

Investigating the role of gut microbiota in the health of black rhinoceros

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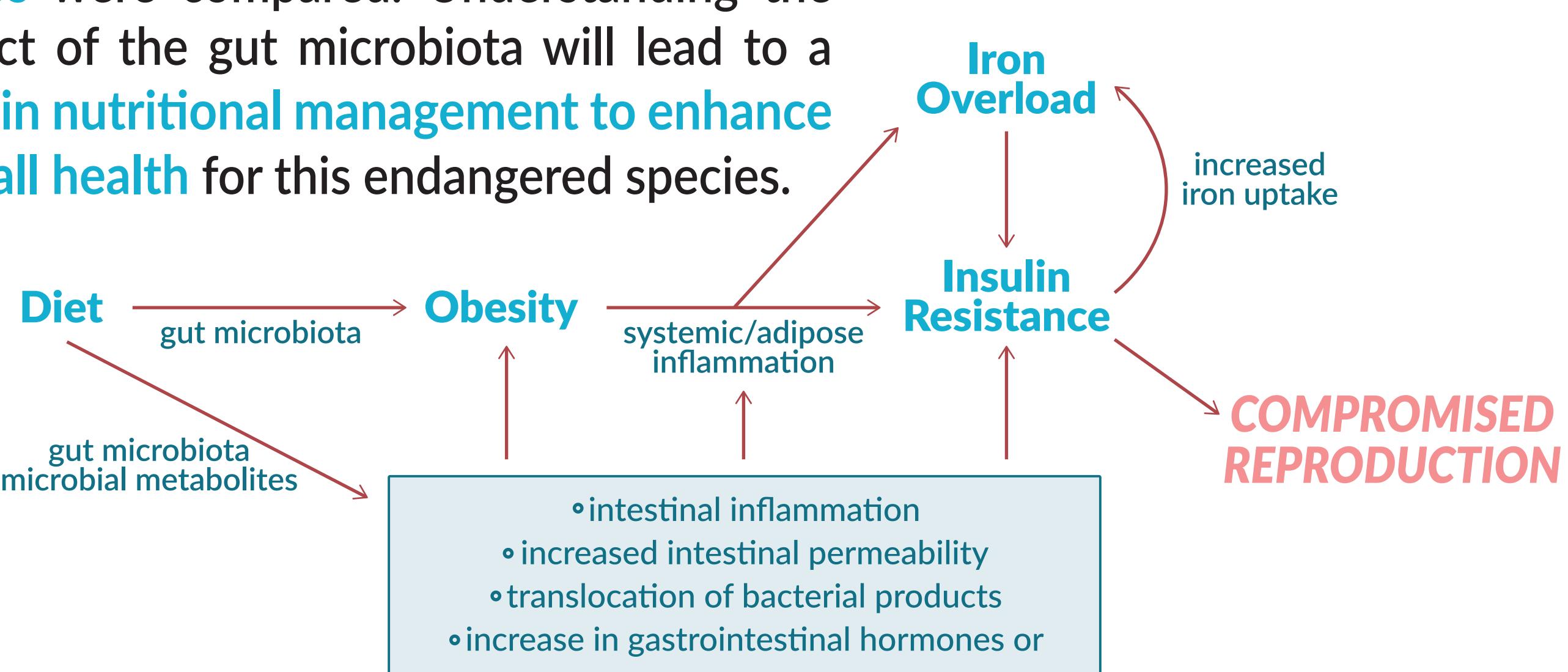
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INTRODUCTION

