

Diet Effects on the Non-Human Primate Gut Microbiome

Madelyn Moy

Citations are either on the slides or in the reference slides at the end of the presentation.

The Human Diet...

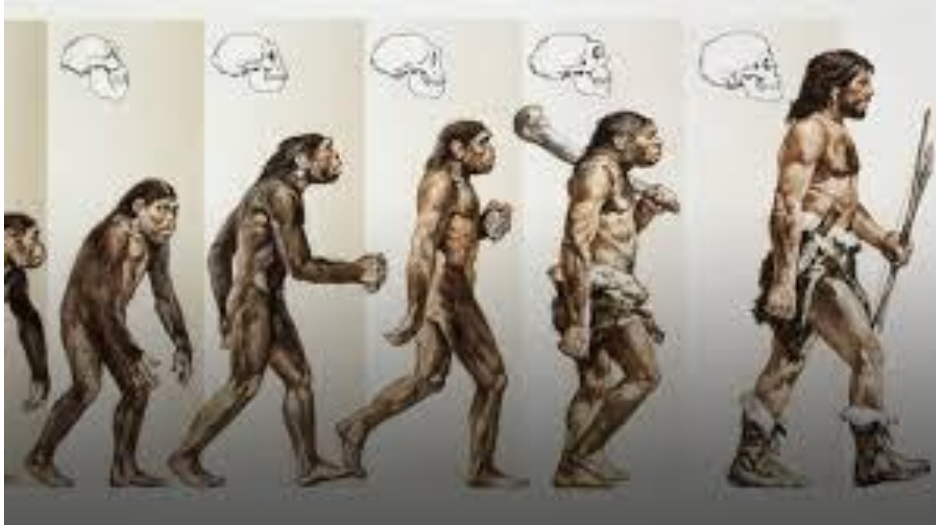


Image: DEA Picture Library/De Agostini/Getty Images



