

# People, Primates and Parasites

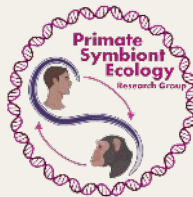
+

## Interdisciplinarity in Anthropology

MVDr. Barbora Červená Ph.D. and Kelly Sambucci, MSci.

# Background

- + Veterinary medicine degree  
University of Veterinary Medicine Brno
- + PhD in Veterinary Parasitology
- + (co)PI of two research grants on parasites of the mountain gorillas
- + Interested in wildlife conservation and health



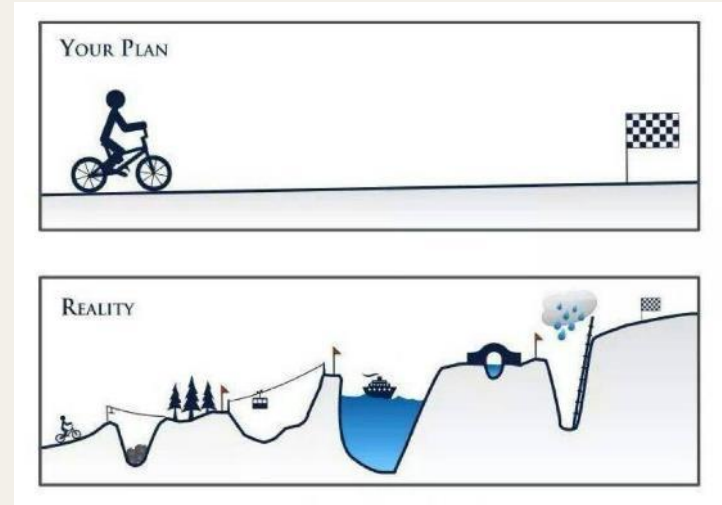
# Background

- + MSci Wild Animal Biology
- + Royal Veterinary College, University of London
- + Zoological Society of London (ZSL London Zoo)
- + Interested in wildlife conservation and health



# PhD in Anthropology?

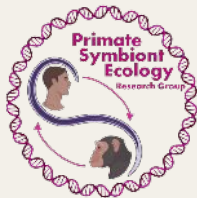
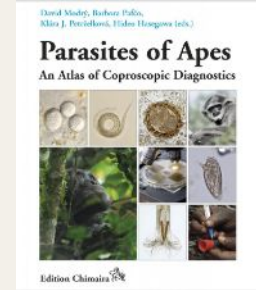
Parasitic infections as a consequence of, or reason for, different primate lifestyle strategies





# Primate Symbiont Ecology Research Group

- + Institute of Vertebrate Biology, CAS
- + Team leader: Dr Klára Petrželková
- + Investigate relationships between hosts, symbionts and the environment
- + Focus on great apes and zoonotic transmission
- + Microbiomes as indicators for ecosystem health



# What is a parasite?

Equal rights  
for parasites!



**Parasite** =

an organism that lives in or on an organism of another species (its host) and benefits by deriving nutrients at the other's expense.

At least half of organisms are parasites

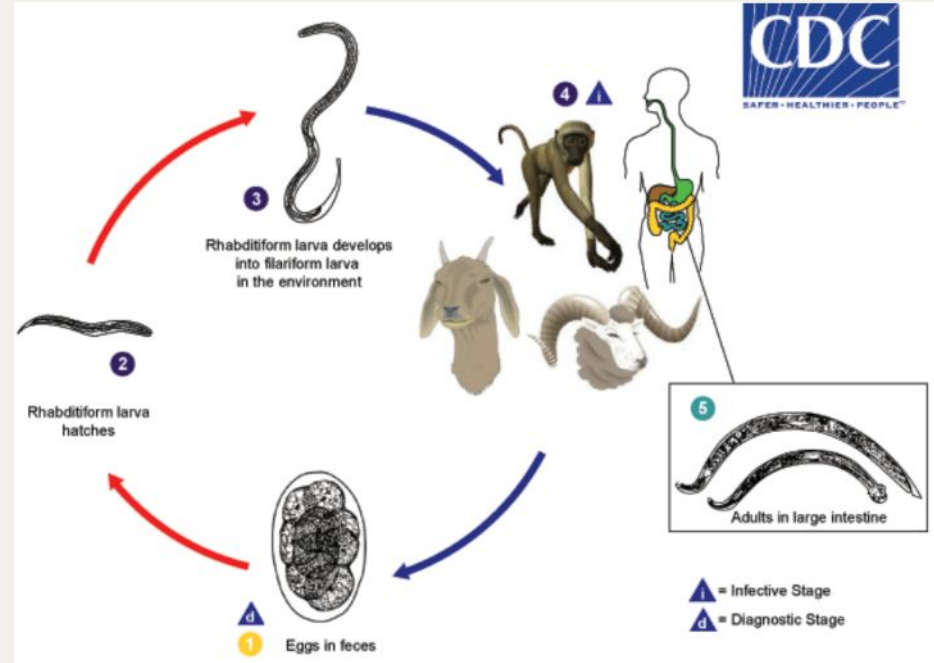
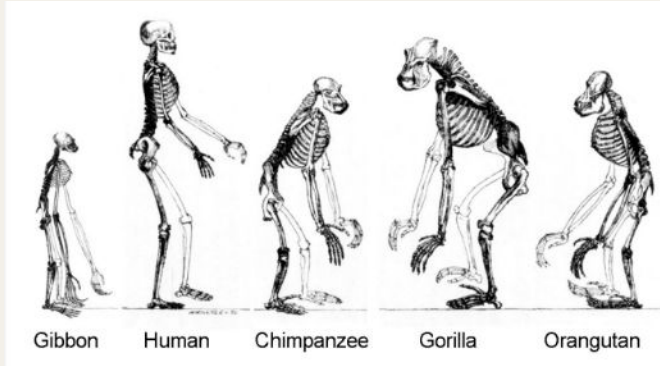
Very diverse group – size, way of life, hosts, way of transmission, effect on the host

