

Diet-driven seasonal dynamics of gut microbiome composition and function in wild Tanzanian chimpanzees (*Pan troglodytes*)

Emilie Egholm Bruun Jensen
PhD student

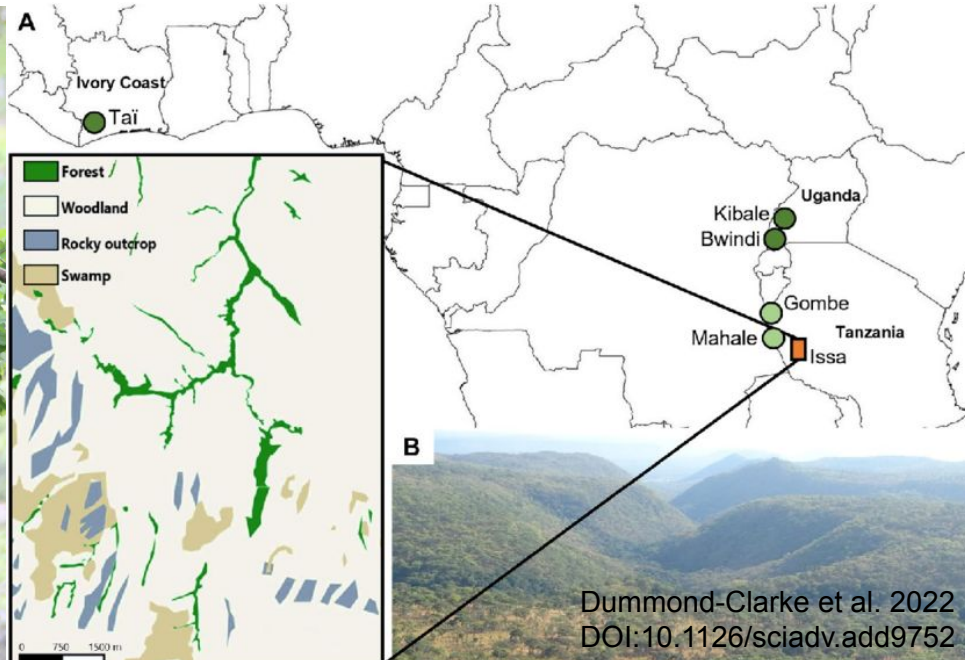
Greater Mahale Ecosystem Research and Conservation

*"We strive to **understand**, **conserve**, and **protect** primates and their behavioural diversity in the Greater Mahale Ecosystem in Western Tanzania."*

<https://www.gmerc.org/>



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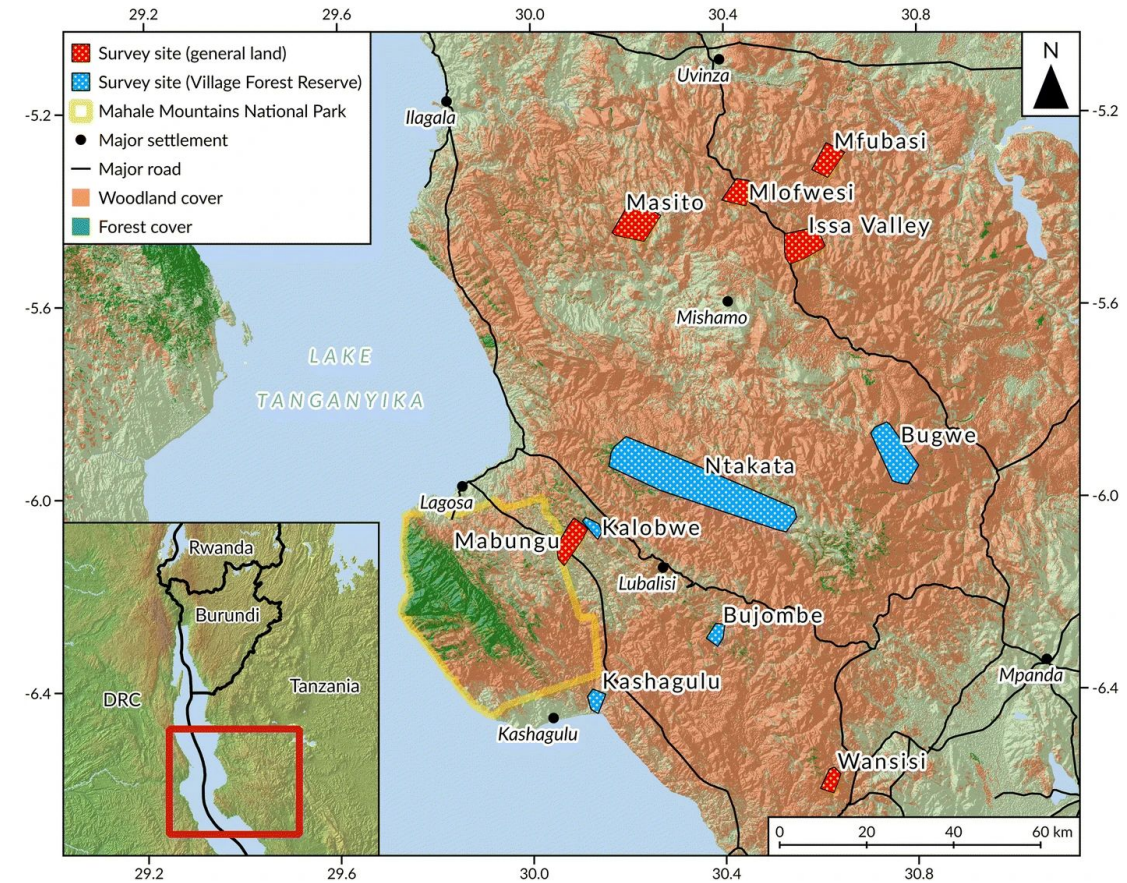