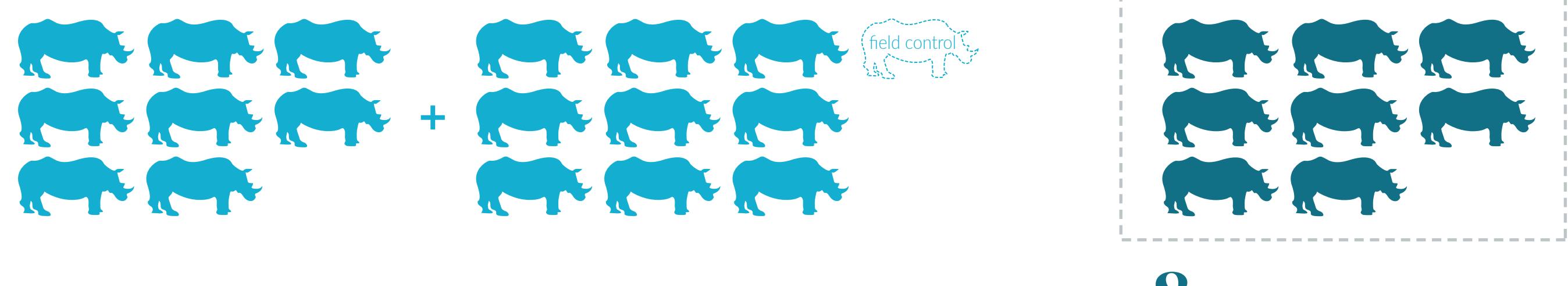
Iron overload remains the major cause of morbidity and mortality in the ex situ population of the Critically Endangered black rhinoceros (*Diceros bicornis*). To understand the implications of diet on their health, gut microbiomes of wild and captive black rhinos were compared. Understanding the impact of the gut microbiota will lead to a shift in nutritional management to enhance overall health for this endangered species.



If differences among the microbiomes exist between captive and wild rhinos, then the microbiota can be exploited to alleviate iron overload in the captive rhinos.