Manipulation with the host



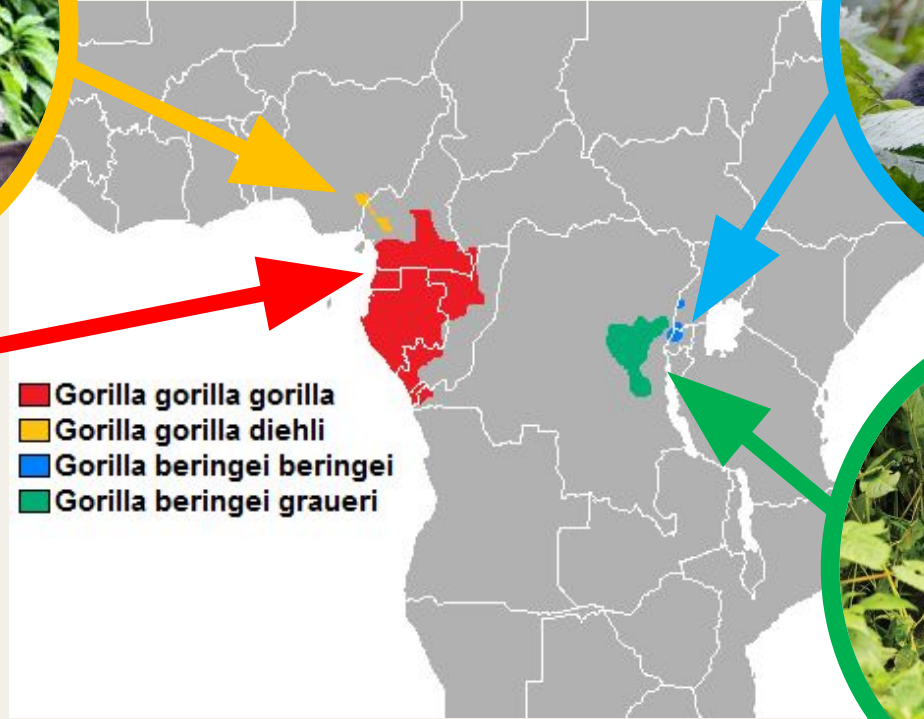
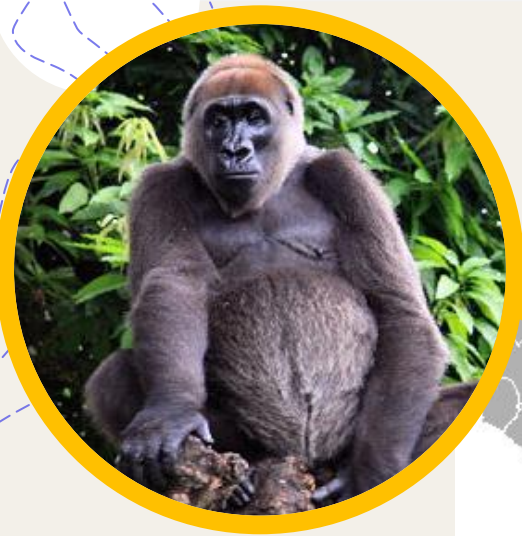


# Why primates and why parasites?





# Gorillas



- Gorilla gorilla gorilla
- Gorilla gorilla diehli
- Gorilla beringei beringei
- Gorilla beringei graueri








# Mountain gorillas



DEMOCRATIC REPUBLIC  
OF CONGO

-  Mountain gorilla habitat
-  Forest Reserves
-  Lakes
-  International boundaries



RWANDA





Rwanda – country of thousands of hills



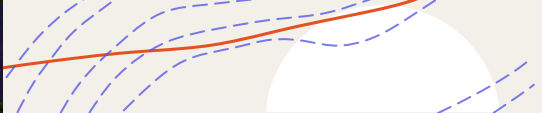




Visoke and Karisim



Sabyinyo





**Mikeno (DRC)**





**Muhabura**







# History of mountain gorilla research

## Research

In October 1902, Captain [Robert von Beringe](#) (1865–1940) shot two large apes during an expedition to establish the boundaries of [German East Africa](#).<sup>[15]</sup> One of the apes was recovered and sent to the [Berlin Zoological Museum](#), where Professor [Paul Matschie](#) (1861–1926) classified the animal as a new form of gorilla and named it *Gorilla beringei* after the man who shot it.<sup>[36][37]</sup> In 1925, [Carl Akeley](#), a hunter from the [American Museum of Natural History](#) who wished to study the gorillas, convinced [Albert I of Belgium](#) to establish the [Albert National Park](#) to protect the animals of the Virunga mountains.<sup>[38]</sup>

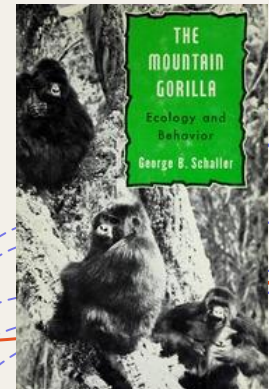
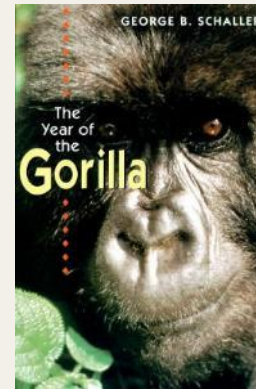
George Schaller began his 20-month observation of the mountain gorillas in 1959, subsequently publishing two books: *The Mountain Gorilla* and *The Year of the Gorilla*. Little was known about the life of the mountain gorilla before his research, which described its social organization, life history, and ecology.<sup>[38]</sup>

In 1960's – 450 mountain gorillas

[https://en.wikipedia.org/wiki/Mountain\\_gorilla](https://en.wikipedia.org/wiki/Mountain_gorilla)



