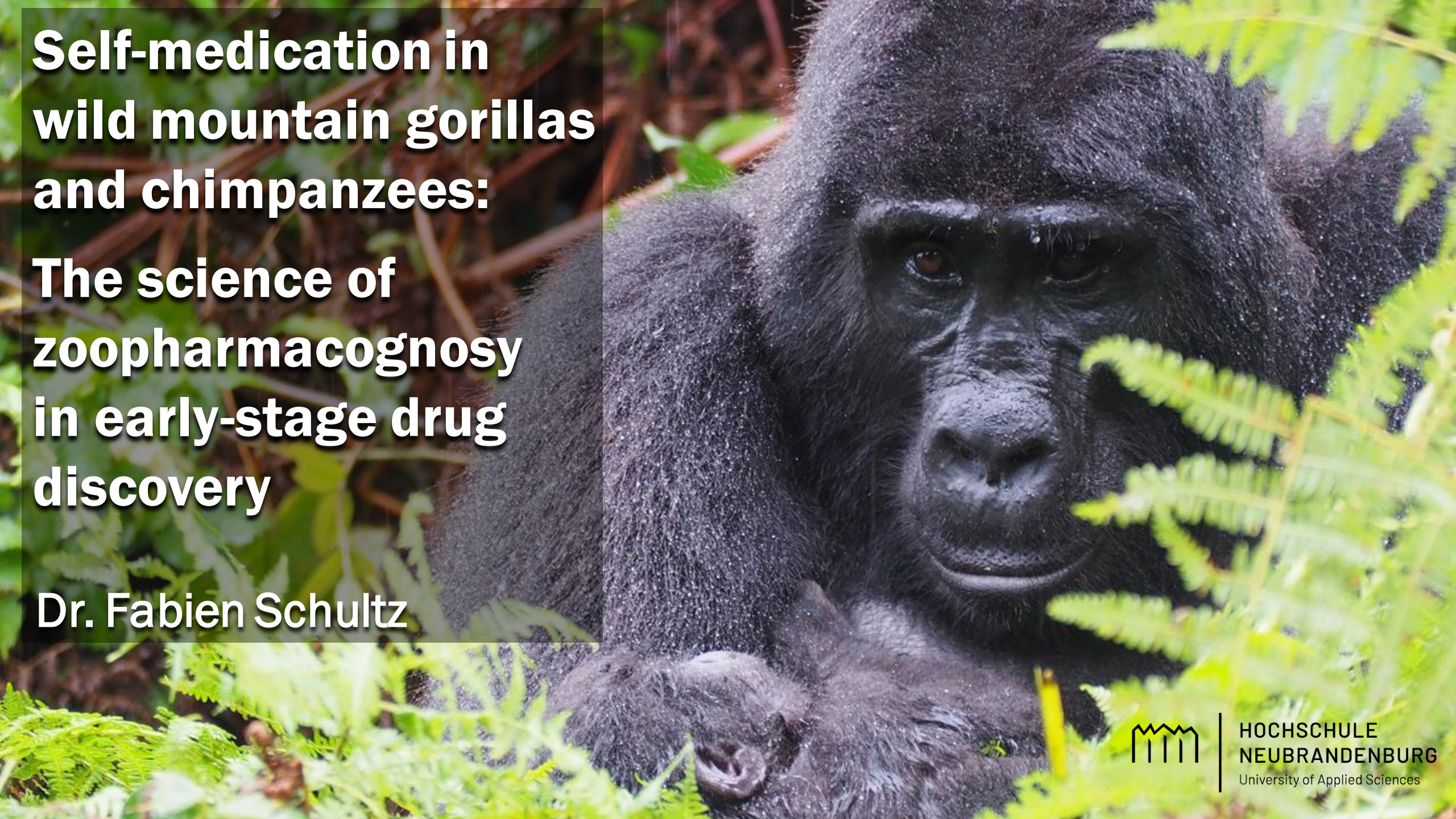
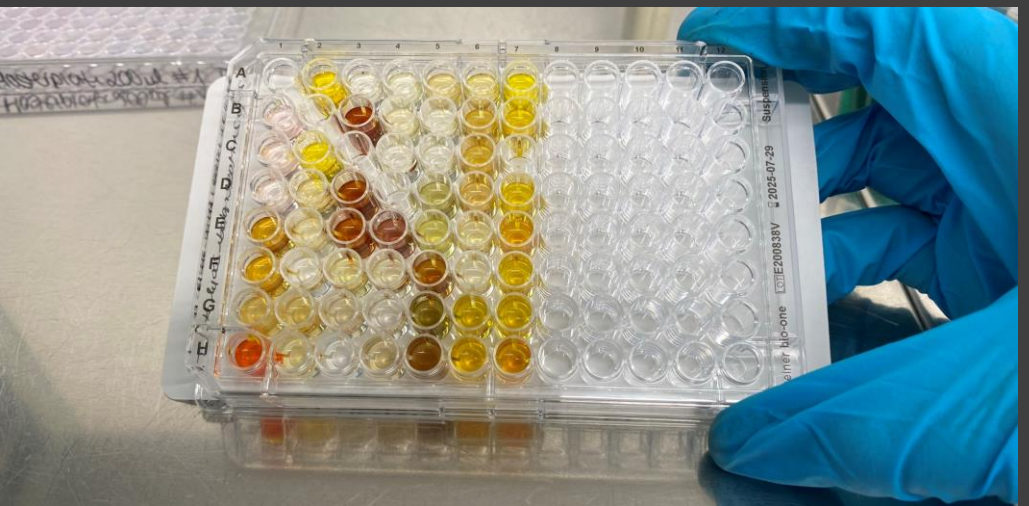
Self-medication in wild mountain gorillas and chimpanzees:

The science of zoopharmacognosy in early-stage drug discovery

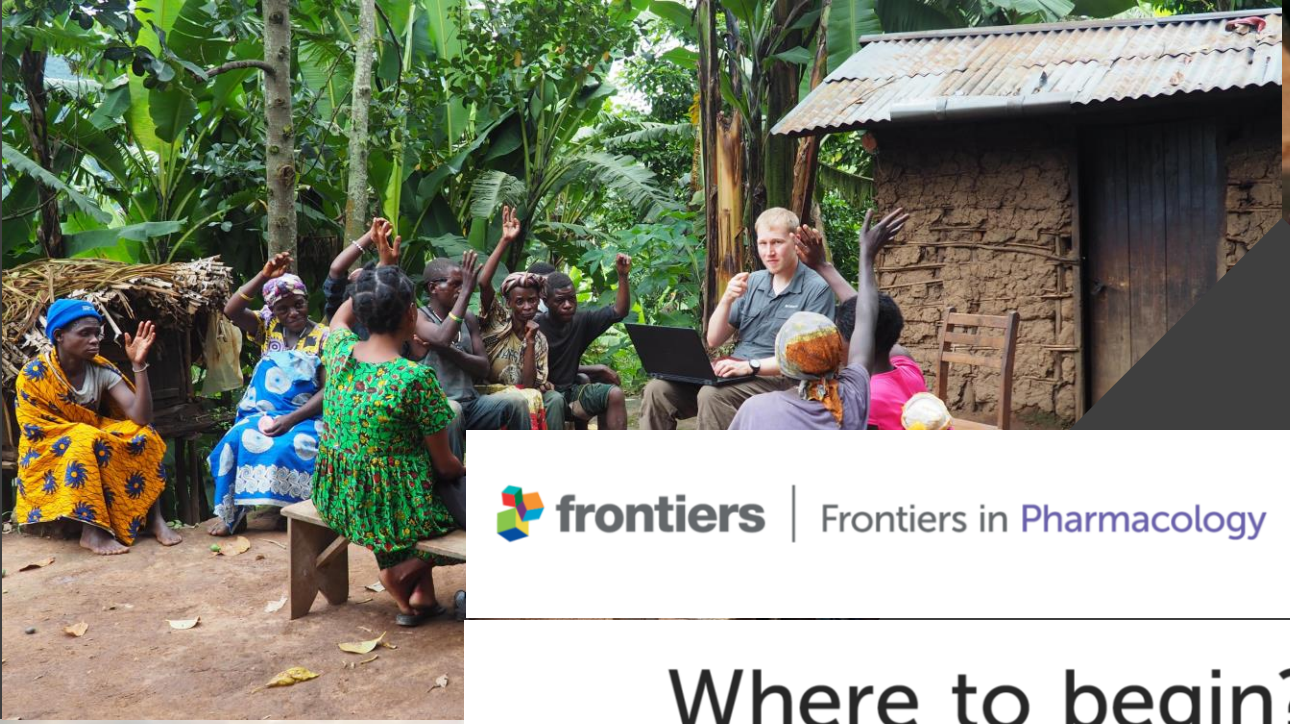
Dr. Fabien Schultz

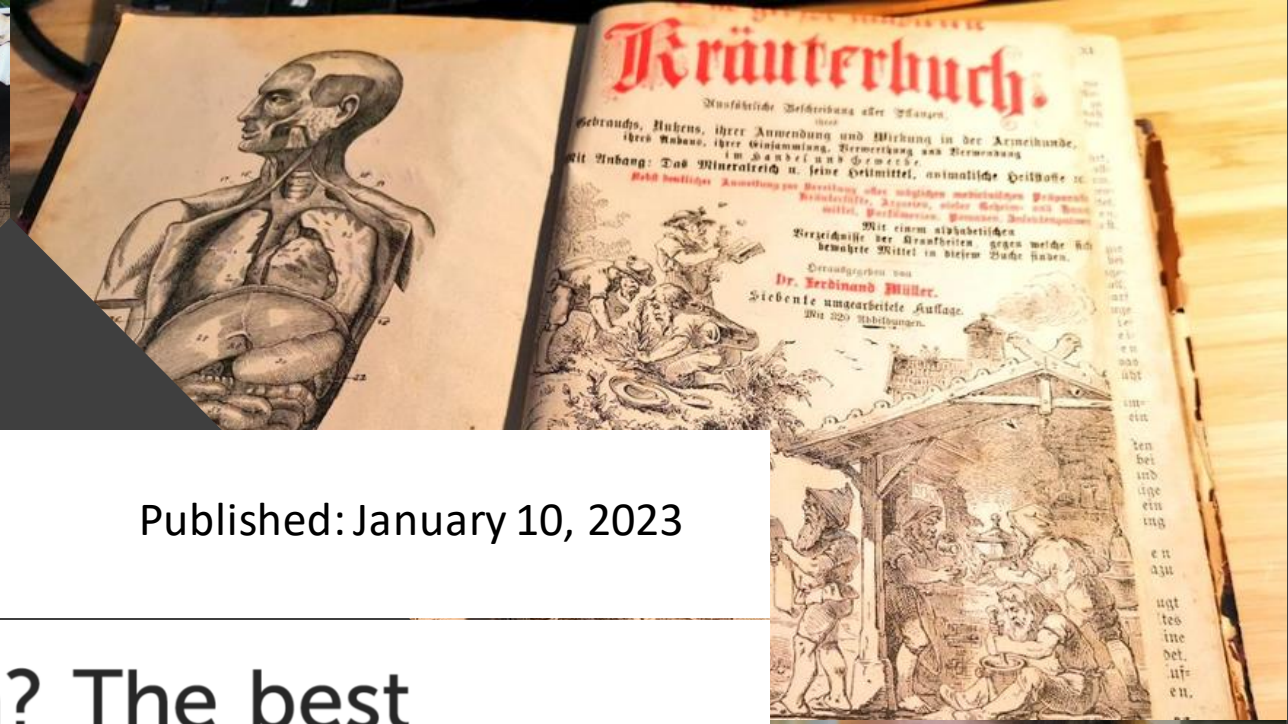


HOCHSCHULE NEUBRANDENBURG
University of Applied Sciences



Zoopharmacognosy



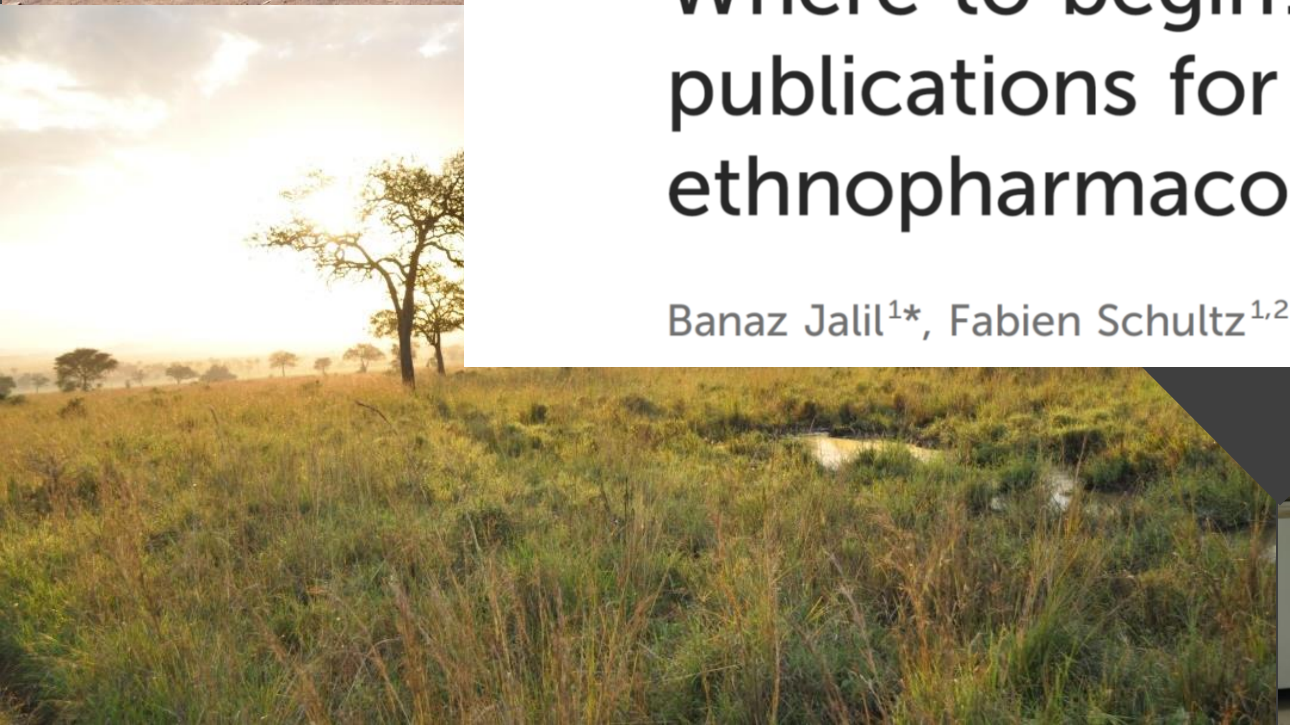


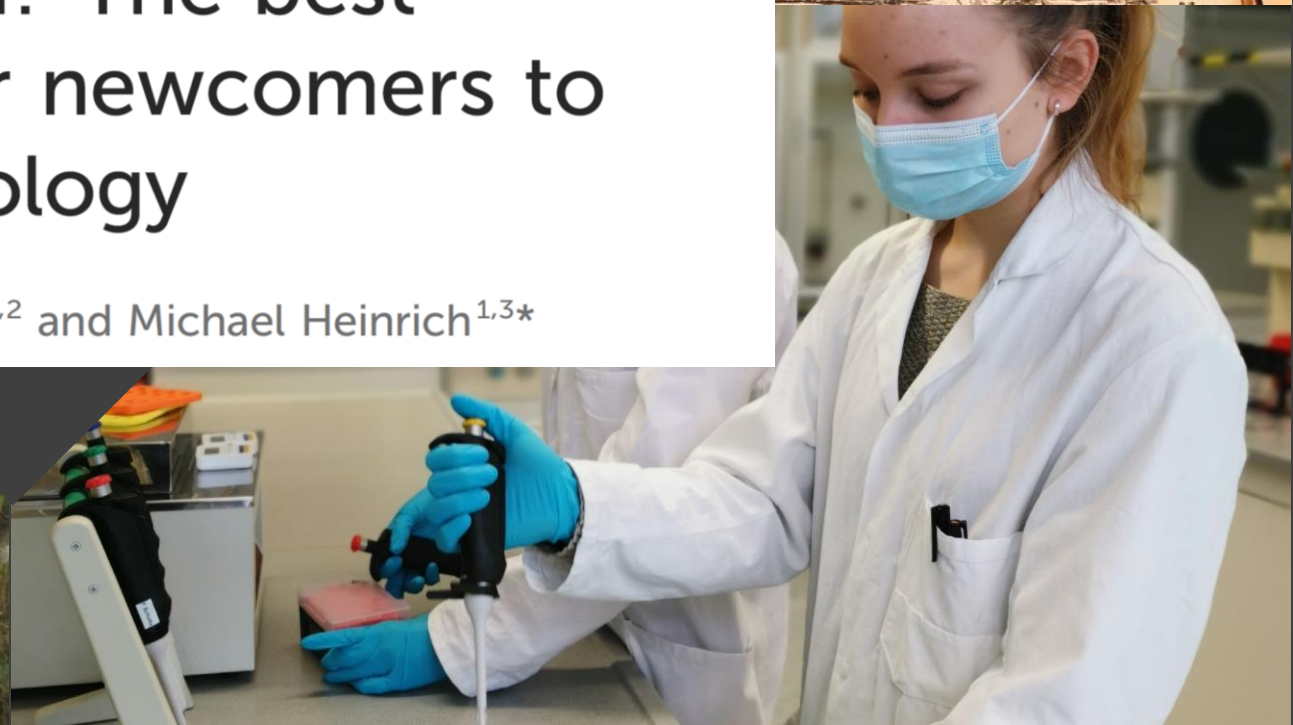
frontiers | Frontiers in Pharmacology

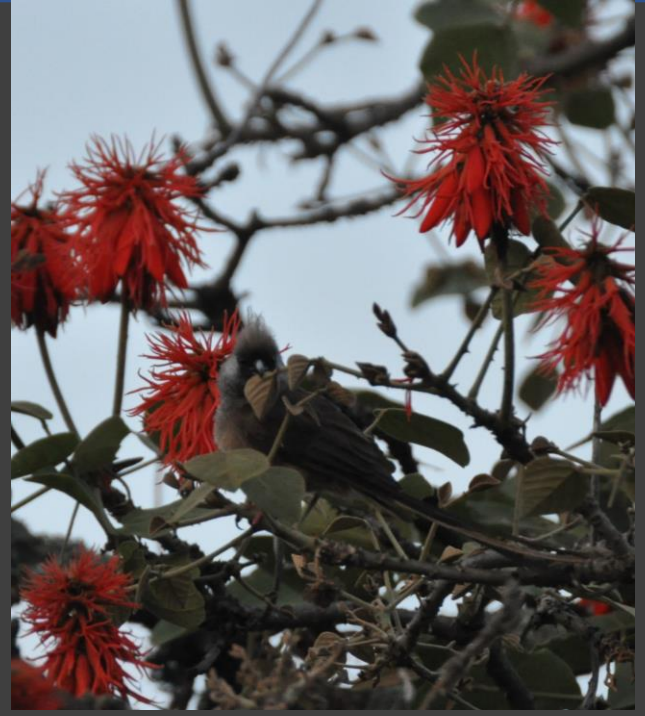
Published: January 10, 2023

Where to begin? The best publications for newcomers to ethnopharmacology

Banaz Jalil[1]*, Fabien Schultz[1,2] and Michael Heinrich[1,3]*