METHODOLOGY

Experimental Design

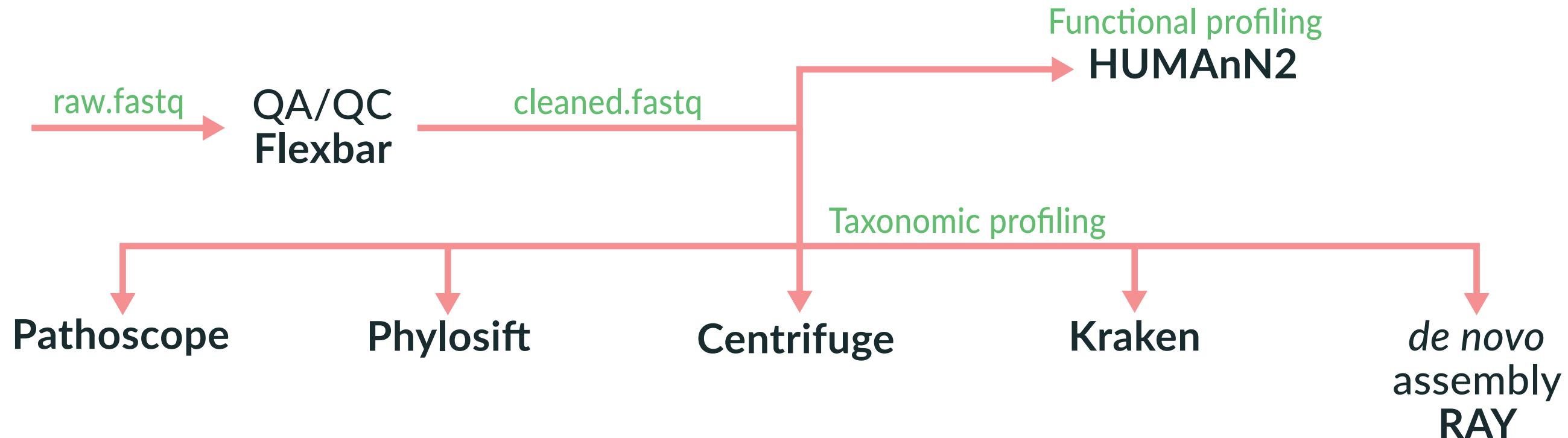


17 wild rhino fecal samples

Microbiome Molecular Biology

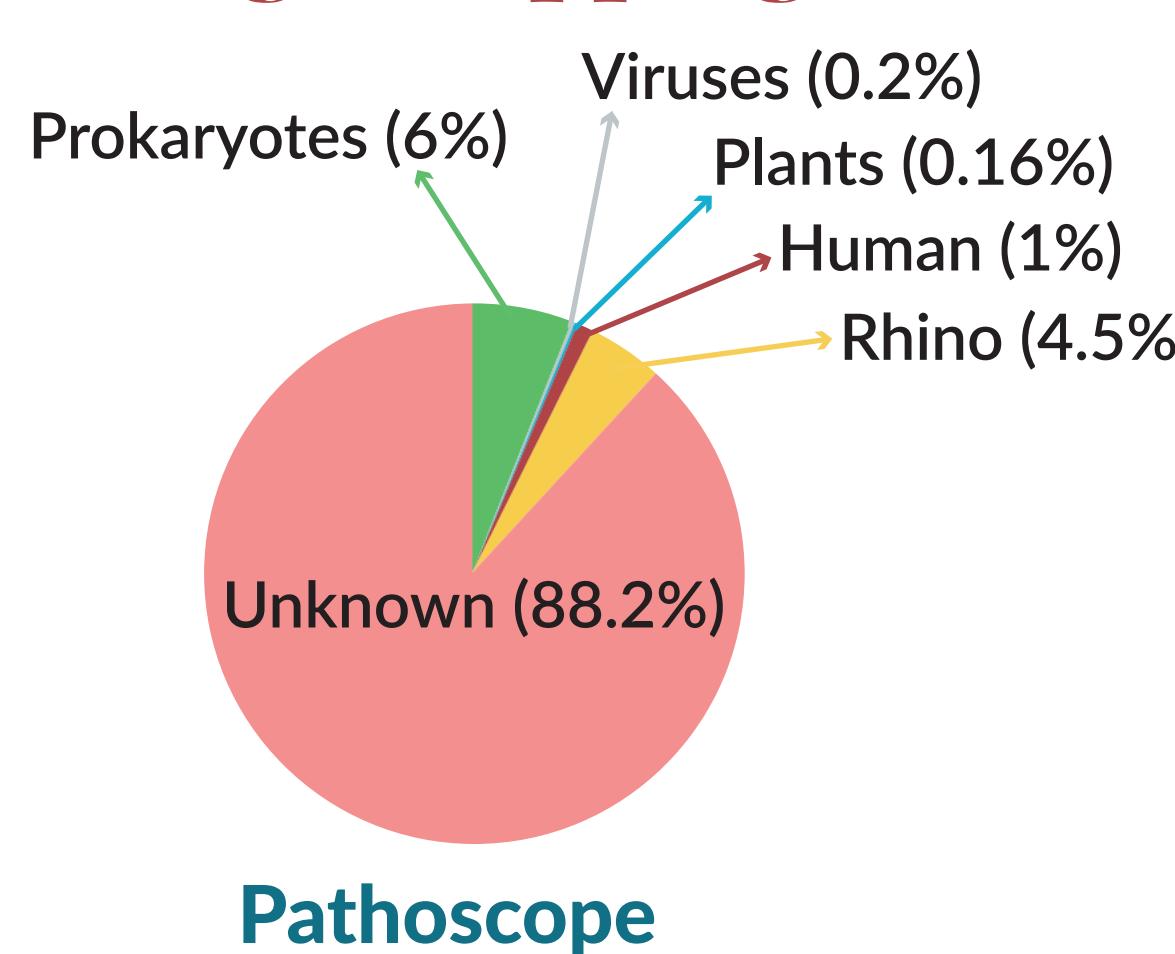


Microbiome Characterization (Bioinformatics)