<https://www.saveagorilla.org/discovery.html>

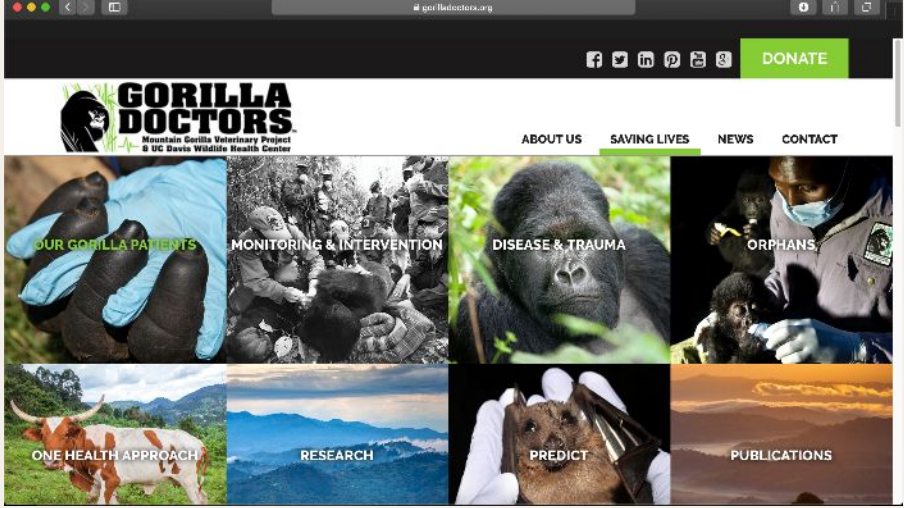
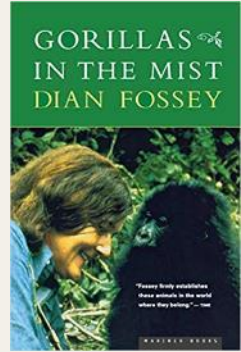




# History of mountain gorilla research

## Dian Fossey era (1966-1985)

- Started in DRC, moved to Rwanda
- first four habituated groups in 1968
- Karisoke Research Center
- conservation efforts – antipoaching patrols
- Studied groups protected from poaching
- The Digit Fund → Dian Fossey Gorilla Fund



mid-1980's – less than 300 mountain gorillas – veterinary clinic – beginning of vet care – Morris Animal Foundation – Mountain Gorilla Veterinary Project (since 2006 separate from MAF) – Gorilla Doctors (with UC Davis; since 2009)

over 50 years studying mountain gorilla ecology, demography, sociology and conservation

daily visits of gorilla groups, health monitoring, veterinary interventions, collection of data

One Health approach, community development, capacity building





Senkwekwe center – the only captive MG



CONSERVATION  
IS WAR.

**NETFLIX**

A NETFLIX DOCUMENTARY

**VIRUNGA**

NOVEMBER 7



# Today

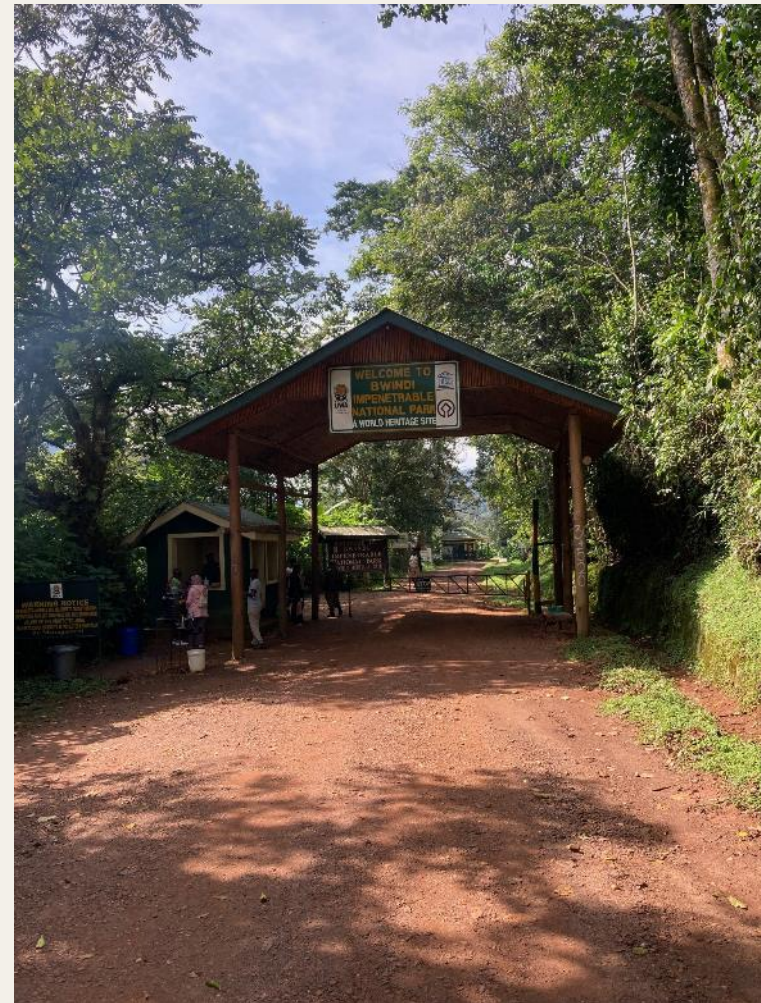
## Extreme Conservation Leads to Recovery of the Virunga Mountain Gorillas

Martha M. Robbins , Markye Gray, Katie A. Fawcett, Felicia B. Nutter, Prosper Uwingeli, Innocent Mburanumwe, Edwin Kagoda, Augustin Basabose, Tara S. Stoinski, Mike R. Cranfield, James Byamukama, Lucy H. Spelman, Andrew M. Robbins

Published: June 8, 2011 • <https://doi.org/10.1371/journal.pone.0019788>

- Over 1,000 mountain gorillas ranging in Virunga (604 individuals) and Bwindi-Sarambwe (459 individuals)
- Most of the population intensively surveyed
- Individual veterinary care provided by Gorilla Doctors