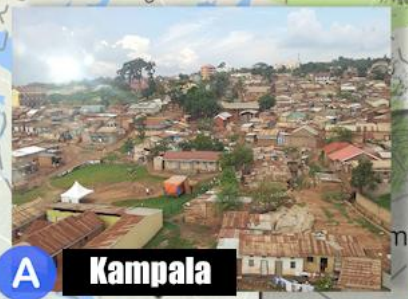


Plants, insects and mushrooms as a source for medicine

C Budongo Forest Reserve

B Bulindi

D Kibale Forest NP



A Kampala

G Kampala

E Bwindi Impenetrable Forest NP

F Lwengo

DR Congo

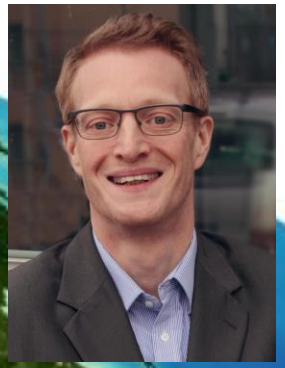
Rwanda

Tanzania

Kenya

Uganda

South Sudan



An international zoopharmacognosy network

@EthnopharmacologyChannel

YouTube @EthnopharmacologyChannel

Social media research channels:

@Fab_Ethnopharm

@Fab_Ethnopharm

@FabienSchultz

Other channels:

@ARUDEVO_Uganda

GOING ONLINE THIS SPRING:

www.ethnopharmacology.de