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Mosaic landscape

Diverse and patchy environment with multiple habitat types:

- Miombo woodlands
- Gallery forests
- Swamps and wetland
- Wooded grasslands



McLester et al. 2019: <https://doi.org/10.1007/s10764-019-00118-6>

Seasonal variation

Wet season

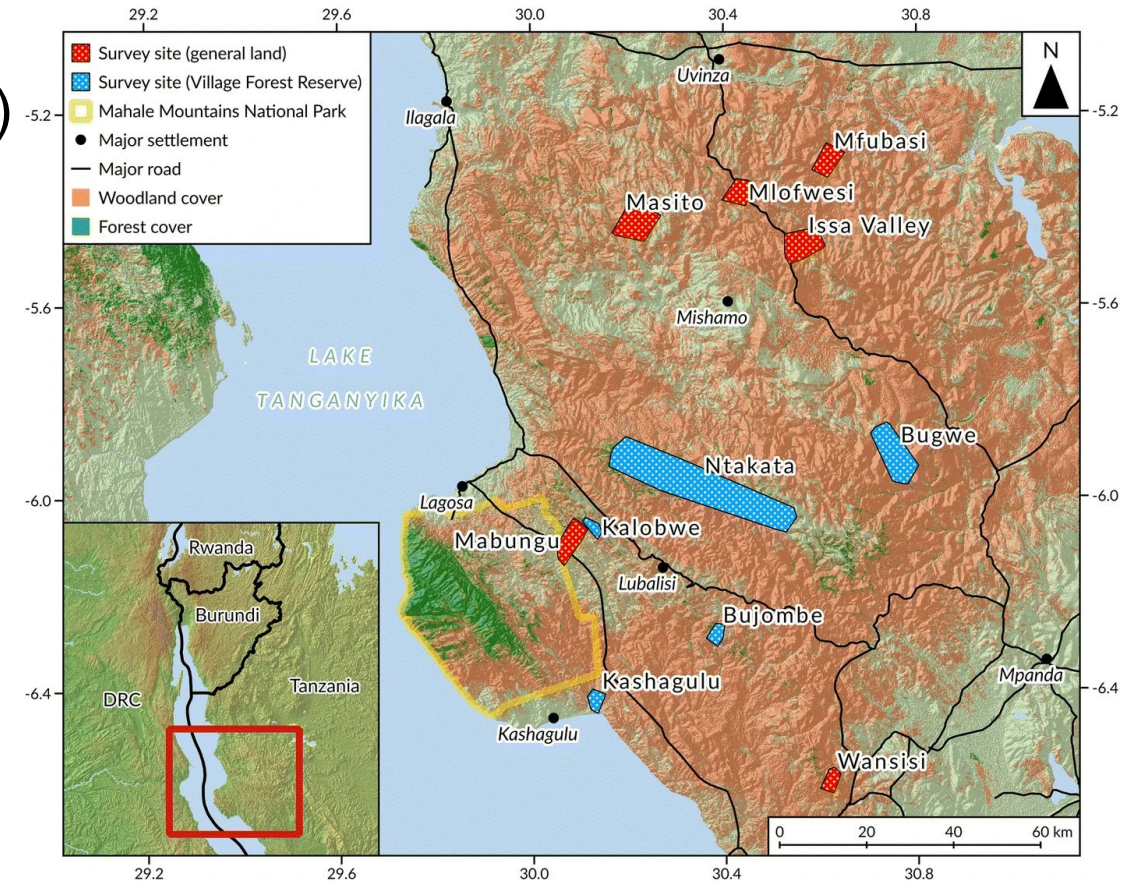
- High annual rainfall (up to 700 mm/year)
- Grass reach 2.5 m

