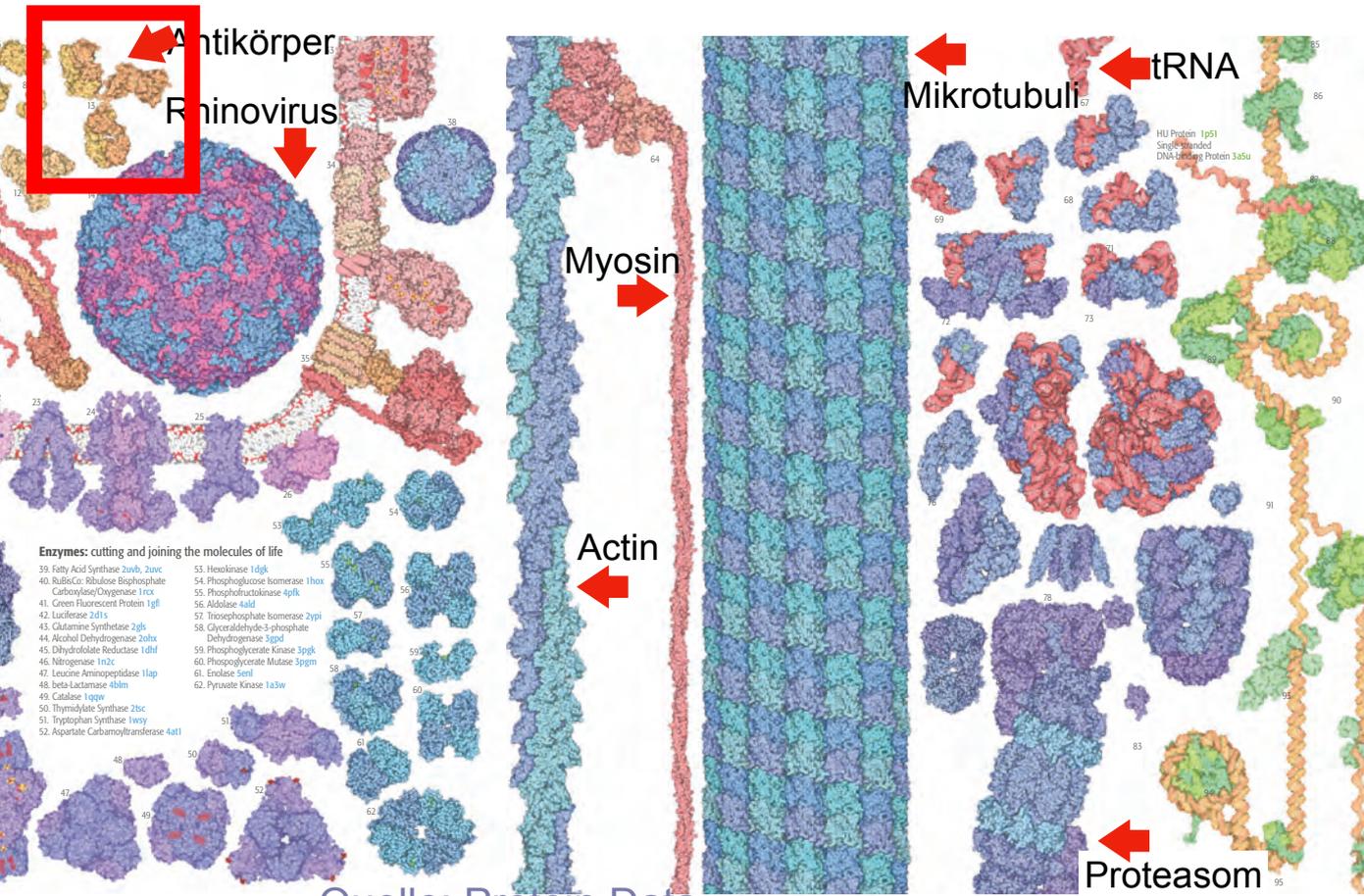


Bedeutung der molekularen Biotechnologie

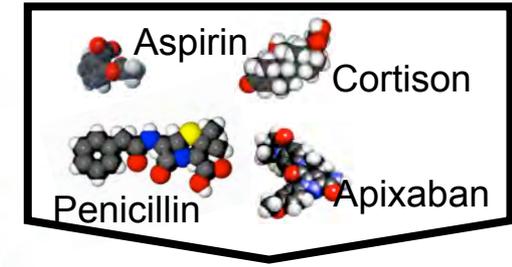
- Moleküle: Grundlegende Elemente des Lebens
- Biomedizinische und pharmazeutische Forschung
- moderne Medikamente („Biologicals“)
- Bio-Nanotechnologie
- Synthetische Biologie