TikTok

Study activities: Fieldwork

Observation of self-medication behavior

McLennan et al..PLoS ONE 12(7), 2017 : e0180431

Aneilema nyasense

Study activities: Fieldwork

Observation of self-medication behavior

88 plant, insect and mushroom species collected (most considered understudied)

Study activities: Fieldwork

Observation of self-medication behavior

Sample collection and voucher specimen production

Processing and drying

FILMING (video team)

Interviewing local traditional healers

Study activities: lab work

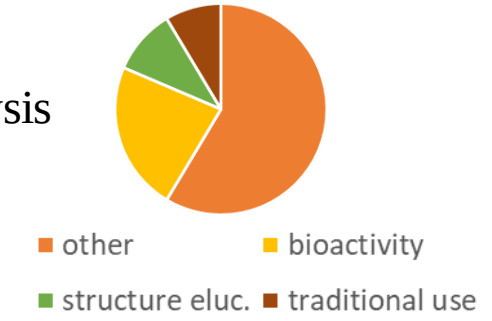
Extractions (double maceration)

solvents: *n*-hexane, EA and MeOH/H_2O (9:1)

Creation of a crude extract library

Literature review

DoP analysis



183 crude extracts produced so far from this project

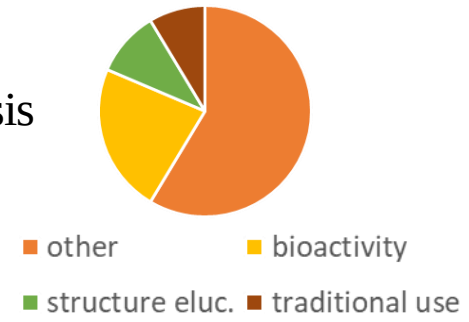
Crude Extract Library

572 unique extracts
from 148 species

Study activities: lab work

Literature review

DoP analysis



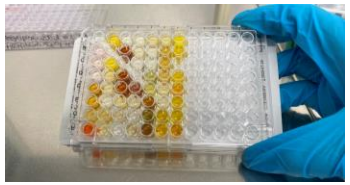
Creation of a crude extract library

Extractions (double maceration)

solvents: *n*-hexane, EA and MeOH/H_2O (9:1)

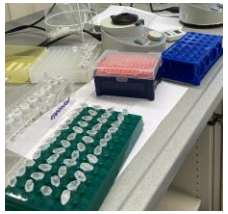
FILMING (video team)