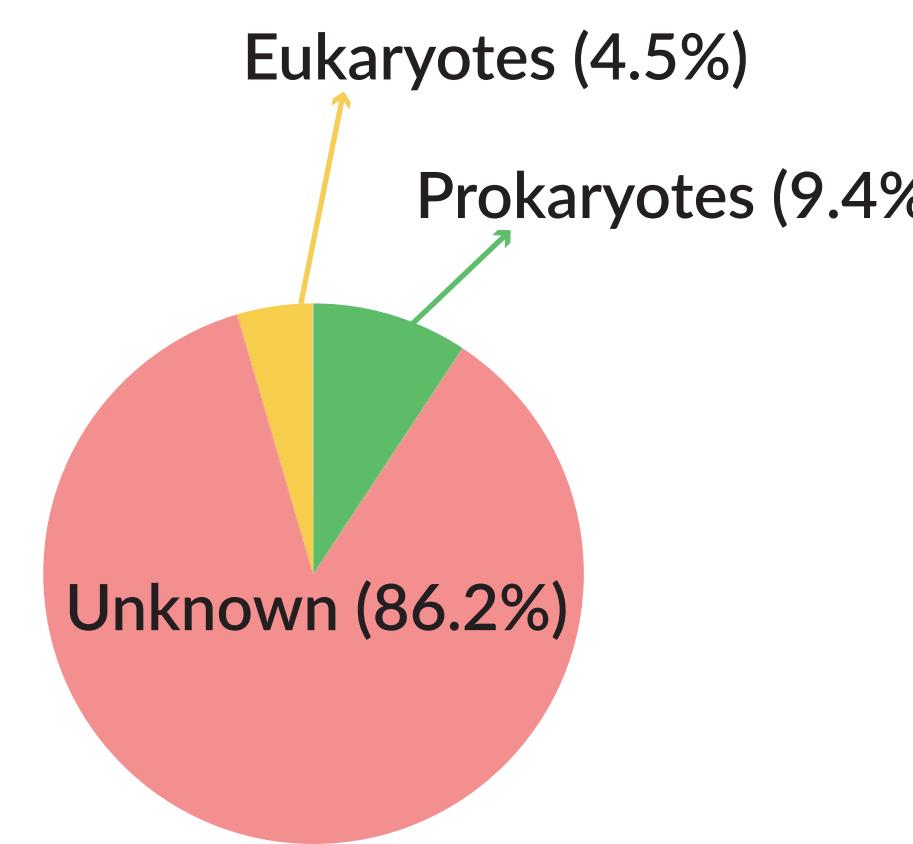


MICROBIOME CHARACTERIZATION