Proteine und Nukleinsäuren



Quelle: Protein Data Bank



„small molecules“

Molekularmasse: einige 100 Dalton

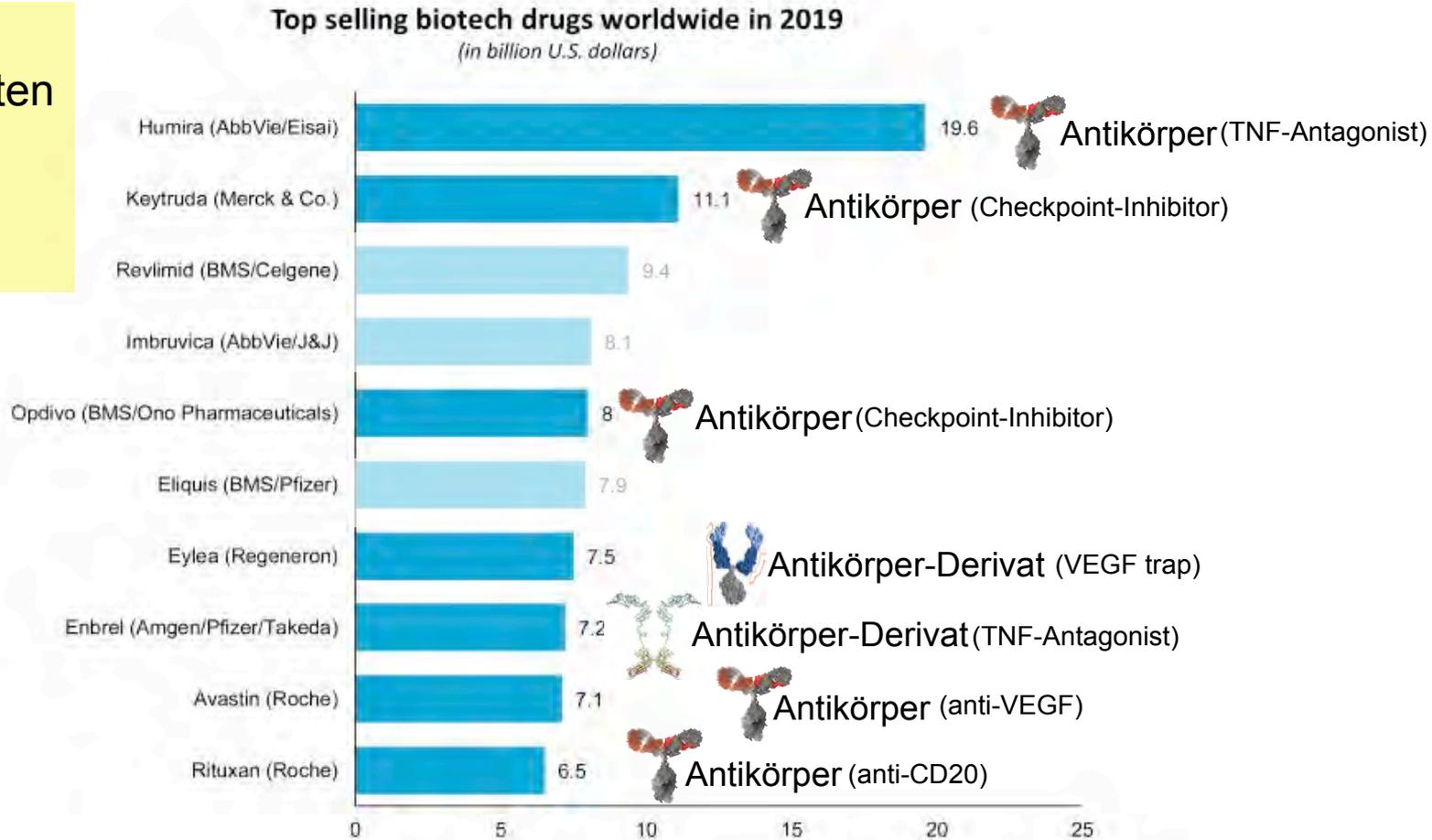
- Aspirin
- Penicillin
- Cortison
- Apixaban

„Biologicals“

10.000-200.000 Dalton

„Biologicals“ sind die führende Medikamentenklasse

7 der 10
umsatzstärksten
Medikamente
sind bereits
Biologicals



<https://www.gostardb.com/biologics-the-biotech-drugs-transforming-medicine/>

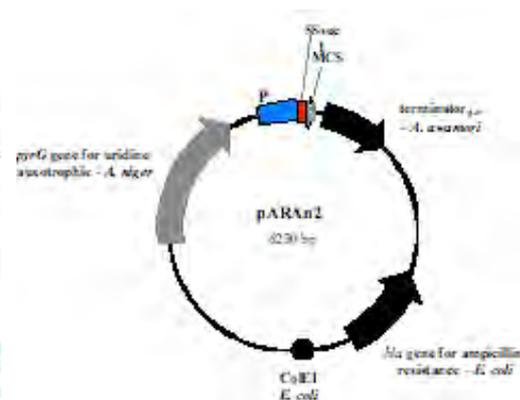
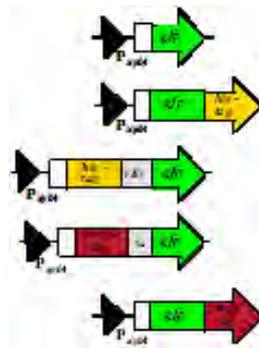
Angewandte Molekularbiologie