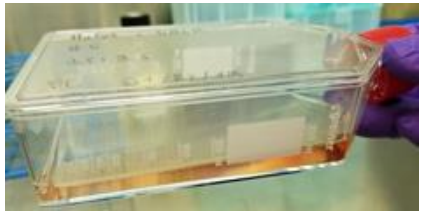
Antibacterial and antibiofilm activity



bioassays against multidrug-resistant clinical isolates of human pathogens

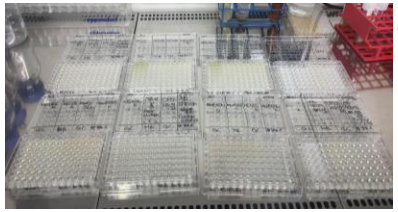
Cytotoxicity counterscreen





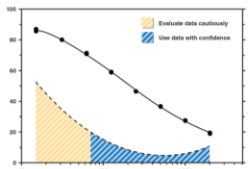
human MRC-5_{SV2} lung fibroblasts

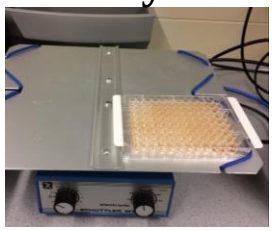
Antinematodal activity



Locomotion decrease of *C. elegans*

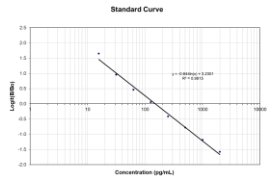
Antiinflammatory activity





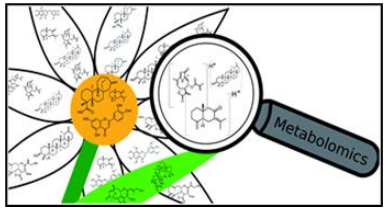
cyclooxygenase-2/1 inhibition

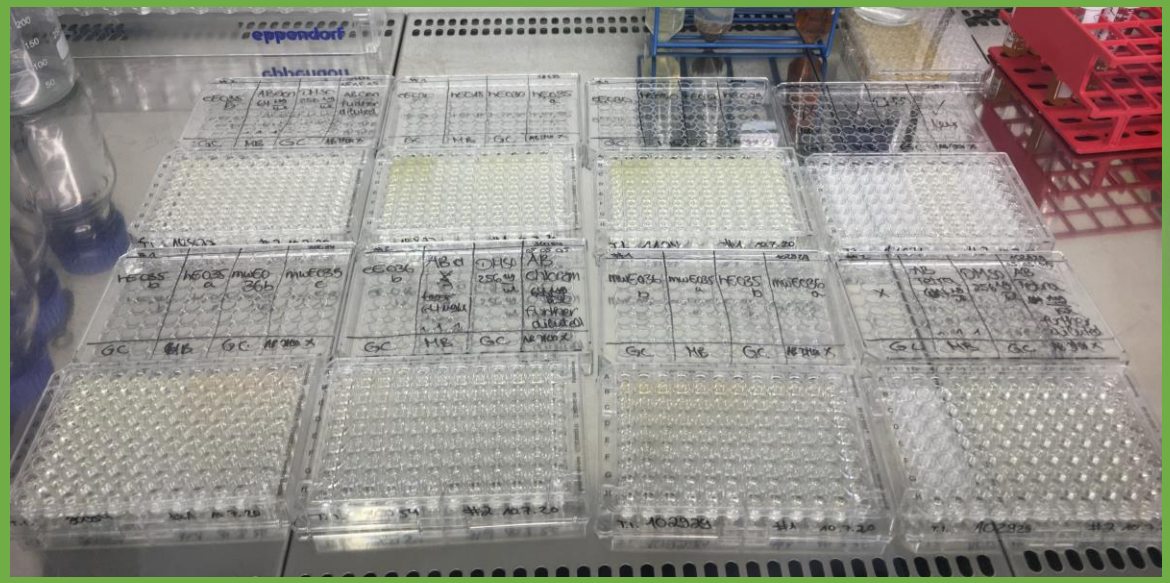
Antiplasmodial activity

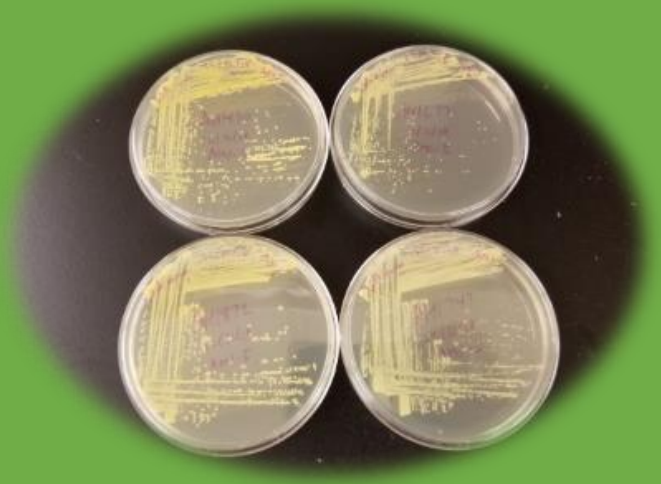


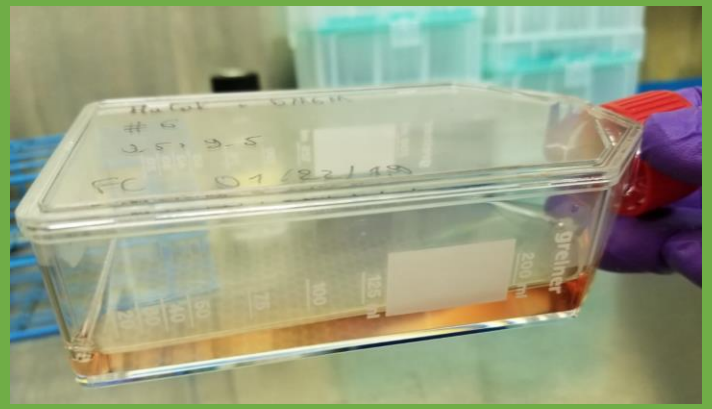
bioassay against chloroquine-resistant *P. falciparum* K1

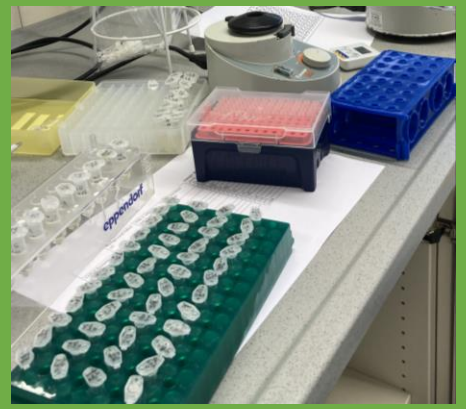
Annotation of untargeted metabolomics data of potent extracts