<https://www.gorillasafaris-tours.com/>









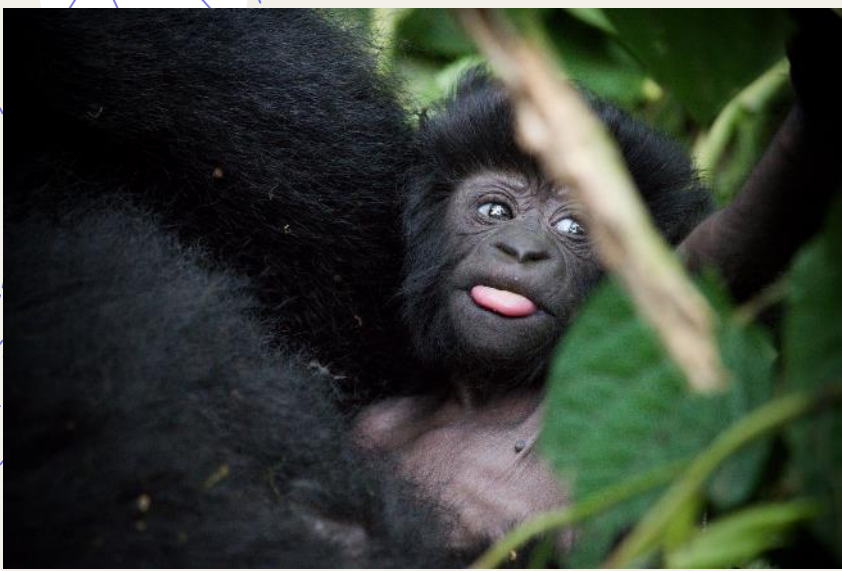












## Gorilla habituation and the role of animal agency in conservation and tourism development at Bwindi, South Western Uganda

EPE: Nature and Space  
2021, Vol. 4(4) 1601–1621  
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**Clemens Driessen** 

Wageningen University and Research, the Netherlands

- gorillas decided whether they want to be habituated or not by accepting presence of people or moving between habituated and unhabituated groups
- when hearing a dog, the gorillas moved closer to the rangers' camp; they showed ranger snares in the forest
- gorillas choose if they let veterinarians to intervene and immobilize the group members
- gorillas choose if and how will they interact with the tourists and where, including the tourist lodges and therefore giving out the valuable gorilla experience for free
- gorillas ranged on a communal land so long that the park management bought the soil from the farmers
- highlighted that gorillas and humans co-existed even before the park has been gazetted, nowadays the gorillas are



































# Human - Domestic - Wildlife Interface



# One Health



*Gastrointestinal parasites in overlapping populations of mountain gorilla, livestock and Batwa communities that live in and around BINP, Uganda*



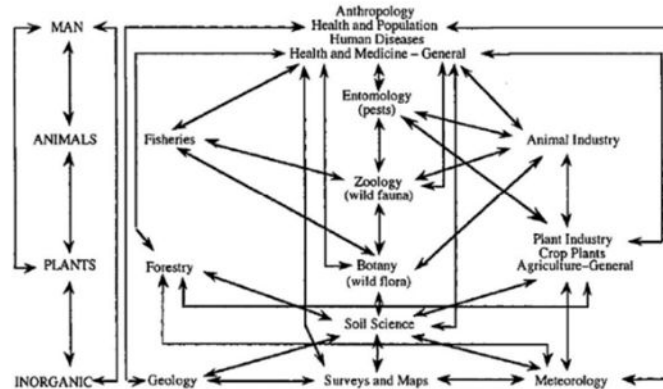


# One Health

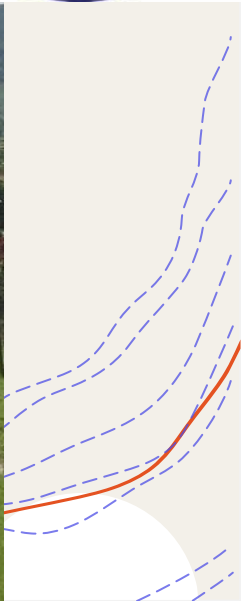
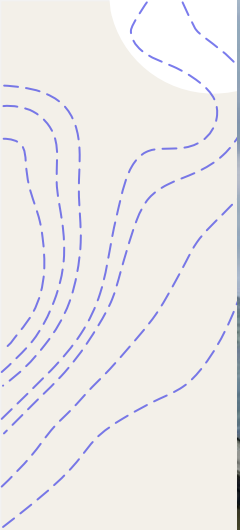
*“One Health” initiative has its roots in colonial engagement and coincides with a need to secure the health of administrators (controlling that of local populations), while pursuing use of resources.’*

N. Lainé and S. Morand: Parasite 2020, 27, 55

3



**Figure 1.** The colonial scientific network of environmental management in Worthington [56] (see also Tilley [50], Morand & Lajaunie [33]).







ORIGINAL RESEARCH article

Front. Vet. Sci., 10 March 2022

Sec. Veterinary Humanities and Social Sciences

Volume 9 - 2022 | <https://doi.org/10.3389/fvets.2022.773903>

This article is part of the Research Topic

Veterinary Anthropology: Samples from an Emerging Field

[View all 7 Articles >](#)

## Diverging Discourses: Animal Health Challenges and Veterinary Care in Northern Uganda

 Anna Arvidsson\*  Klara Fischer<sup>1</sup>  Kjell Hansen<sup>1</sup>  Susanna Sternberg-Lewerin<sup>2</sup>  Erika Chenais<sup>3</sup>

<sup>1</sup> Department of Urban and Rural Development, Swedish University of Agricultural Sciences, Uppsala, Sweden

<sup>2</sup> Department of Biomedical Science and Veterinary Public Health, Swedish University of Agricultural Sciences, Uppsala, Sweden

<sup>3</sup> Department of Disease Control and Epidemiology, National Veterinary Institute (SVA), Uppsala, Sweden









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The local communities also constantly accused the park staff of favoring wildlife more than humans (see also Laudati 2010b referenced in van der Duim et al., 2014).

