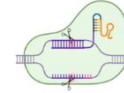
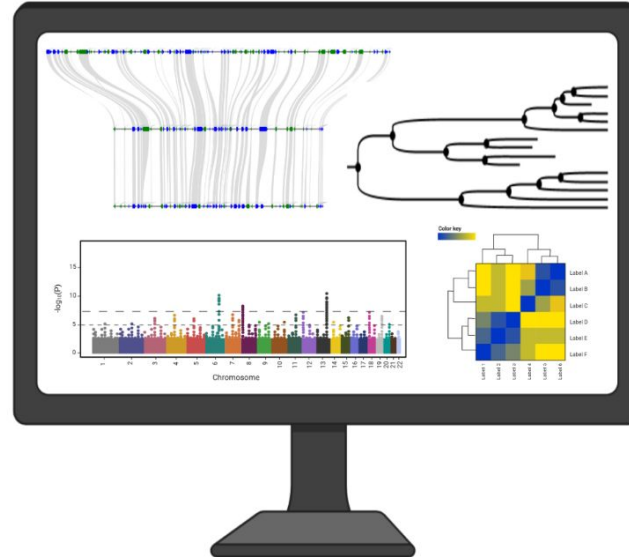
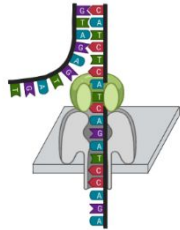
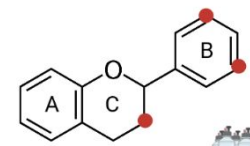




Technische  
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Braunschweig



species  
biosynthesis  
within  
sequences  
single  
reference  
sites  
plants  
pigments  
key  
sequence  
flavonol  
gene  
MYB  
introns  
residues  
RNA-Seq  
proteins  
activity  
betanin  
functional  
variants  
R2R3-MYB  
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sequencing  
read  
transcription  
genomic  
across  
identification  
RFA-Seq



Plant Biotechnology  
and Bioinformatics

# Data Literacy in Genome Research / Genomics

Prof. Dr. Boas Pucker and Katharina Wolff  
(Plant Biotechnology and Bioinformatics)

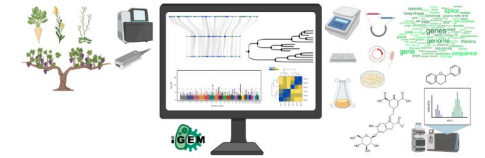
# Round of introduction

- Name?
- Study program?
- Semester?
- Previous experiences with genomics?
- Previous experiences with bioinformatics?
- Previous experiences with data science?
- Expectations?

# Boas Pucker

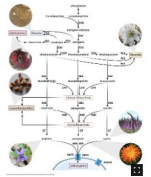
- Biochemistry at HHU Düsseldorf
- (Systems) Biology at Bielefeld University
- Doctoral student (CeBiTec, Bielefeld University)
  - Genomics & Bioinformatics; synthetic biology (iGEM)
- Post doc (Ruhr-University Bochum)
- Post doc (Department of Plant Sciences, Cambridge, UK)
- Plant Biotechnology & Bioinformatics, TU Braunschweig (since October 2021)
  - Specialized plant metabolites, applied bioinformatics

## Plant Biotechnology and Bioinformatics (Prof. Pucker)

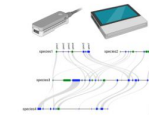


### Specialized Metabolism

Plants produce a plethora of specialized metabolites. These allow plants not only to cope with numerous environmental challenges, but they can also have beneficial effects on humans. Many plant species have been successfully used in traditional medicine. Investigations of specialized plant metabolism can reveal the biosynthesis pathways and enable heterologous production of drug candidates. Our fundamental research on biosynthetic pathways paves the way for translation into industrial applications.



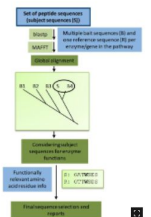
### Plant Genomics



Plant genomes harbour genes, which are the blue prints for enzymes involved in various biosynthetic pathways. Knowledge about plant genomes unravels the mysteries of the specialized biosynthetic pathways in plants. Rapid developments in long read sequencing technologies enable us to study even large and complex plant genomes.