Bt-BM01 - Angewandte Molekularbiologie

- V: Allgemeine Mikrobiologie (Jahn)
- P: Angewandte Molekularbiologie (Dübel/Jahn)

Bt-BM02 - Grundlagen der Molekulargenetik

- V: Molekulare Genetik (Brinkmann, Fleissner)
- P: Molekulare Genetik (Brinkmann, Fleissner)



Adaptation und Überlebensstrategien von Mikroorganismen

- Signaltransduktion
- Bakterielle Bewegung
- Differenzierung
- Pilze – Sporen
- Algen
- Symbiosen - Parasiten
- Proteinexpression – Chaperone
- Proteinsekretion und –transport
- Sekretions- und Membranproteine

You never walk alone
We and our microbiome

June 18th, 2019

Philipps-Universität Marburg
Center for Synthetic Microbiology
Venue: Cineplex, Biegenstr. 1,
35037 Marburg

Speakers:
Michaela Axt-Gademann, Hochschule Coburg
Michael Blaut, Institut für Ernährungsforschung Potsdam
Peer Bork, EMBL Heidelberg
Dirk Haller, Technische Universität München
Eleanor Jameson, The University of Warwick, UK
Thomas Kuri, Zymo Research, Freiburg
Christine Lang, MBCC Group, Berlin
Andreas Schwirtz, MVZ Institut für Mikroökologie, Herborn
Andrey Shkaporov, University College Cork, Ireland
Ulrich Steinhoff, Philipps-Universität Marburg

Organizers:
Anke Becker (SYNMIKRO)
Erhard Bremer (SFB 987)

Contact:
Bettina Hoppel
bettina.hoppel@synmikro.uni-marburg.de



Participation is free!
Registration is required!
www.synmikro.de

Philipps-Universität Marburg MPI



Wie lange überleben Endosporen?

HOW LONG CAN AN ENDOSPORE SURVIVE?

In this chapter we have discussed the dormancy and resistance properties of bacterial endospores and have pointed out that endospores can survive for long periods in a dormant state. But how long is long?

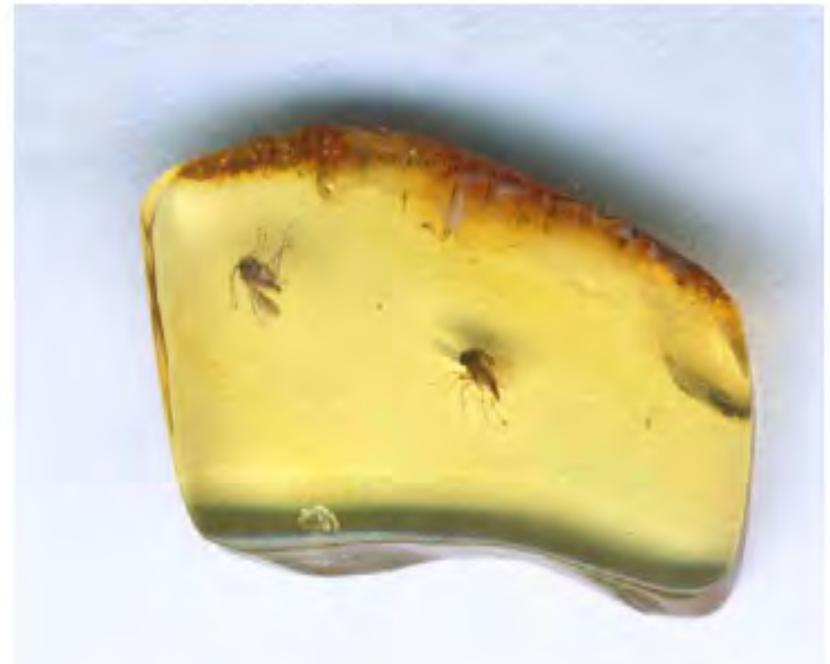
Published evidence for endospore longevity has shown that endospores can remain viable (that is, capable of germination into vegetative cells) for at least several decades and probably for much longer. A suspension of spores of *Clostridium acetivum* (see p. 10) prepared in 1947 was placed in a storage medium in 1981, 34 years later, and in less than 12 hr growth commenced, leading to a robust culture. *Clostridium acetivum* was originally isolated by the Dutchman K. T. Wieringa in 1940 but was thought to have been lost until this vial of *C. acetivum* spores was found in a storage room at the University of California at Berkeley