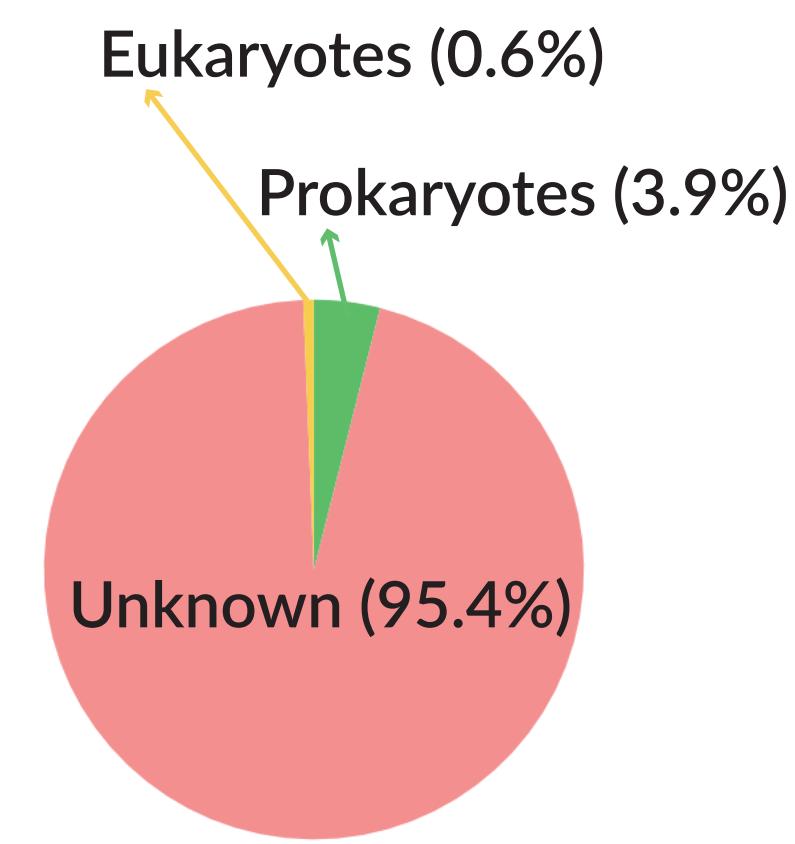
Average Mapping Rates



Pathoscope