Images: National Cancer Institute; shutterstock.com

The Human Diet....Has Dramatically Changed

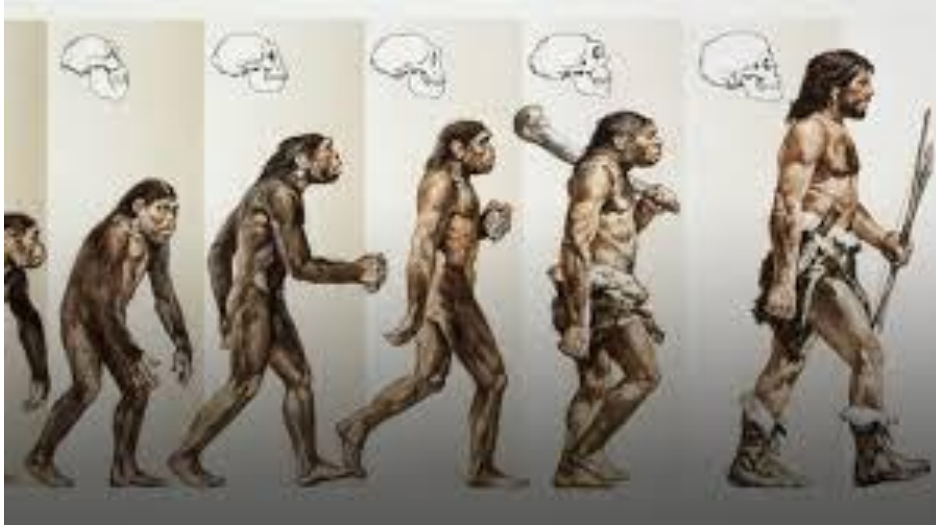


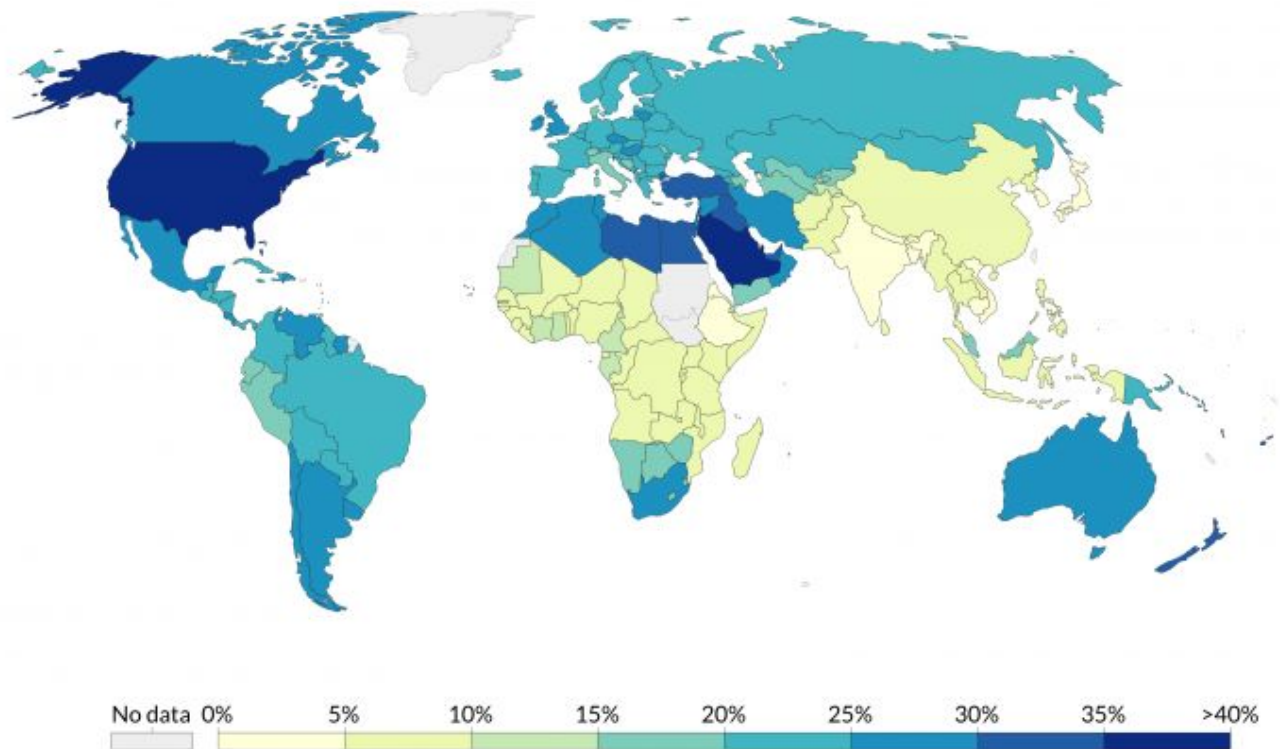
Image: DEA Picture Library/De Agostini/Getty Images