Clostridium acetivum 1947-1981

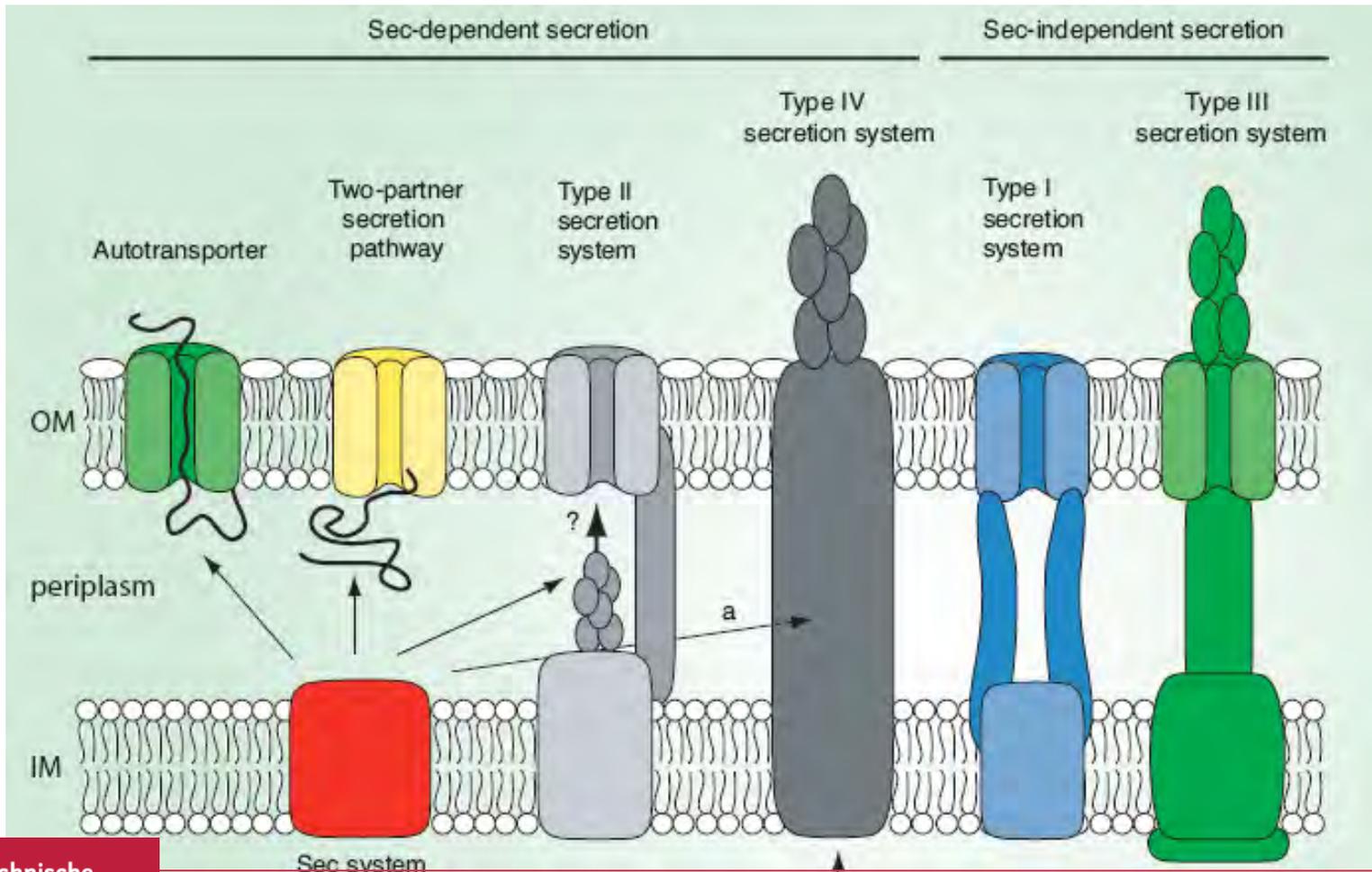
Photograph of the vial containing spores of the bacterium *Clostridium acetivum* prepared on 10/10/1947. After remaining dormant for over 30 years, the spores were suspended in a culture medium after which growth occurred within 12 hr.

Revival and Identification of Bacterial Spores in 25- 40-Million-Year-Old Dominican Amber
Cano and Borucki, Science, 1995