### Bioinformatics

Specific biological questions can be answered through sophisticated tools. Automatic analysis of large data sets and the integration of genomic, transcriptomic, and metabolomic data are often required. Applications include the discovery of biosynthetic pathways and their regulators, the detection of biosynthetic gene clusters, and the identification of tolerance/resistance mechanisms. Bioinformatic tools are an effective way to generate hypotheses and to guide molecular biology experiments.

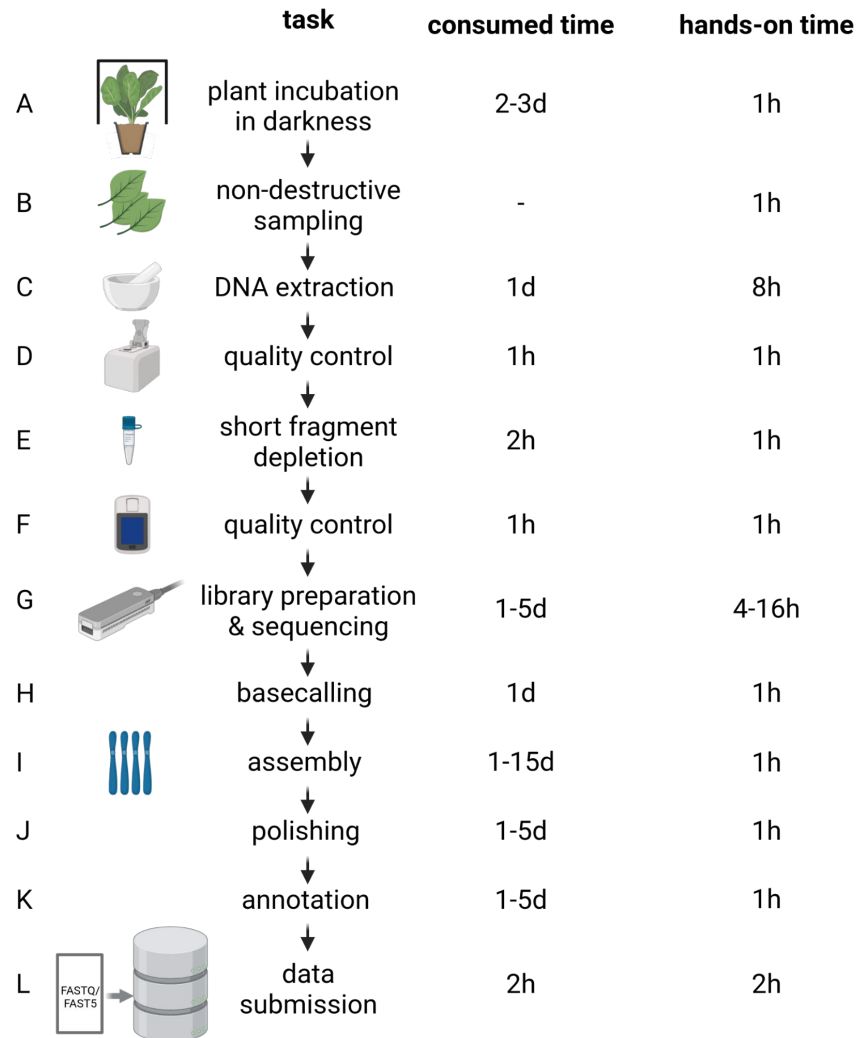


# Availability of slides

- All materials are freely available (CC BY) - after the lectures:
  - StudIP: Data Literacy in Genomics
  - GitHub: <https://github.com/bpucker/teaching>
- Questions: Feel free to ask at any time
- Feedback, comments, or questions: [b.pucker\[a\]tu-bs.de](mailto:b.pucker[a]tu-bs.de)