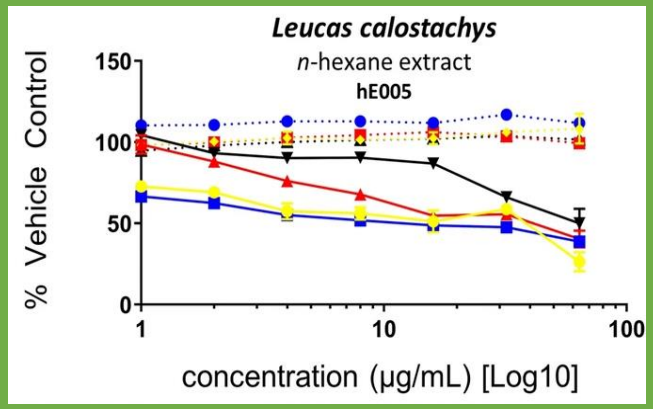


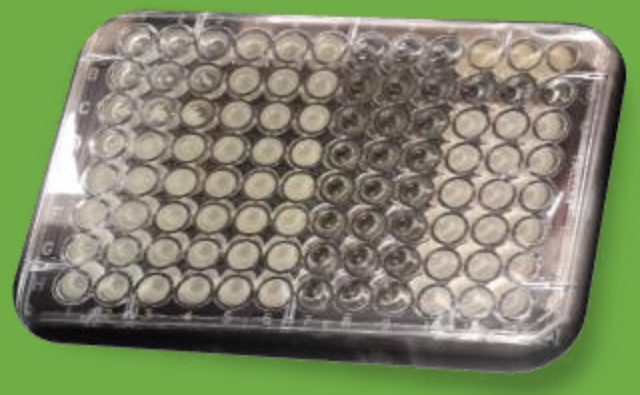












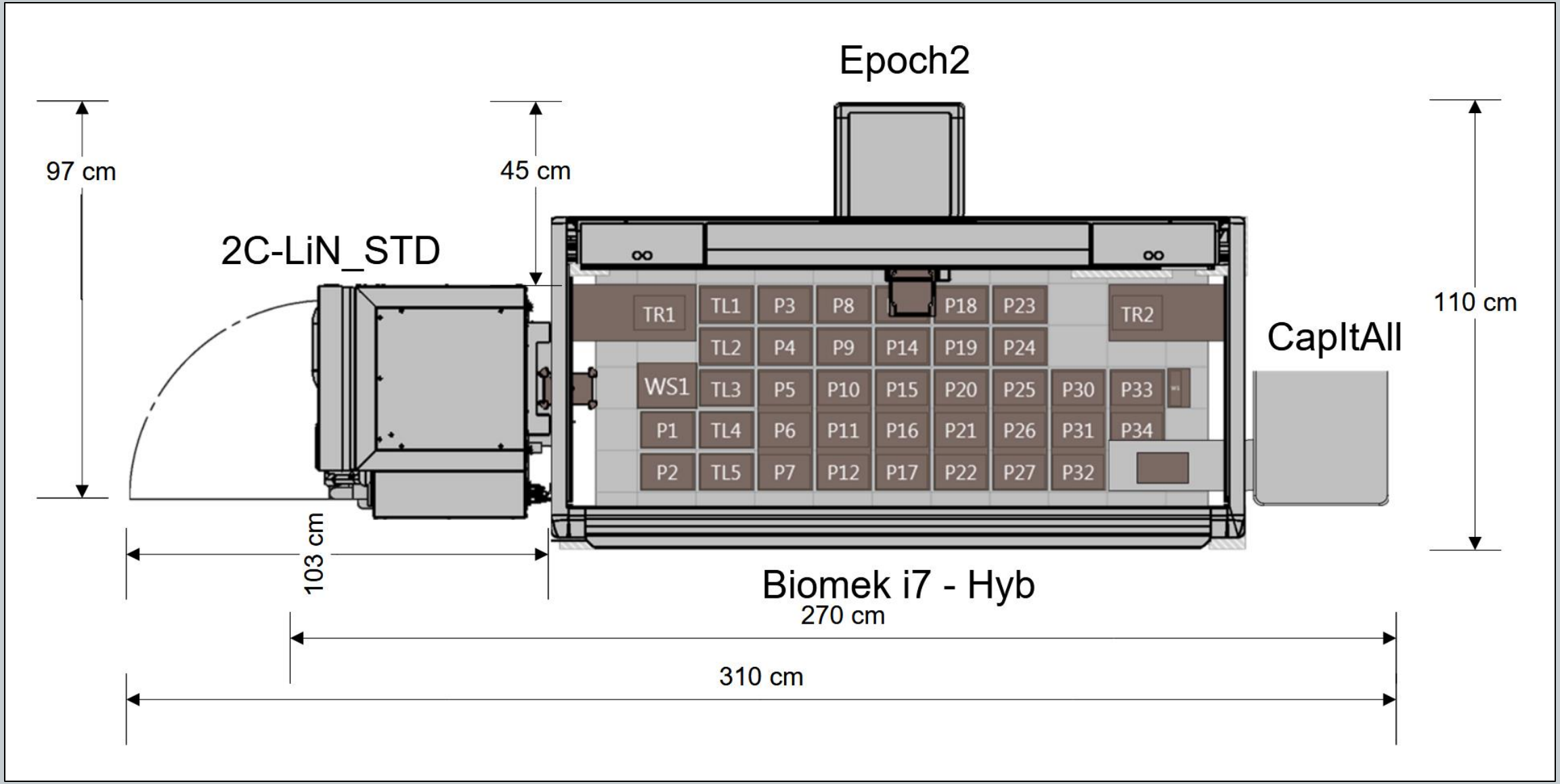
Quorum quenching activity
Biofilm eradication

Inhibition of toxin production and inflammation

HSNB screening platform

Biomek i7 Liquid Handling Workstation, SL2 (to be delivered in April 2023, state-of-the-art, approx. 650,000 Euro)

Liquid Handling Workstation, SL2



Applying AI methods for combining animal behavioral and ethnomedicinal data with untargeted metabolomics and structure predictions in drug discovery

Evaluation of pharmacological efficacy and bioassay-guided discovery of bioactive compounds strategy

taxonomic identification

extraction

extract library

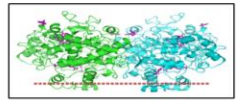
fractionation / isolation

automated flash chromatography and preparative HPLC

Bioassays

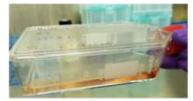
antimalarial
P. falciparum K1 model

antinematodal
C. elegans model



antiinflammatory
COX-1/COX-2 model

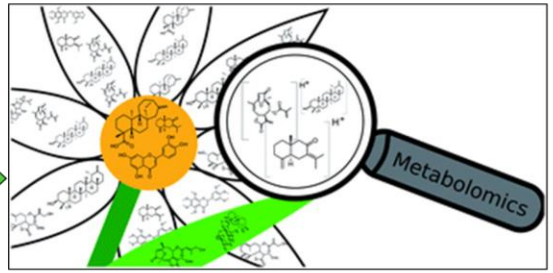
antibiotic
multiresistant strains



cytotoxicity
human MRC-5 fibroblasts HaCaTs keratinocytes

GC/LC-MS NMR

structure elucidation



Study activities: Fieldwork

Observation of self-medication behavior

Sample collection and voucher specimen production

Processing and drying

FILMING (video team)

Interviewing local traditional healers

Transfer of results back to indigenious communities

Initiation of community projects

1. Jiggers medical intervention
2. Noma disease

Acknowledgements and research group

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Lena Schulz

Lisa Grohs

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Kandace Baez

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Thank you for your attention! Any questions?