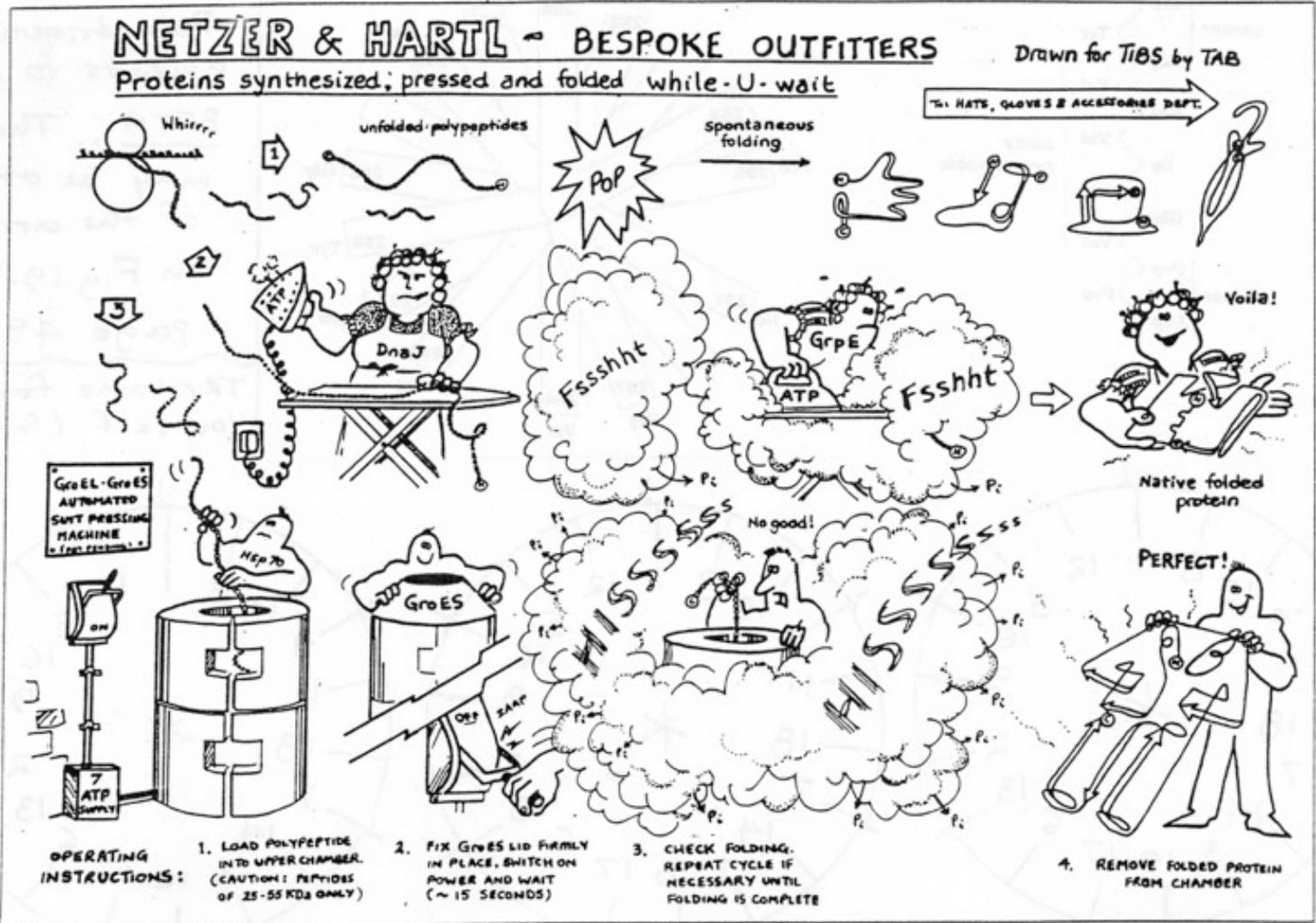


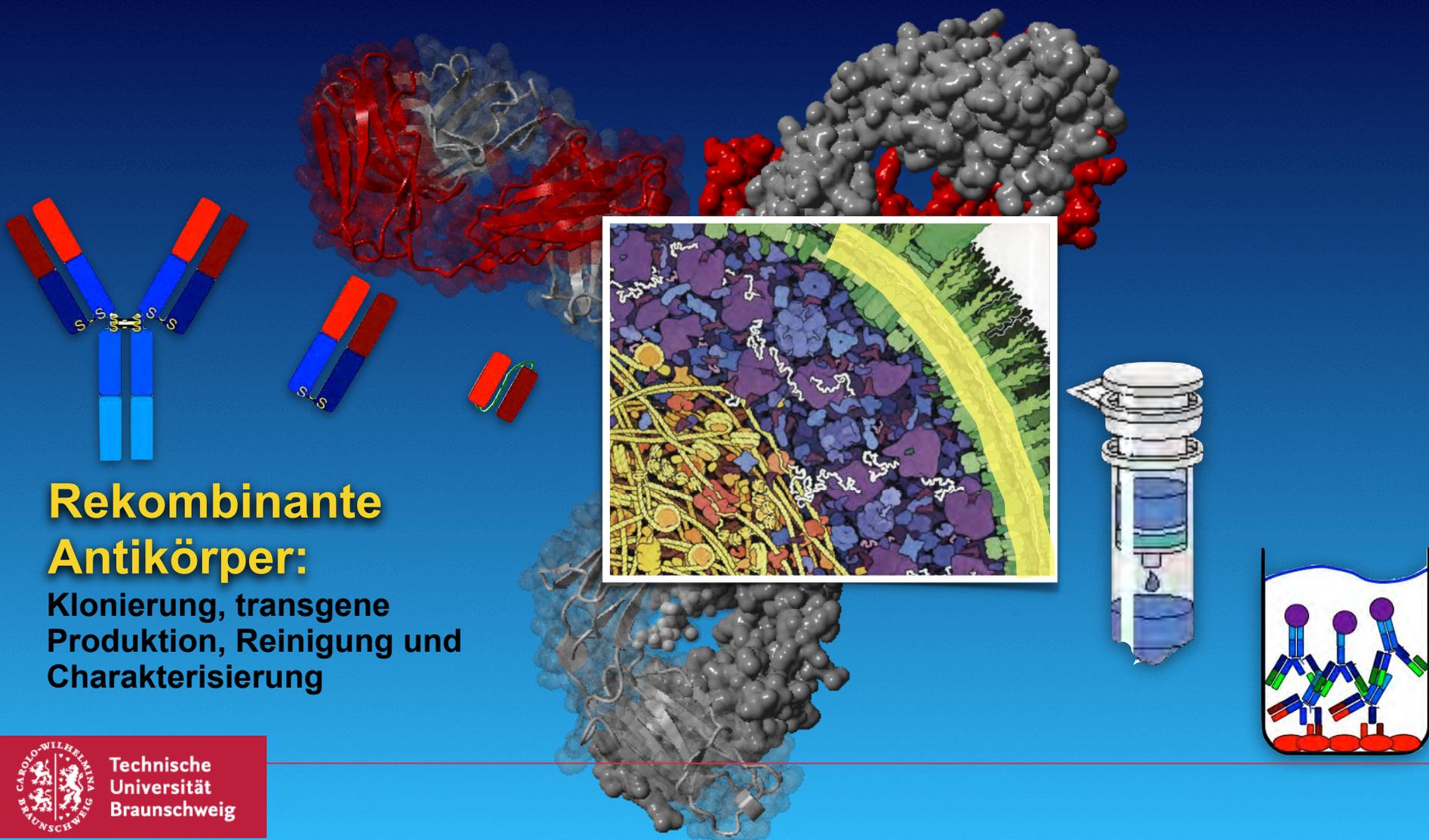
Bt-BM 01 Angewandte Molekularbiologie Vorlesung