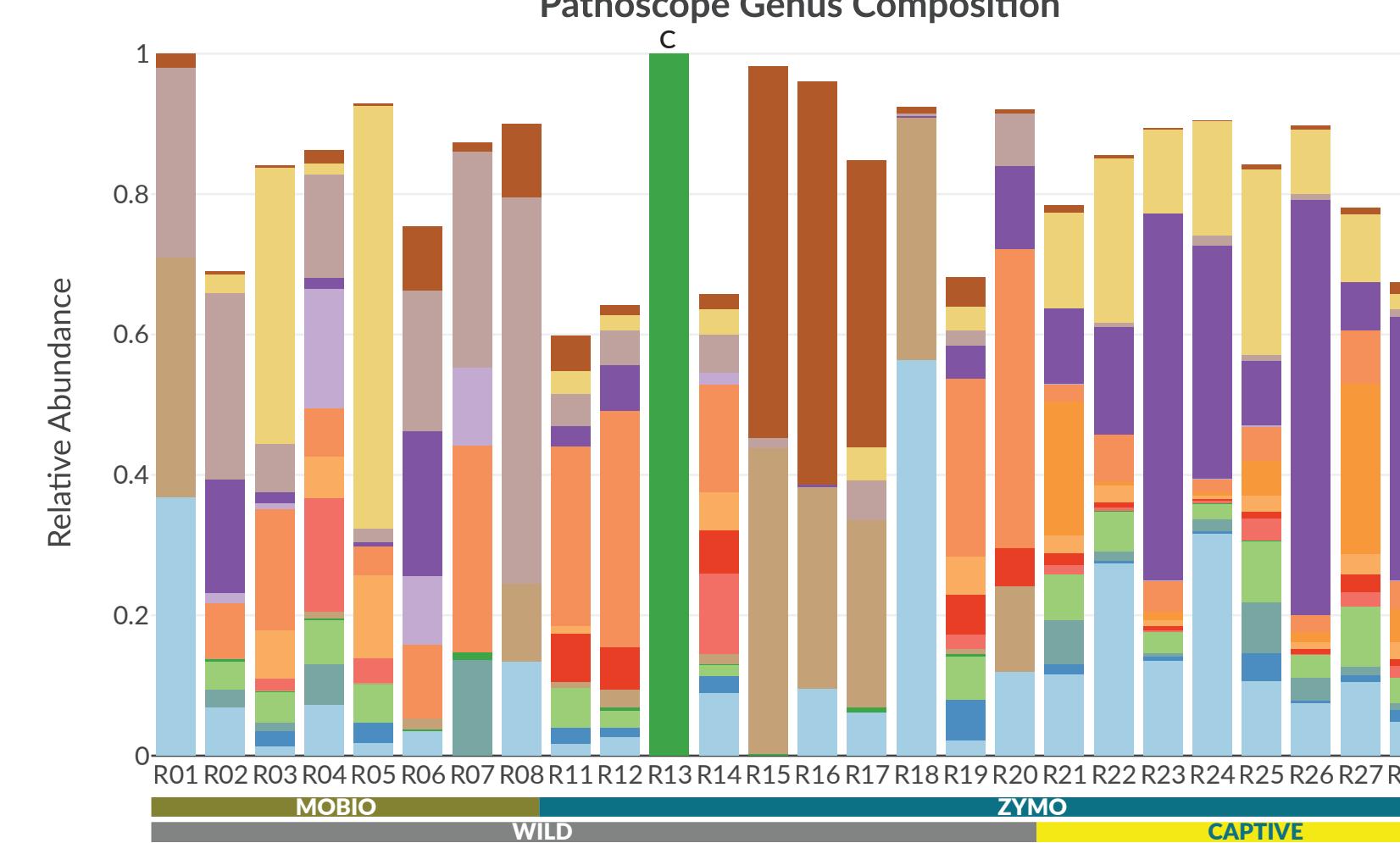
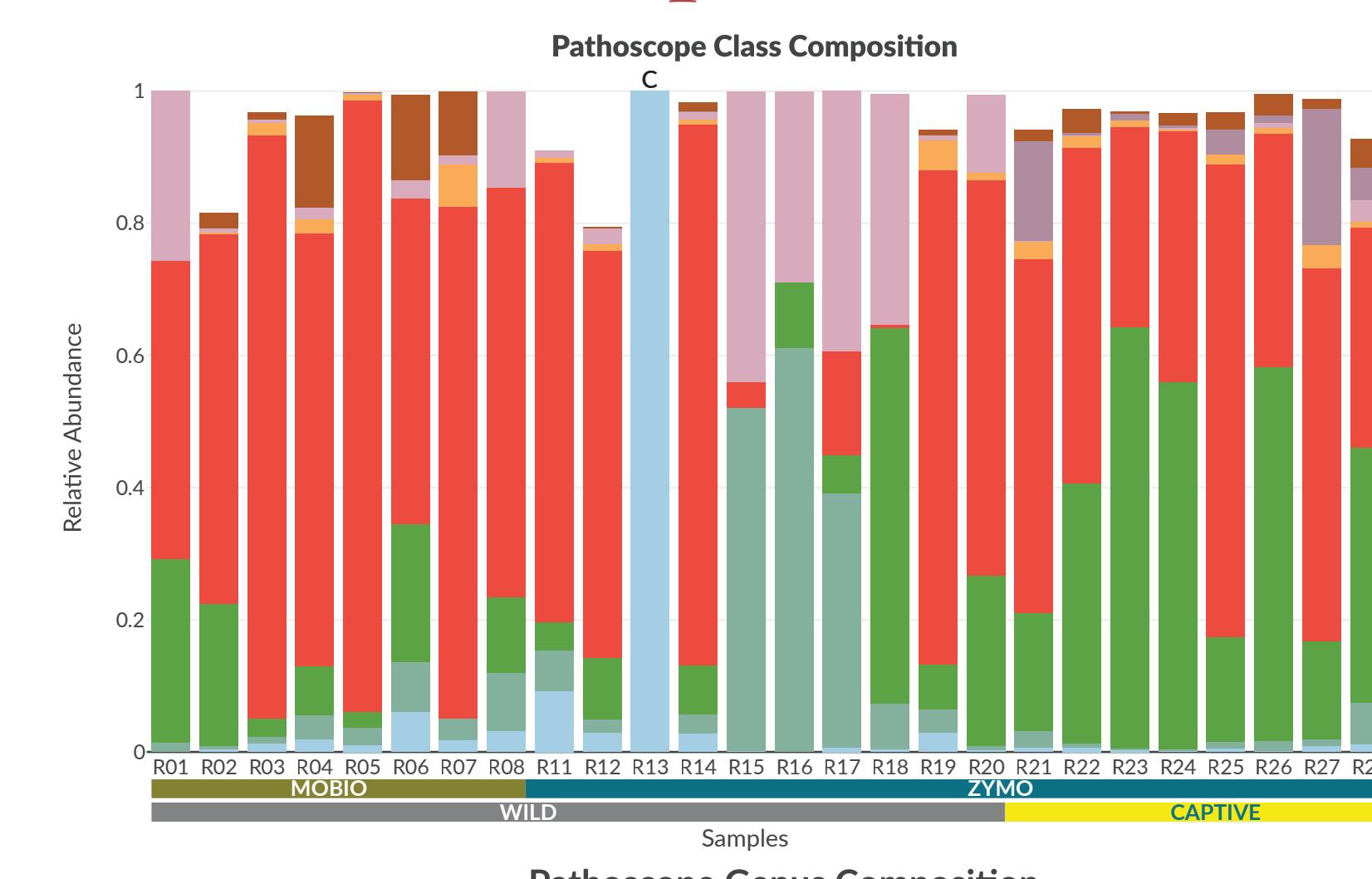