Images: National Cancer Institute; shutterstock.com

Share of adults that are obese, 2016

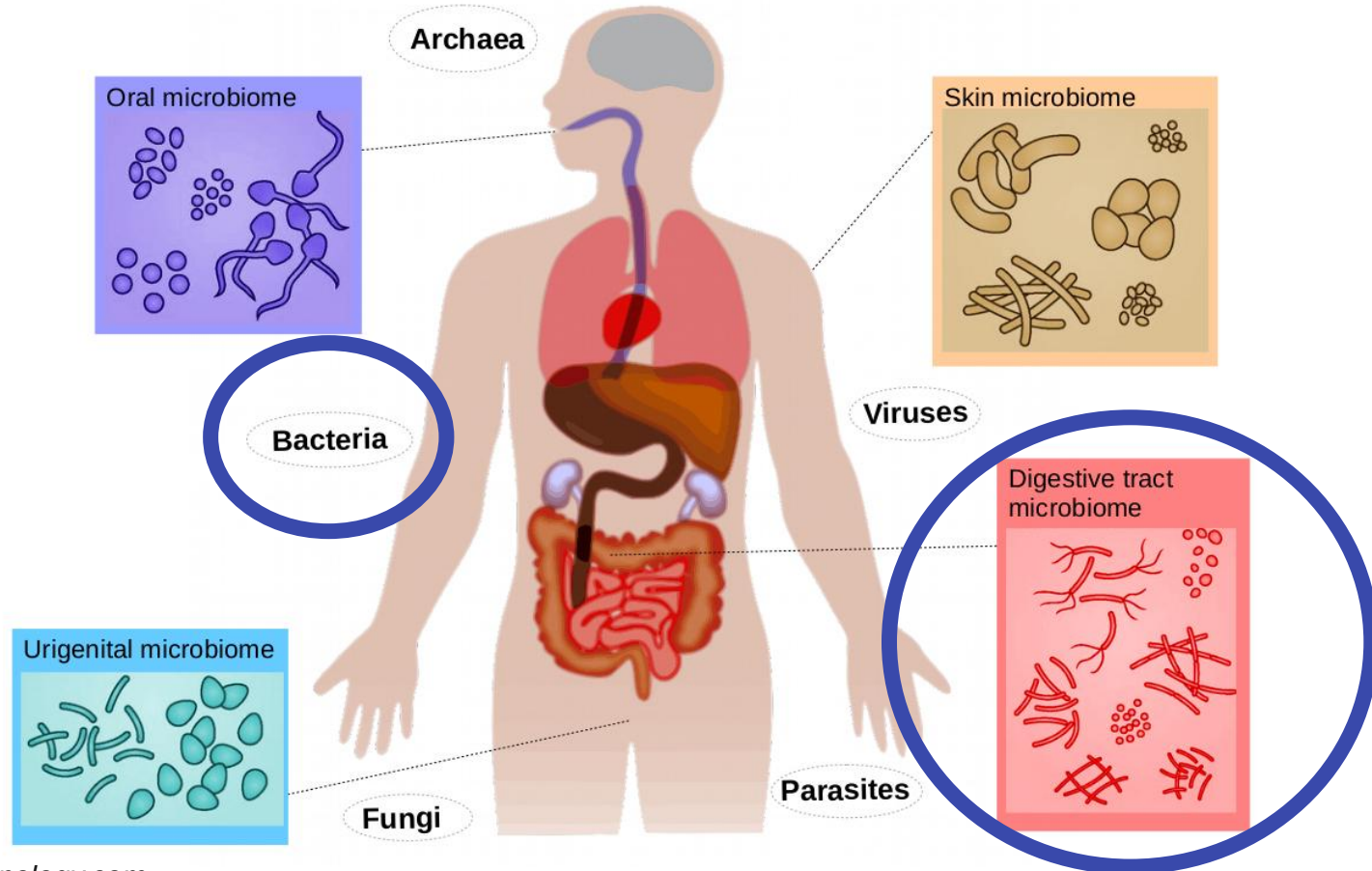
Obesity is defined as having a body-mass index (BMI) equal to or greater than 30. BMI is a person's weight in kilograms divided by his or her height in metres squared.