Sekretionssysteme der äußeren Membran



Proteine – Proteinfaltung - Proteolyse



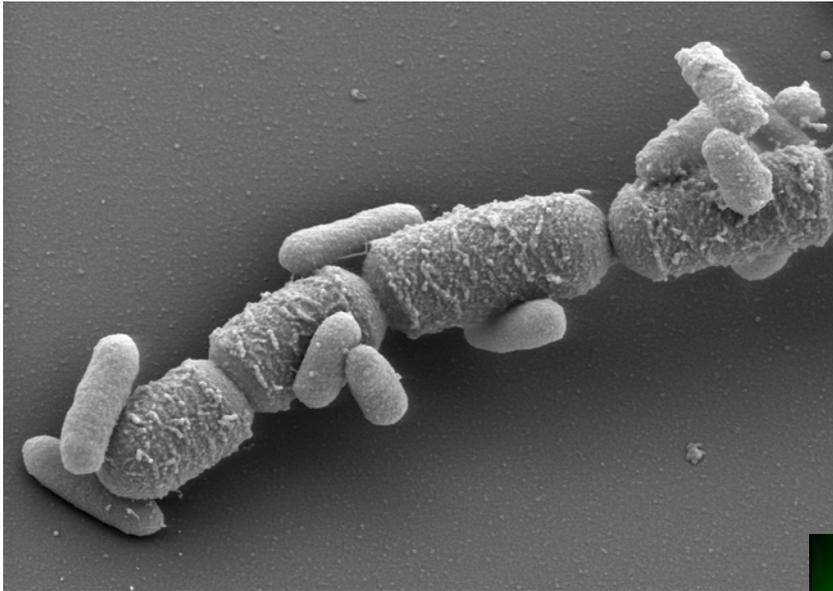


Rekombinante Antikörper:

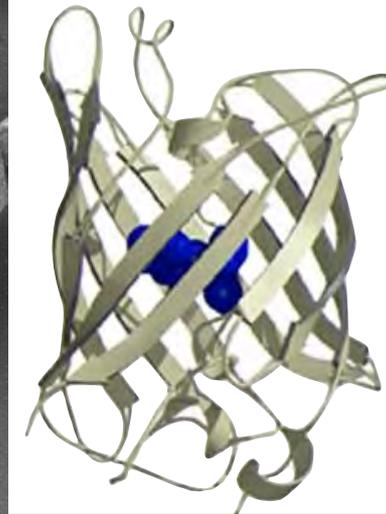
Klonierung, transgene Produktion, Reinigung und Charakterisierung

Bt-BM 01 Angewandte Molekularbiologie Praktikum

Rekombinante Proteinproduktion in *Priestia megaterium* am Beispiel des Grün fluoreszierenden Proteins (GFP)



