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GENETIC CONFIRMATION OF A HYBRIDIZATION ZONE OF FOREST AND SAVANNAH ELEPHANTS AT THE EXTREME NORTH OF KIBALE NATIONAL PARK, UGANDA

Julie Bonnard^{a,b}, José Utge^a, Mary K. Kuhner^c, Samuel K. Wasser^c, Edward Asalu^d, John Paul Okimat^b & Sabrina Krief^{a,b}

a. Eco-Anthropologie, Muséum national d'Histoire naturelle, Université Paris Diderot, CNRS, Paris, France
 b. Sebitoli Chimpanzee Project, Sebitoli research station, Kibale National Park, Fort Portal, Uganda
 c. Center for Environmental Forensic Science, University of Washington, Seattle, WA, USA
 d. Uganda Wildlife Authority, Kampala, Uganda

INTRODUCTION

African elephants were recently recognized as two distinct species by the IUCN¹



Savannah Elephant²

&

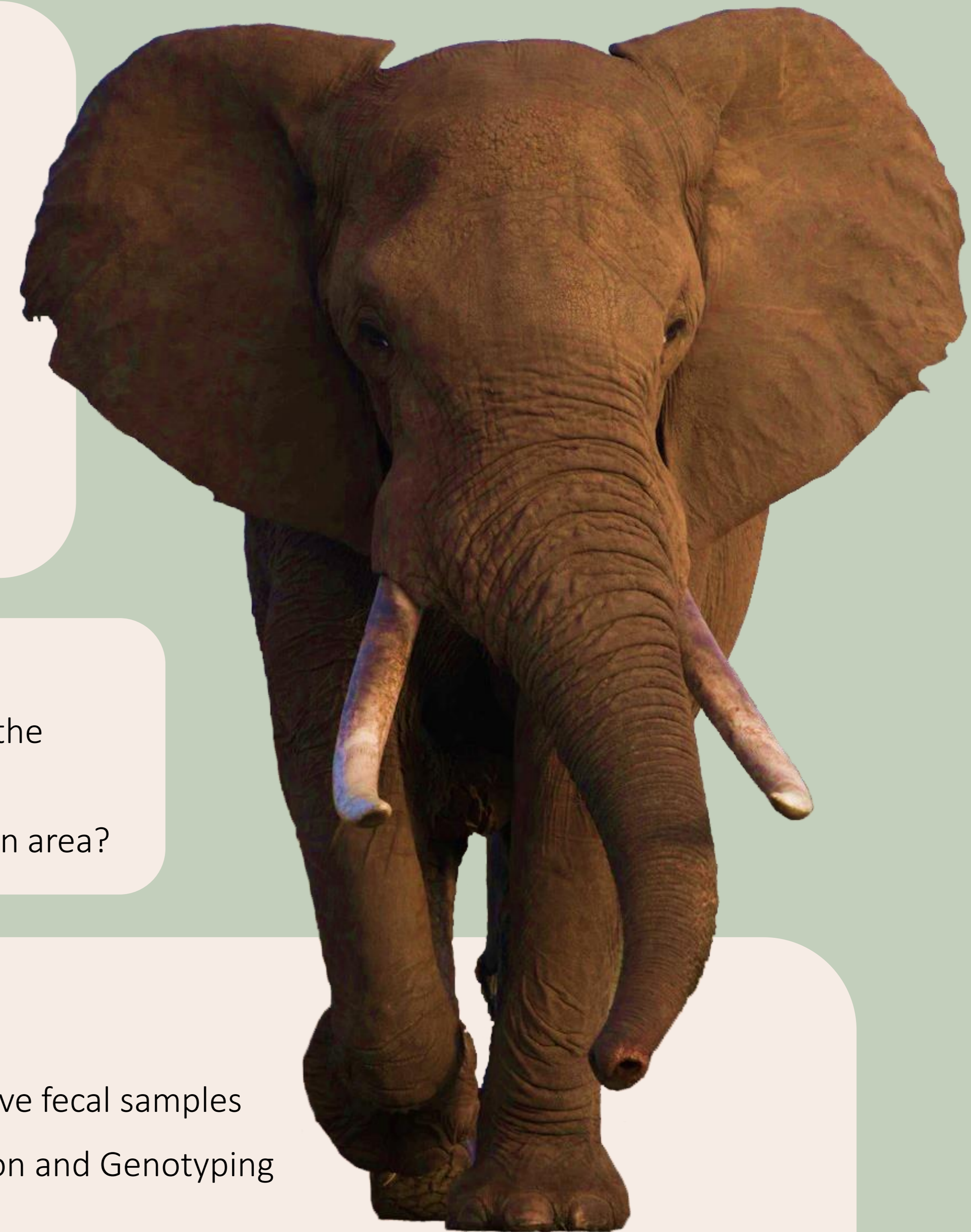
Forest Elephant³



The two species have different habitats but their range overlaps in some ecotones
 → The two species live together and few hybrids have been reported