Dry season

- Scarcity of surface water in dry season
- Grass fire depleting 75% of the region



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Does the functional gut microbiome adapt to the season changes?



Samples



557 fecal samples
from Greater Mahale
Ecosystem



Samples were collected
from 2009 - 2020



Alexander Piel and Fiona Steward
Evolutionary Anthropology
University College London

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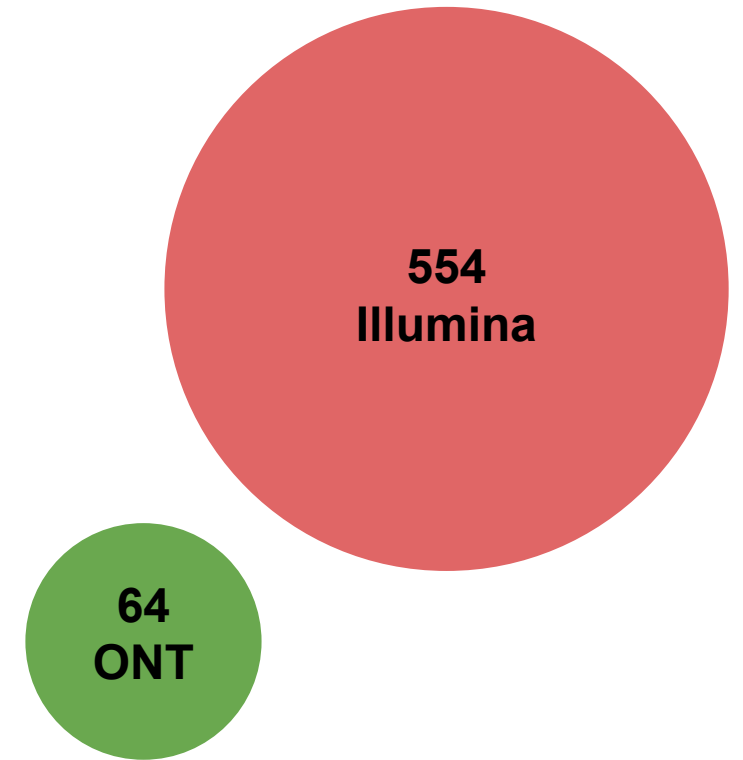
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Sequencing

Total samples sequenced: **557**

554 samples sequenced on NovaSeq 6000

64 samples sequenced on PromethION 2 Solo



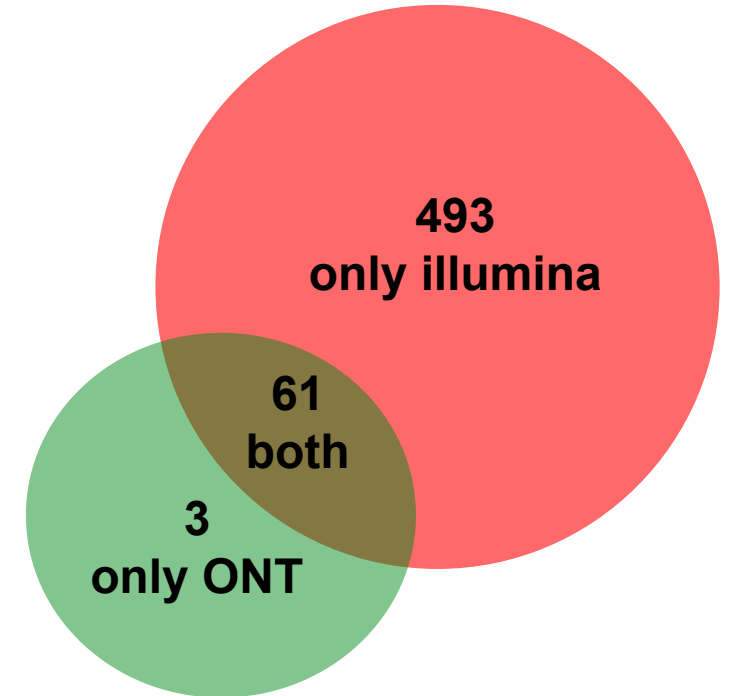
Thanks to Jacob Dyring Jensen
and Christina Aaby Svendsen for
the lab work!