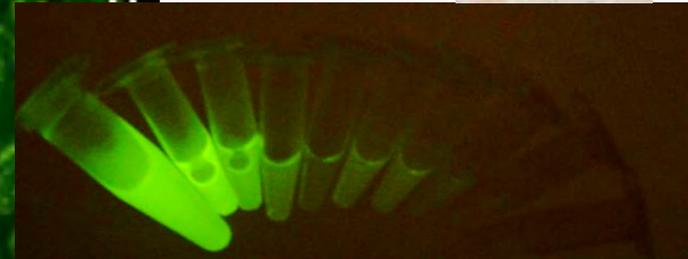
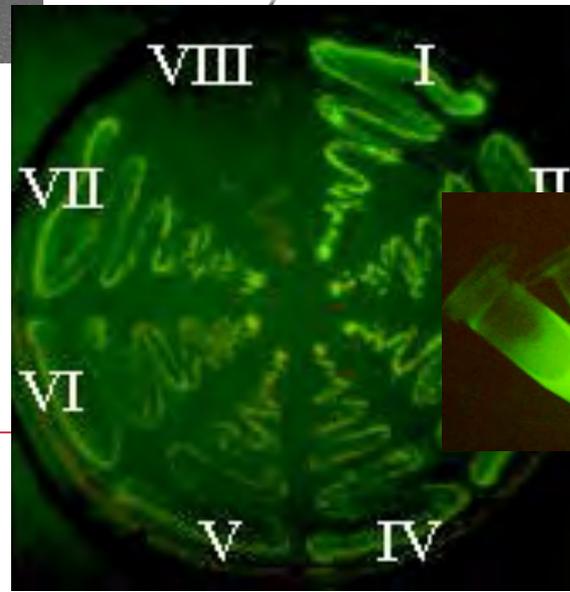
Elektronenmikroskopische Aufnahme: *Priestia megaterium* (große Zellen) mit *Escherichia coli* (kleine Zellen), Rohde, 2006



GFP



Reinigung von rekombinant hergestelltem GFP



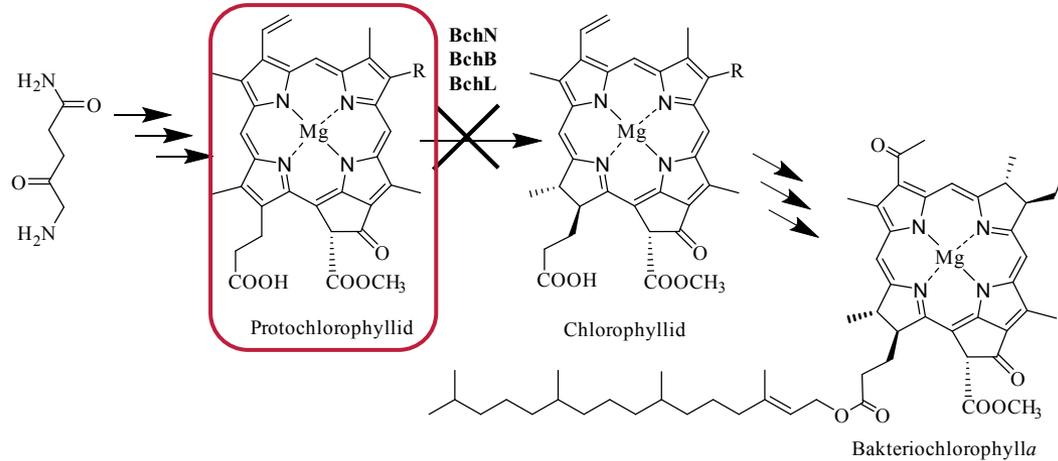
Gereinigtes GFP

GFP-produzierender *P. megaterium* auf Agarplatte

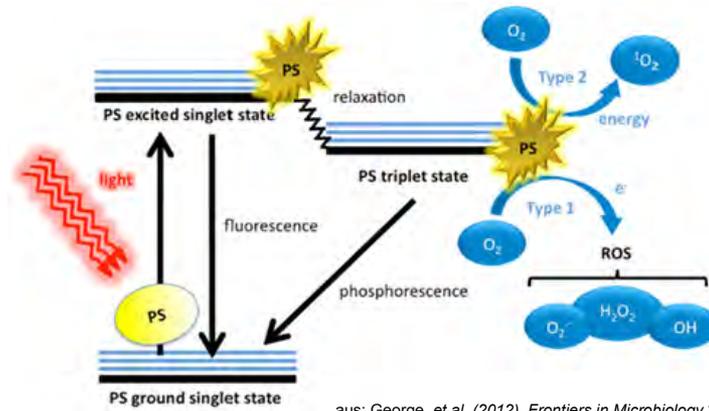


Isolierung von Protochlorophyllid für die Antimikrobielle Photodynamische Therapie

Produktion und
Reinigung:



Photodynamische Abtötung
von *Bacillus subtilis*:



aus: George, et al. (2012). *Frontiers in Microbiology* 3, 120.