Source: WHO, Global Health Observatory

OurWorldInData.org/obesity • CC BY

Human Microbiome



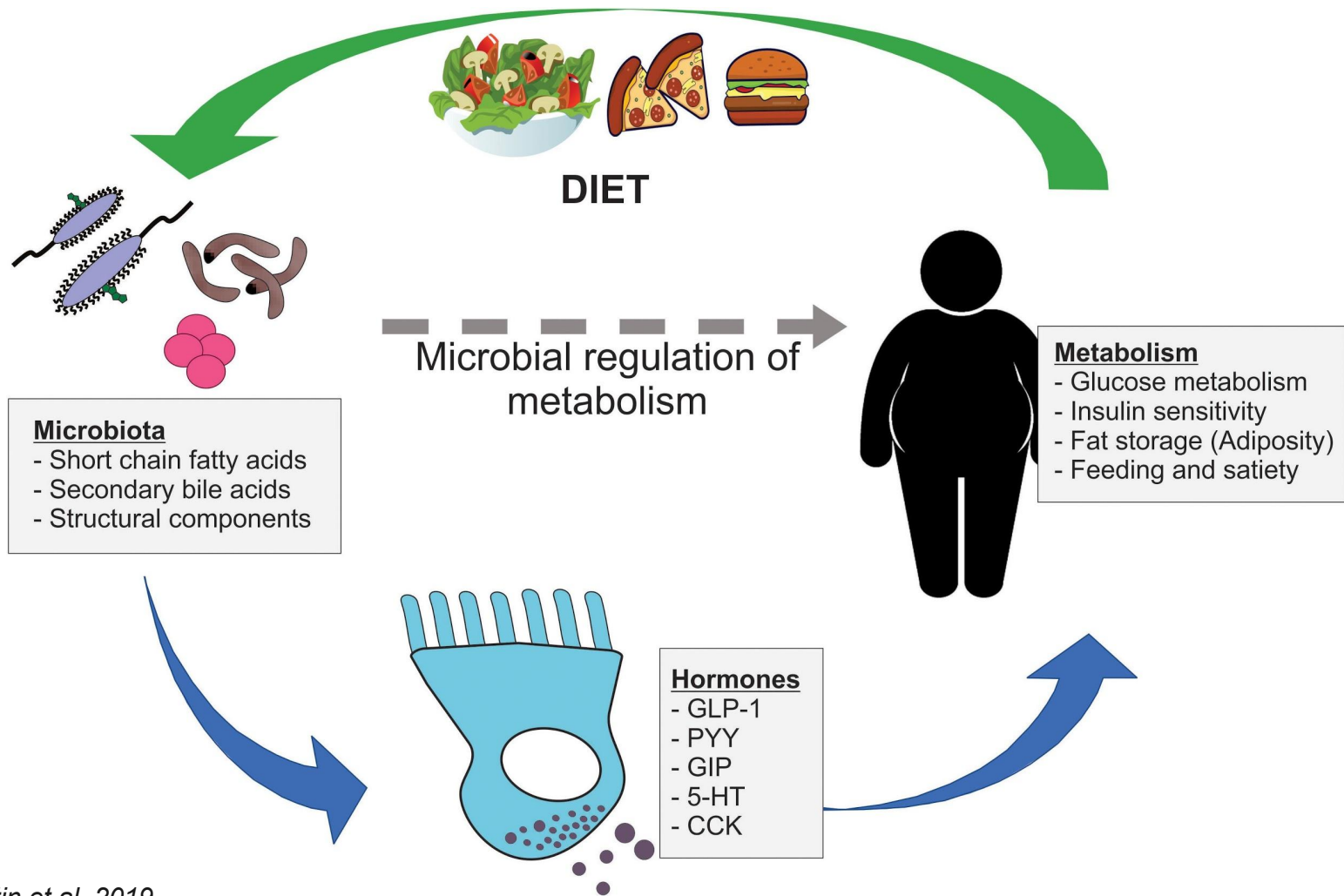




Image: Chip Clark, Jim DiLoreto, & Don Hurlbert /Smithsonian Institution



How does the primate gut microbiome change in response to an industrialized, high fat low fiber (HFLF) diet from a low fat high fiber (LFHF) diet?

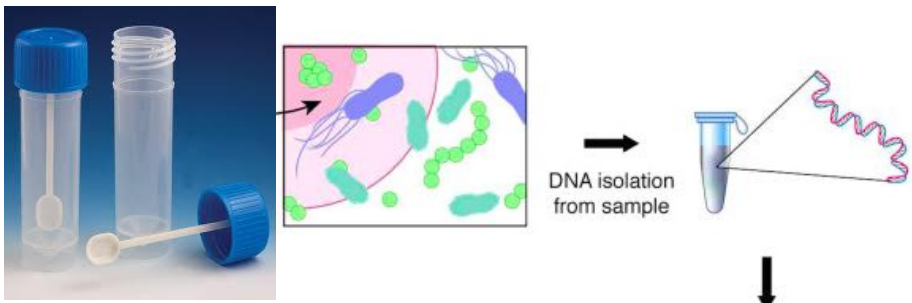


Akagera National Park, Rwanda

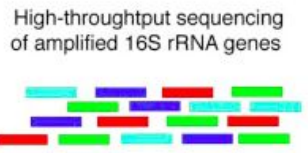
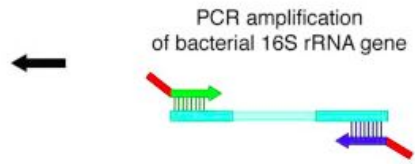