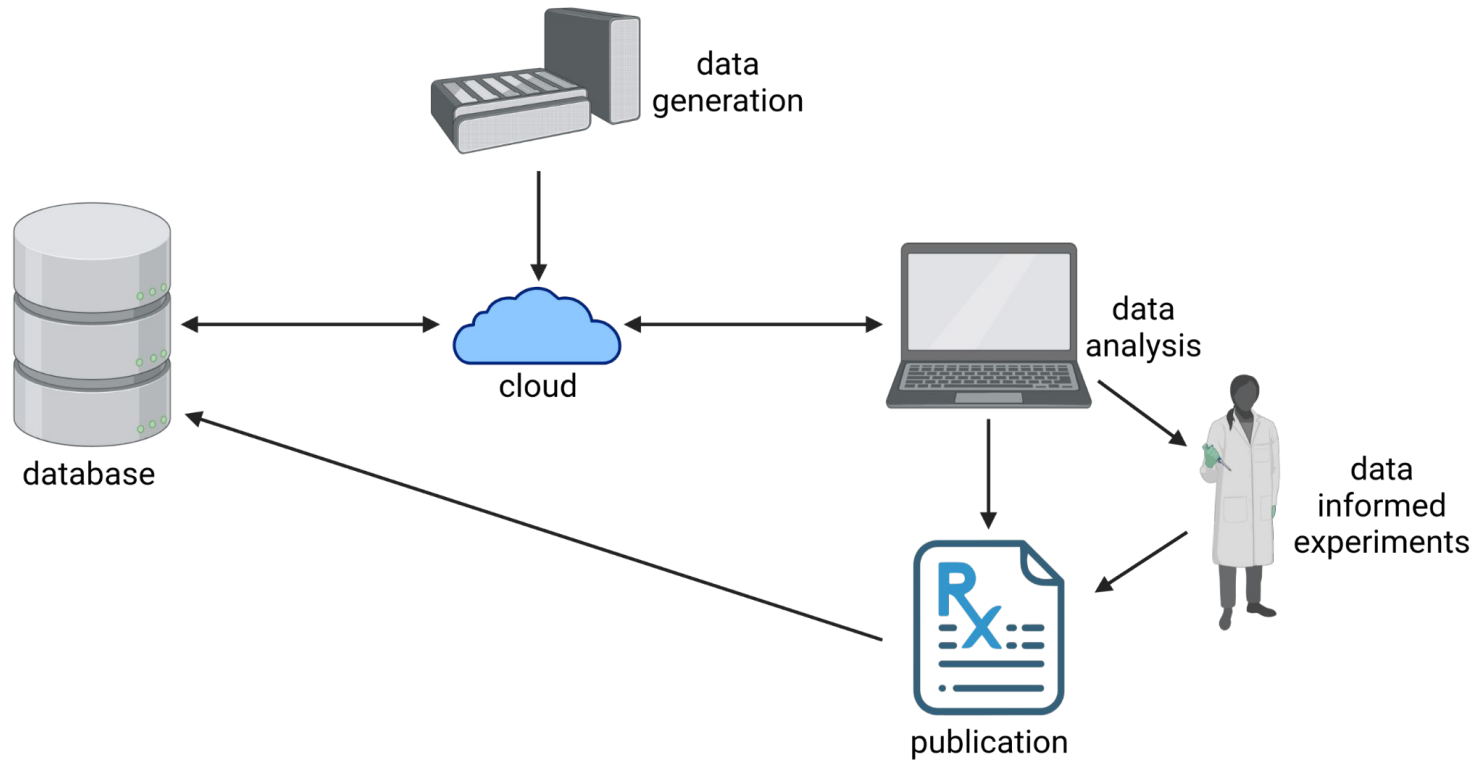
My figures and content can be re-used in accordance with CC BY 4.0, but this might not apply to all images/logos. Some figure were constructed using bioRender.com.

# Sequencing plant genomes



(modified from: <https://doi.org/10.1017/qpb.2021.18>)

# Processing and interpreting large data sets



# Lectures

- Introduction to data literacy in genomics
- Sequencing
- Assembly and annotation of a genome sequence
- Comparative genomics
- Submitting, publishing, and re-using data

# Practical course

- Planning of experiments & preparations (buffers, ELIXIR account)
- High molecular weight DNA extraction
- Quality control
- Preparation of sequencing libraries
- Sequencing
- Data analysis
- Presentation in front of international audience
- Protocols (two weeks after end of course)

**Laptops?**



# Seminar / international symposium

- Scientific talk (about 10-15 minutes) about own project + discussion
- Option for trial talks to prepare for the event

# Dates & times

- Lecture:
  - Start: xxxxx
  - Mon-Fri: xxxx - xxx (including breaks)
- Practical course:
  - (Safety induction on xxxx)
  - #5: xxxx - xxxx
  - Usually 10am-4pm
- Seminar:
  - Flexible
- Oral exam:
  - TBD

# Time for questions!