...the survival of mountain gorillas features in most interventions, policies and controversial debates around Bwindi. The focus on gorillas in most of the plans, practices and reports on Bwindi management, despite the presence of other fauna such as elephants, duikers, chimpanzees and monkeys (Hickey et al., 2019), is striking. (Ampumuza & Driessen, 2020)





# Our research plan

Including methods of anthropology to evaluate the role and significance of parasites in Bwindi for both humans and other-than-humans

Talking and listening to local communities and include their perspectives in preparing the recommendations for the decision makers

Considering the active role of non-humans, including parasites, when preparing the recommendations for the decision makers

Comparing with “hard” data on parasites

# Indigenous knowledge

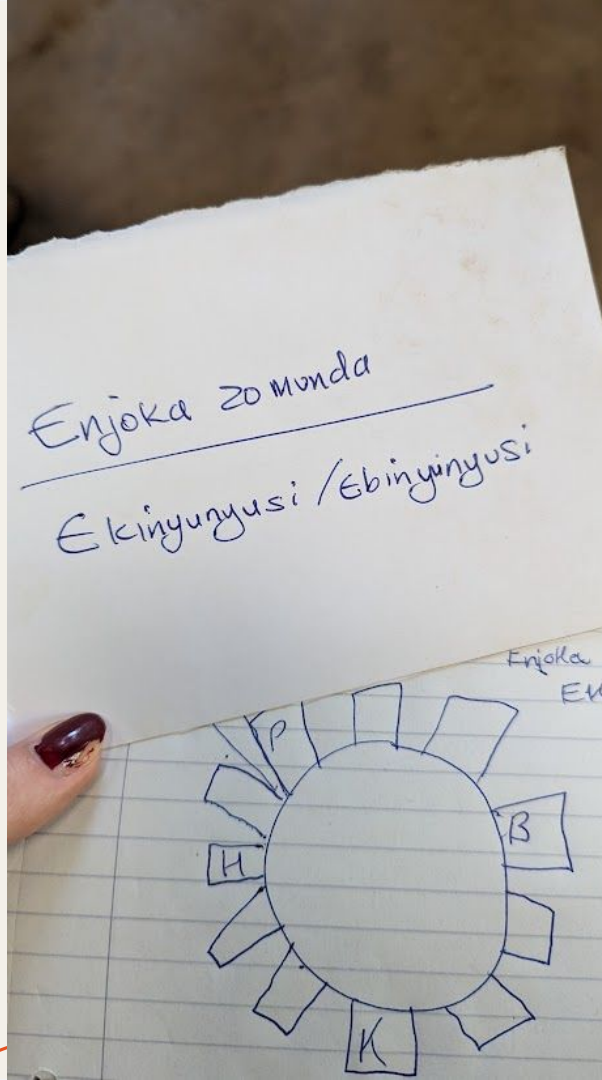
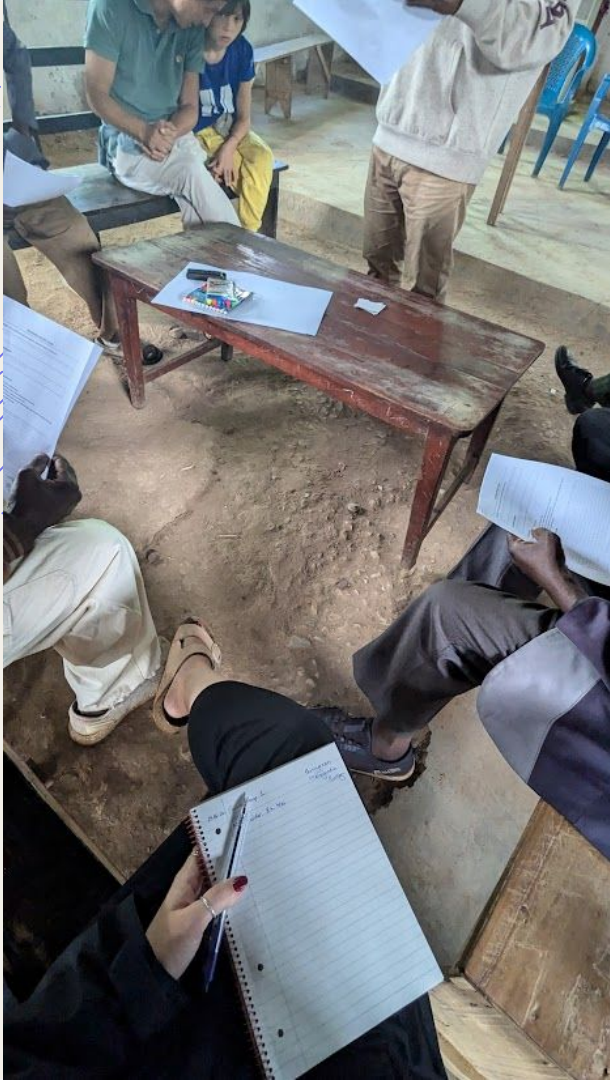
*Descriptive knowledge presents the way the world is... facts about gorillas.. produced by scientific study. It does not explain why to conserve gorillas, only what gorillas are. **Indigenous knowledge describes how to relate to gorillas, not just what gorillas do...** It helps humans and gorillas coexist while considering morals to guide action and behavior. When indigenous accounts included information about how to interact with gorillas, they confused Western scientists who were looking for objective facts.*

Amir, 2021



# Focus Group Discussions

- + Separated by gender – cultural considerations
- + Mixed ages – potential limitations
- + Group of 8
- + Question prompts











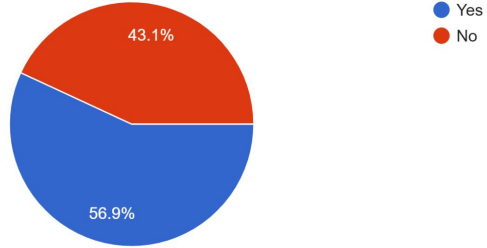
H. Nana  
BCH121





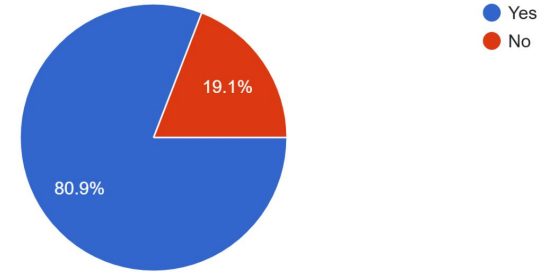
Have you ever been in contact with gorilla feces? (e.g. were they on your property, did you see them in the forest...?)