Moderne Methoden der Molekulargenetik

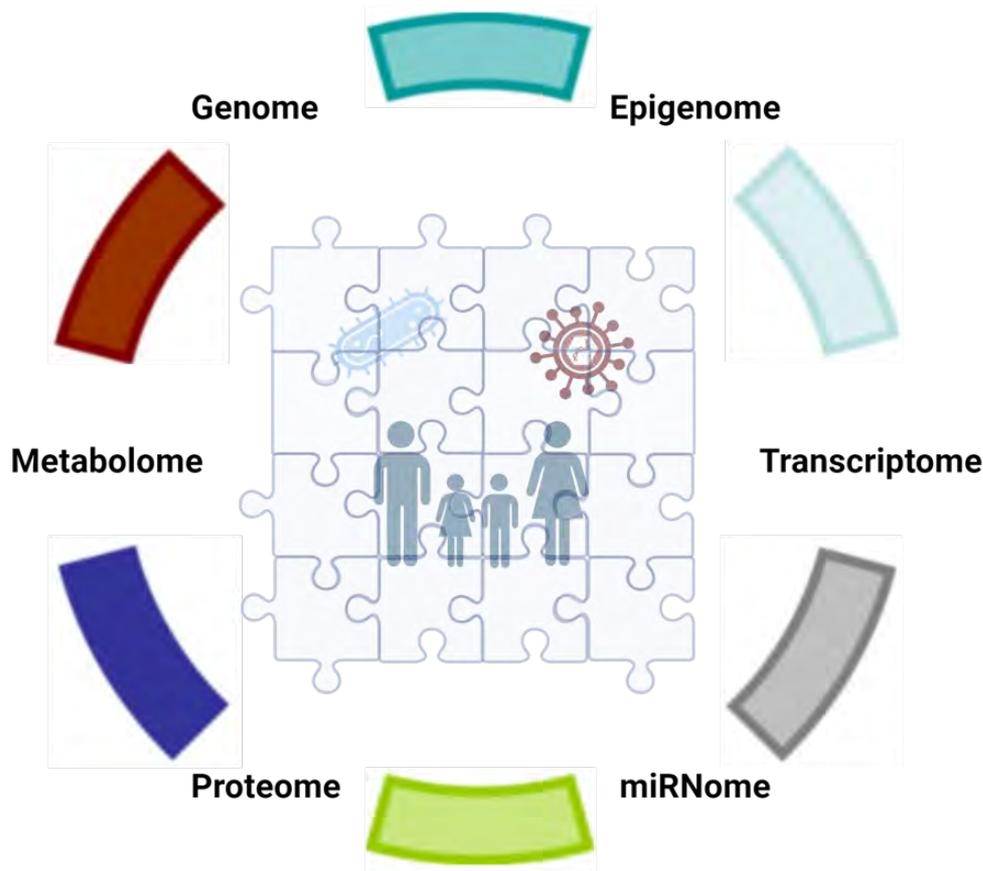
BT-BM02



Modulverantwortliche:
Prof. Dr. André Fleißner
Prof. Dr. Melanie Brinkmann
with Prof. Dr. Laura Steenpass



Modul BM02: Vorlesung (SS) und Praktikum (WS)

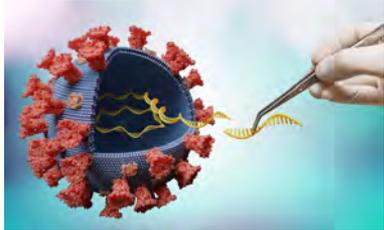


Genom, Epigenom, miRNome, Transkriptom, Proteom, Interaktom, Metabolom

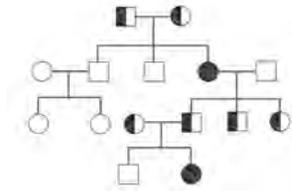
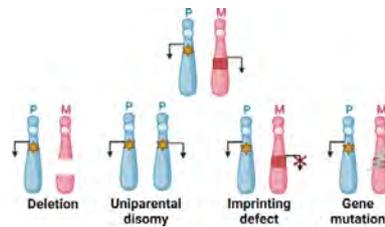
WissenschaftlerInnen wollen heute nicht mehr nur einzelne Gene und Proteine identifizieren, sondern alle Gene einer Zelle (Genom), alle abgelesenen Gene (Transkriptom), alle RNAs, alle Proteine (Proteom) und deren Partner (Interaktom), sowie alle Metabolite (Metabolom).

-> Dafür brauchen wir neue moderne Methoden

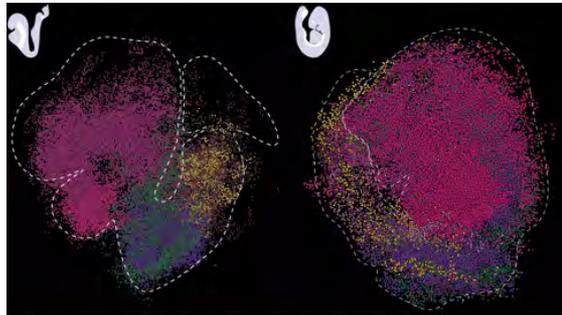
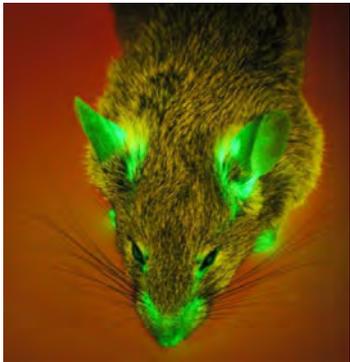
Modul BM02: **Vorlesung (SS)** und Praktikum (WS)



How can I engineer viral genomes (and why should I do that)?



- With which methods can I perform karyotyping?
- What is genomic imprinting and how can I measure it?
- Clinical Genetics



3D-reconstructed E8.5 (left) and E9.0 (right) stage embryos with six cell states highlighted in different colours (L. Incore). Bolondi et al. 2023

Measuring gene expression at high resolution: spatial and temporal

Modul BM02: Vorlesung (SS) und **Praktikum** (WS)



You use the gene scissor Cas9!

1