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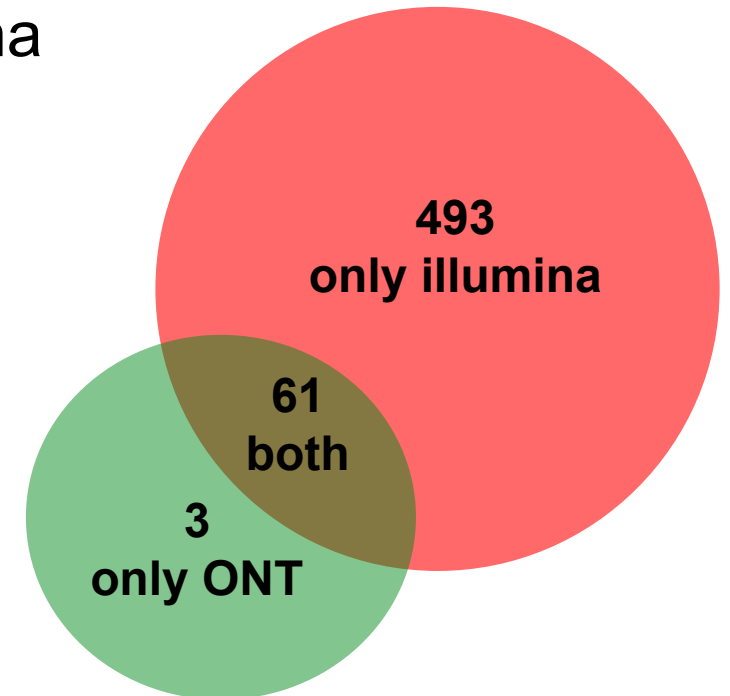


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Choosing an assembly and binning strategy