116 responses



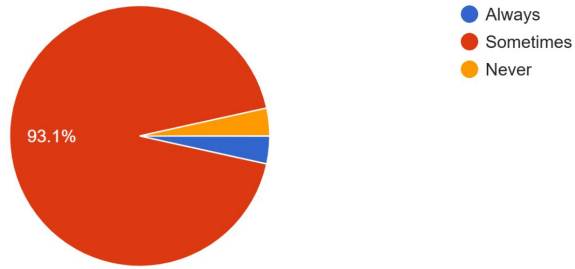
Do you walk barefoot outside your house (garden, field, forest)?

115 responses



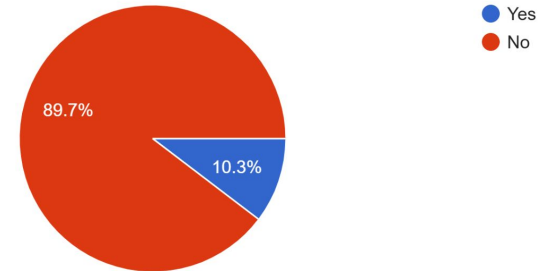
Do you wash or sanitize your hands after you defecate?

116 responses



Are you taking anti-worm medication?

116 responses



# Finding the Cause of Mountain Gorilla Chronic Wasting Syndrome



- + Principal Investigator: MVDr. Barbora Červená, Ph.D.
- + Institute of Vertebrate Biology (IVB)
- + Collaboration with Gorilla Doctors
- + 2 year project (2021-23)





# Chronic Wasting Syndrome?

Larval stages of intestinal strongylids usually migrate through the mucosa and submucosa of the intestine □ lesions resulting in impaired function □ clinical picture of **chronic wasting**

- + loss of body weight,
- + emaciation,
- + rough and discoloured hair coats,
- + alopecia,
- + loss of appetite, and
- + weakness/lethargy



# Methodology

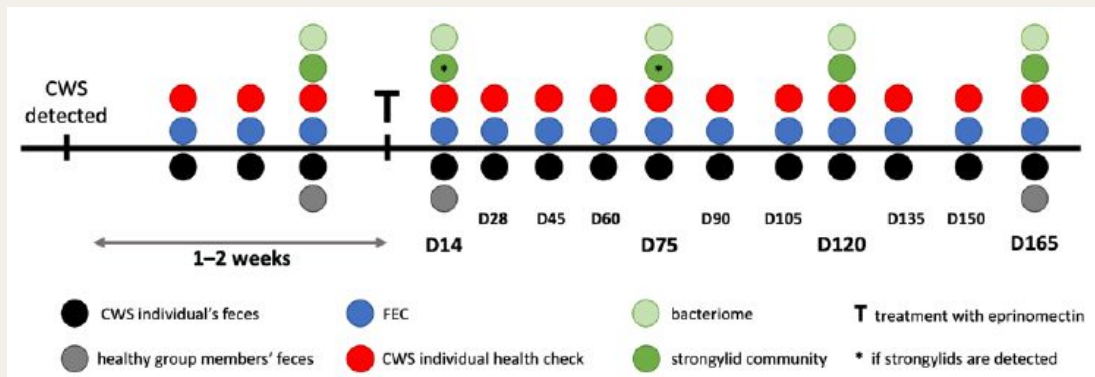
- + Retrospective study (3–5 years) of veterinary records and evaluation of factors associated with CWS occurrence
- + Strongyle egg quantification in new cases, screening of strongylid and microbial communities
- + Evaluation of eprinomectin efficiency – fecal egg count reduction, re-infection period
- + Clinical symptom variation in time – relationship with EPG



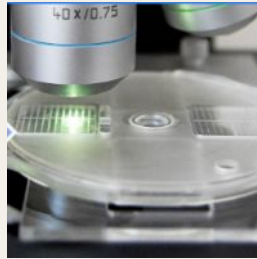
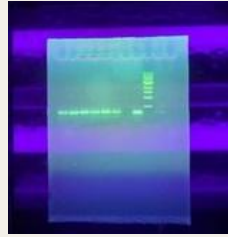


# Study Design

- + Sampling plan based on current treatment (long range eprinomectin)