The hybridization areas still remain understudied

The border between DRC and Uganda appears to be the main hybridization area



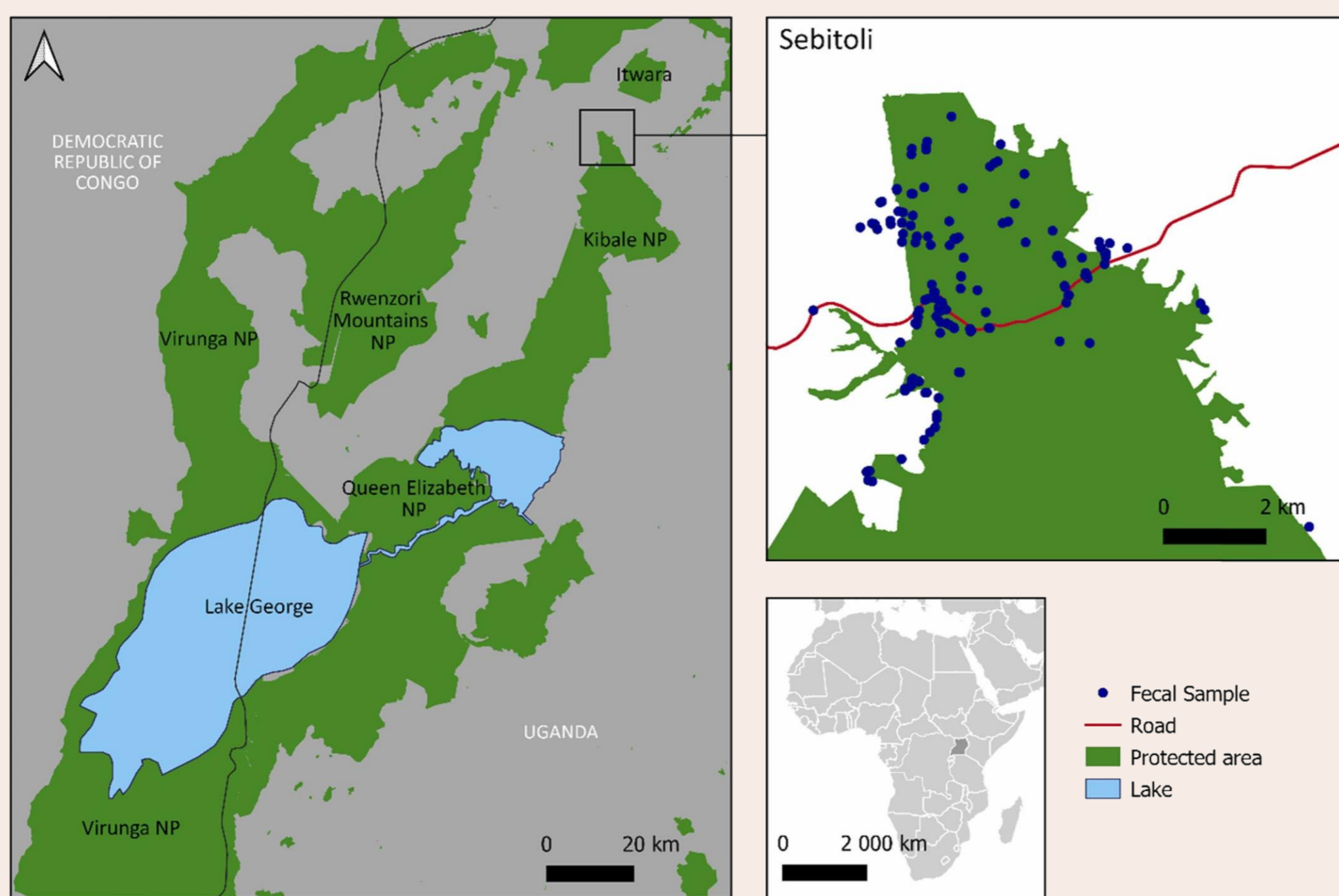
OBJECTIVE & RESEARCH QUESTION

We aim to provide better knowledge of the main hybridization area, located on the DRC-Uganda border, to support efficient conservation plans

What is the composition of elephant populations living in a forested hybridization area?