Centrifuge

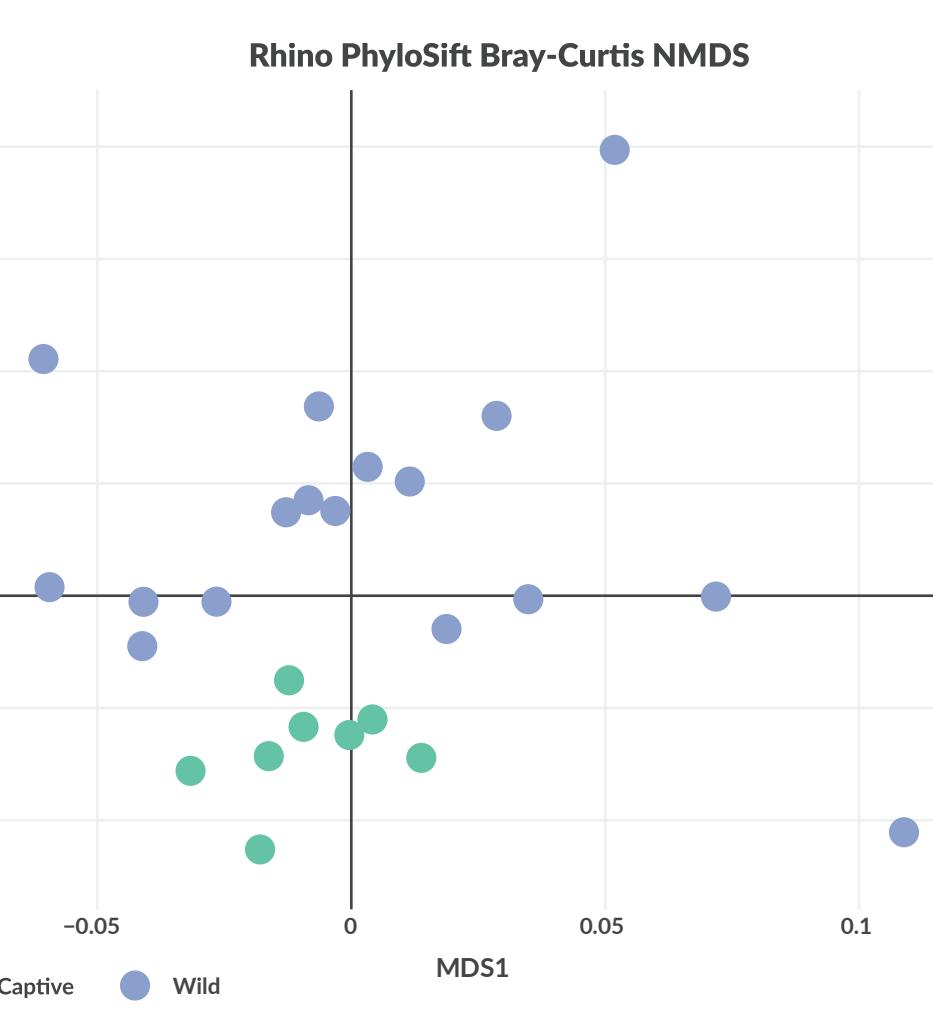


Kraken

Taxonomic Composition



- Phylosift shows significant differences in diversity between captive and wild with wild being much more taxonomically diverse $P=0.012$, PERMANOVA.
- Pathoscope reports bacterial taxa traditionally associated with ruminant guts are higher in captive.
- Pathoscope results suggest the unknown gut symbionts of wild rhinos are being replaced by those found in conventional human-domesticated livestock.



Functional Profiling

- Greater abundance of glycolysis pathways in captive rhinos, representing an organism receiving a readily available source of glucose.
- Pathways abundant in wild rhinos indicate they're not receiving a glucose source as readily.
- Captive rhinos had a greater abundance in pathways involving methane, which is reflected in their bacteria composition.
- Captive rhinos show greater abundance on amino acid synthesis pathways, indicating inadequate nutrition.

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