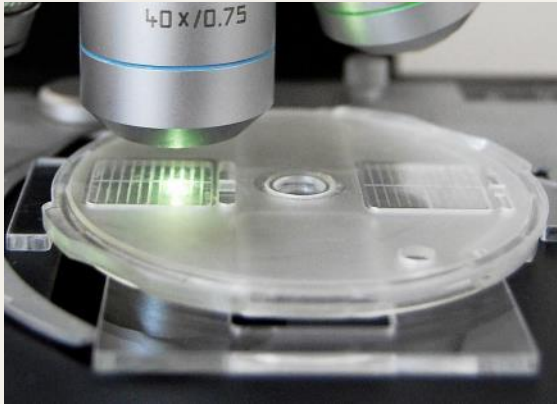
# Methods





# Coproscopy

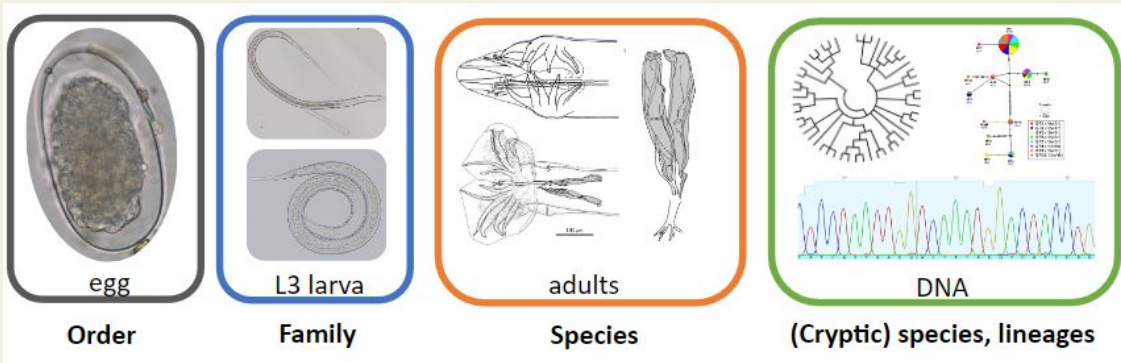
## Mini-Flotac Quantification



## Strongylid L3 larvae morphology

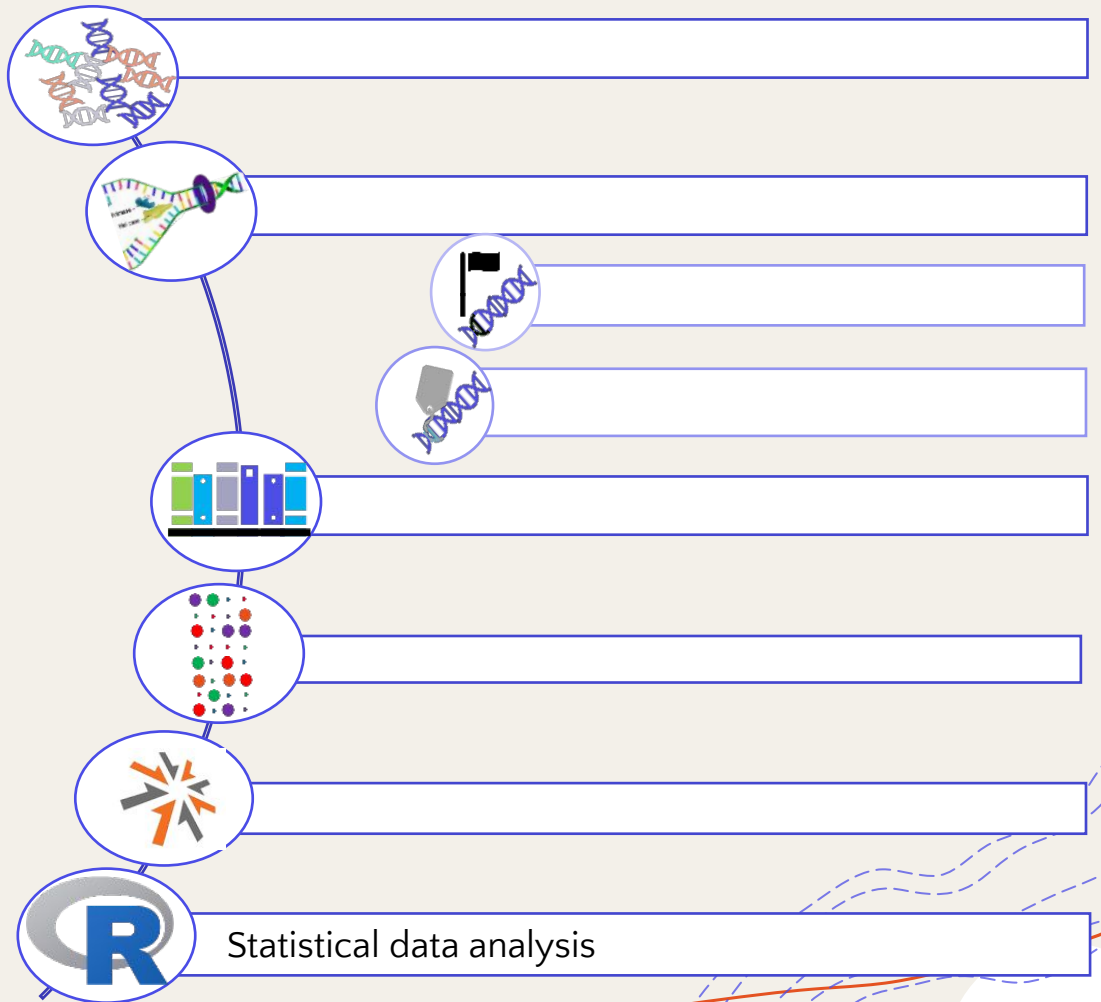


*Murshidia* - 300-400 μm, anterior end flattened with "horns", intestinal lumen zigzagged, posterior strangulated with a little bulb and thinner tip, short tail of the sheath





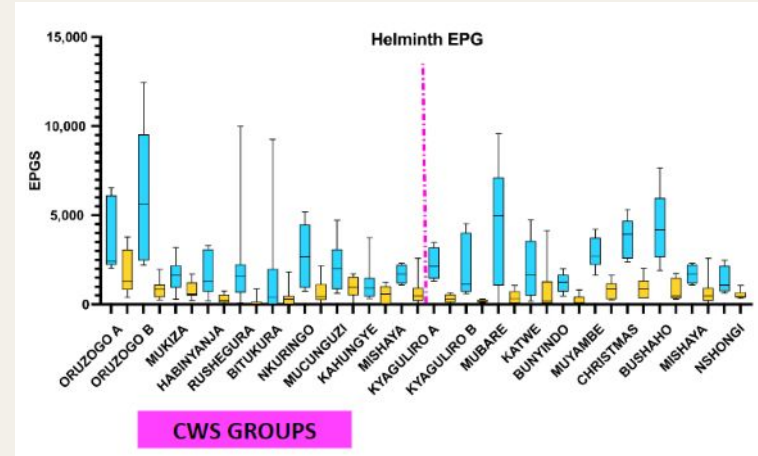
# High-throughput sequencing



# Species identified

*Oesophagostomum stephanostomum*  
– nodular worms, zoonotic, develop in mucosa of the intestine, may stay like that for months, captive great apes – clinical disease