MATERIALS & METHODS

Study site: Sebitoli area, extreme north of Kibale National Park, Uganda
 Forest with dense undergrowth surrounded by agricultural lands



- Collection of 177 non-invasive fecal samples
- DNA Extraction, Amplification and Genotyping
 - 15 microsatellite loci
- Identification of the individuals
- Molecular sexing of the elephants⁴
- Species and Hybrid assignment analyses: EBhybrids software⁵
 - Reference samples: 1692 Savannah elephants & 715 Forest elephants
 - Gives the probability of being Savannah, Forest or Hybrid (F1, F2, BXS, BXF, other)

Study conducted in the context of the project « Forest-Fauna-Populations in Uganda »

RESULTS & DISCUSSION



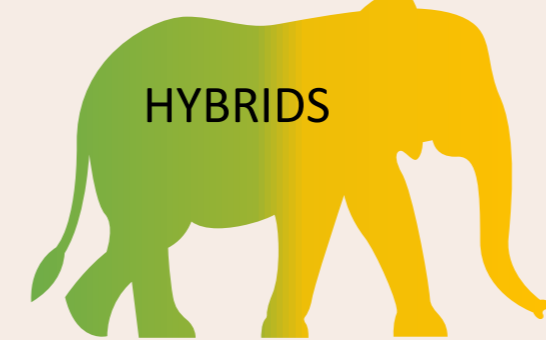
SEBITOLI ELEPHANTS
 91 individuals
 62♂ 29♀



0



SAVANNAH ELEPHANTS
 18.7% (n=17)
 14♂ 3♀



HYBRIDS
 81.3% (n=74)
 48♂ 26♀

F1 = 1
 F2 = 23
 BXS = 41
 BXF = 6
 Other = 3
 } 98.6% of second generation or more

- **NO FOREST ELEPHANTS** detected in this forested area
- **HIGHER PROPORTION** of Hybrids compared to the whole hybridization area (18,2%)⁵
- **FERTILE** despite an ancient separation between the two species (2.6 - 5.6 My)⁶
- **FEMALES and MALES** among Savannah elephants and Hybrids

PERSPECTIVES

What are the drivers responsible for this hybridization area? → Dating of the hybridization area
 Was this hybridization area created due to poaching pressures?

What conservation status should Hybrids have?
 What are the behavioral adaptations of Savannah elephants living in forest?



Read the article here



References:

- Hart, J., Gobush, K., Maisels, F., Wasser, S., Okita-Ouma, B., Slotow, R., 2021. African Elephant Specialist Group's 2021 Red List Assessment and Status Report treat forest and savanna elephants as separate species. *Oryx* 55 (2), 169–172
- Gobush, K.S., Edwards, C.T.T., Balfour, D., Wittemyer, G., Maisels, F., Taylor, R.D., 2021a. *Loxodonta africana*. The IUCN Red List of Threatened Species 2021: e.T181008073A181022663. <https://dx.doi.org/10.2305>
- Gobush, K.S., Edwards, C.T.T., Maisels, F., Wittemyer, G., Balfour, D., Taylor, R.D., 2021b. *Loxodonta cyclotis*. The IUCN Red List of Threatened Species 2021: e.T181007989A181019888. <https://dx.doi.org/10.2305>
- Aznar-Cormano, L., Bonnard, J., Krief, S., Guma, N., & Debruyne, R. (2021). Molecular sexing of degraded DNA from elephants and mammoths: a genotyping assay relevant both to conservation biology and to paleogenetics. *Scientific reports*, 11(1), 1–11.
- Mondol, S., Moltke, I., Hart, J., Keigwin, M., Brown, L., Stephens, M., Wasser, S.K., 2015. New evidence for hybrid zones of forest and savanna elephants in central and west Africa. *Mol. Ecol.* 24 (24), 6134–6147
- Rohland, N., Reich, D., Mallick, S., Meyer, M., Green, R.E., Georgiadis, N.J., Hofreiter, M., 2010. Genomic DNA sequences from mastodon and woolly mammoth reveal deep speciation of forest and savanna elephants. *PLoS Biol.* 8 (12), e1000564

Contact: juliebonnard@gmail.com