61 samples were sequenced with ONT and Illumina



Choosing an assembly and binning strategy



61 samples were sequenced on both ONT and Illumina

Illumina

MetaSpades and MetaBat2
MetaSpades and Vamb
MetaSpades and SemiBin2

ONT

MetaFlye and MetaBat2
MetaFlye and Vamb
MetaFlye and SemiBin2

Choosing an assembly and binning strategy



61 samples were sequenced on both ONT and Illumina

Illumina

MetaSpades and MetaBat2
MetaSpades and Vamb
MetaSpades and SemiBin2

ONT

MetaFlye and MetaBat2
MetaFlye and Vamb
MetaFlye and SemiBin2

MetaMDBG and SemiBin2



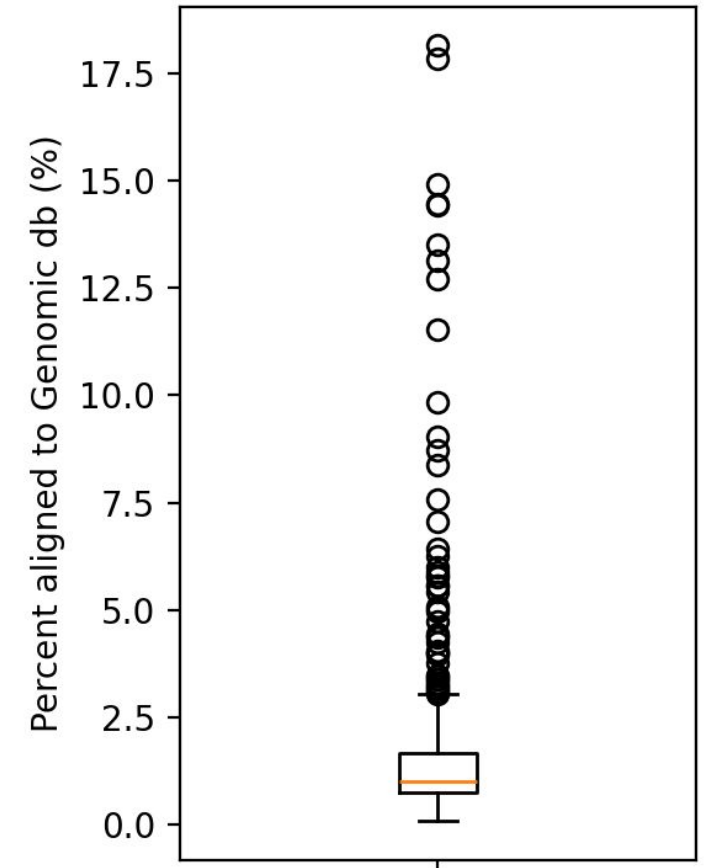
Nanopore no longer
recommends
MetaFlye for complex
communities

Choosing an assembly and binning strategy

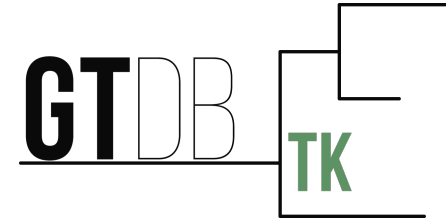
		MQ bins	HQ bins	Time used (60 gb mem, 10 theads)
ONT	MetaFlye + MetaBat2	1889	266	
	MetaFlye + Vamb	982	260	7 hours, 34 min
	Metaflye + SemiBin2	2065	656	86 hours, 42 min
	metaMDBG + SemiBin2	1897	428	71 hours, 56 min
Illumina	MetaSpades + MetaBat2	3534	1228	
	MetaSpades + Vamb	3001	2215	16 hours, 2 min
	MetaSpades + SemiBin2	3086	2513	83 hours, 0 min

Why do we want to create a MAG catalogue?

~1.6% of the Illumina reads can be aligned to genomic db



University of Queensland



Philip Hugenholtz

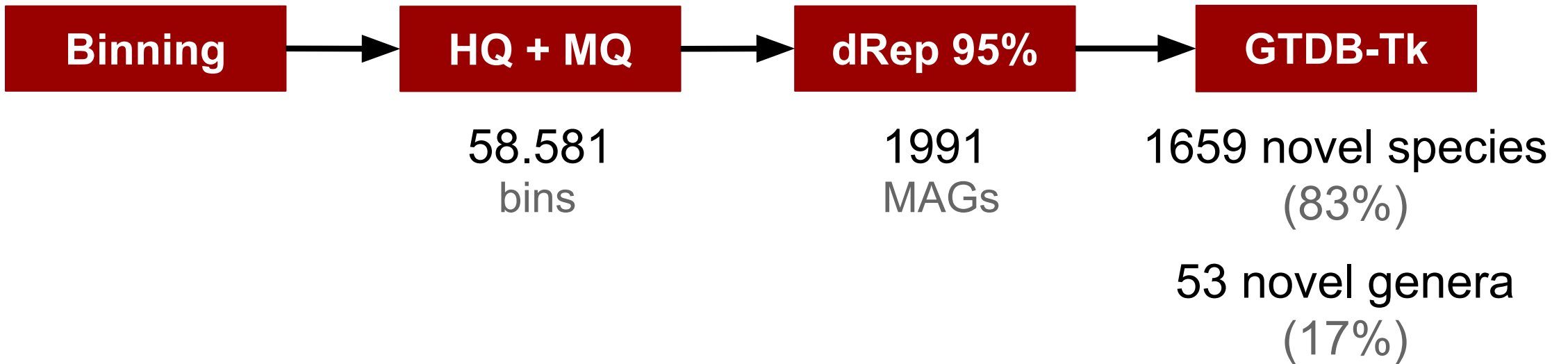


Michaela Blyton



Kate L. Bowerman

MAG catalogue and novel taxa



How much do the MAGs explain?

ONT median explained: **52.45%**

Illumina median explained: **73.26%**

Seasonal differences: Metabolism



Questions?