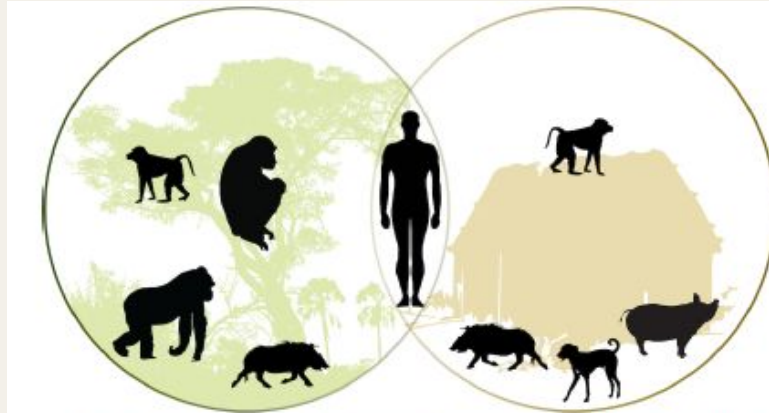
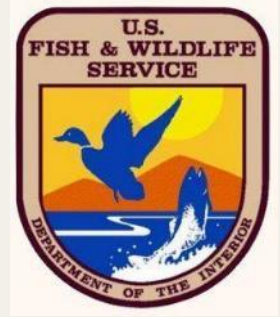
*Murshidia devians* – found in large bowel, pathogenesis unknown, but nodules observed in gorilla intestines





# Our Current Project

*Parasites in Bwindi great apes: ecology, epidemiology and health impacts*

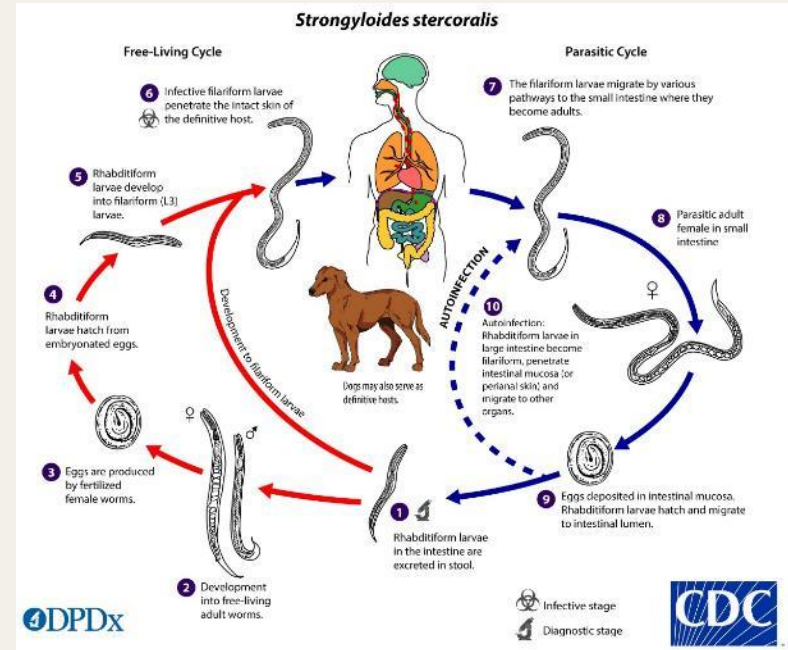
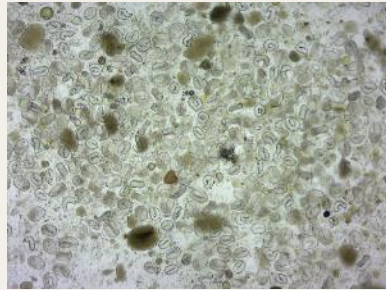


*Figure 1. Human – domestic animal – wildlife interface*  
Červená, B, 2021.



# Strongyloides

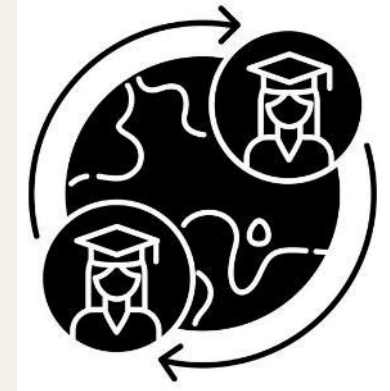
- + *S. stercoralis* and *S. fuelleborni*
- + Larvae actively penetrate skin
- + Heavy infection in one infant with clinical signs

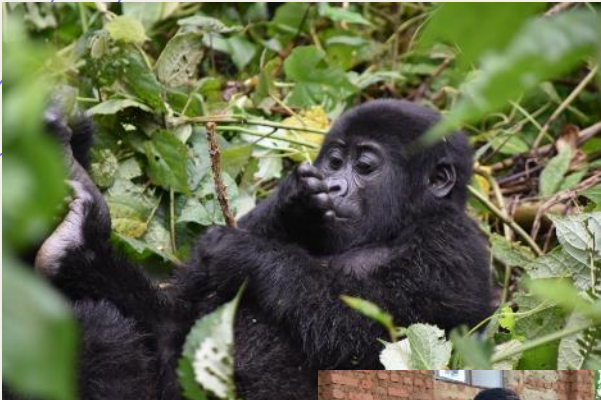




# One Health – capacity building

- + Collaboration with Bwindi Community Hospital
- + Training in molecular diagnostics with new wildlife lab at QENP
- + Training opportunity for Ugandan scientist in Czech Republic
- + Educational materials
- + Student exchange







"In Bwindi's depths, where the trees stand tall,  
The gorillas roam and the locals call,  
Their songs of life and ancient lore,  
Echoing through the forest floor.

The mountain's mist may cloud the sight,  
As helminth parasites thrive in their right,  
But we know now they play a role,  
In this rich ecosystem that makes us whole.

With curiosity in mind,  
We investigate the complex bind,  
Of gorillas, locals, and helminth friends,  
A dance of life that never ends.

The research brings new light to see,  
The interlinks of harmony,  
How parasites, gorillas, and folks,  
Exist in balance and evokes

© Peterson Mafabi





Thank you for listening,  
any questions?