Olive Baboons (*Papio Anubis*)

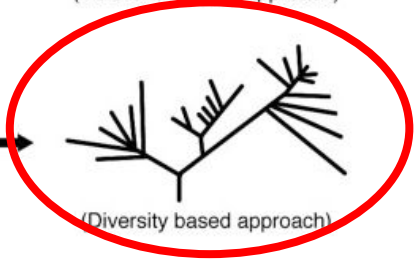
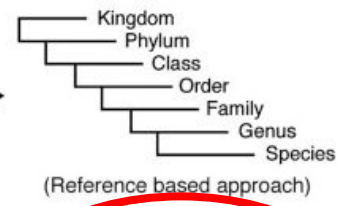
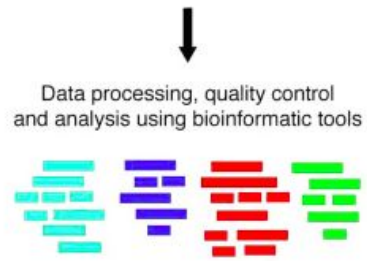
High fat, low fiber (HFLF) = unlimited access to trash
Low fat, high fiber (LFHF) = no access to trash



Wet Lab



Dry Lab



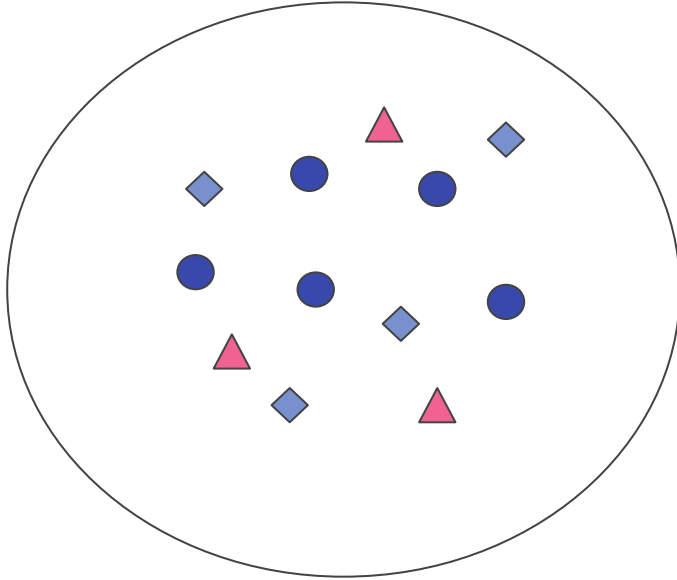
2 Types of Diversity

α -diversity: diversity **within** a particular group

β -diversity: comparison of diversity **between** groups

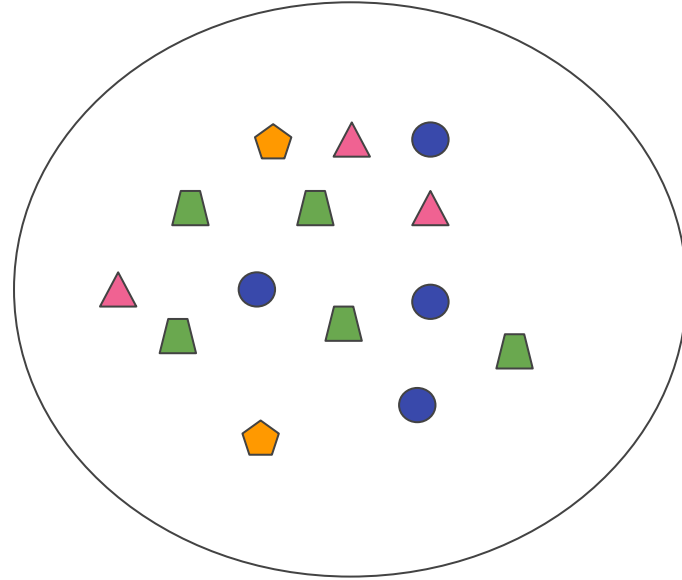
α -diversity: diversity **within** a particular group

● = 5
▲ = 3
◆ = 4



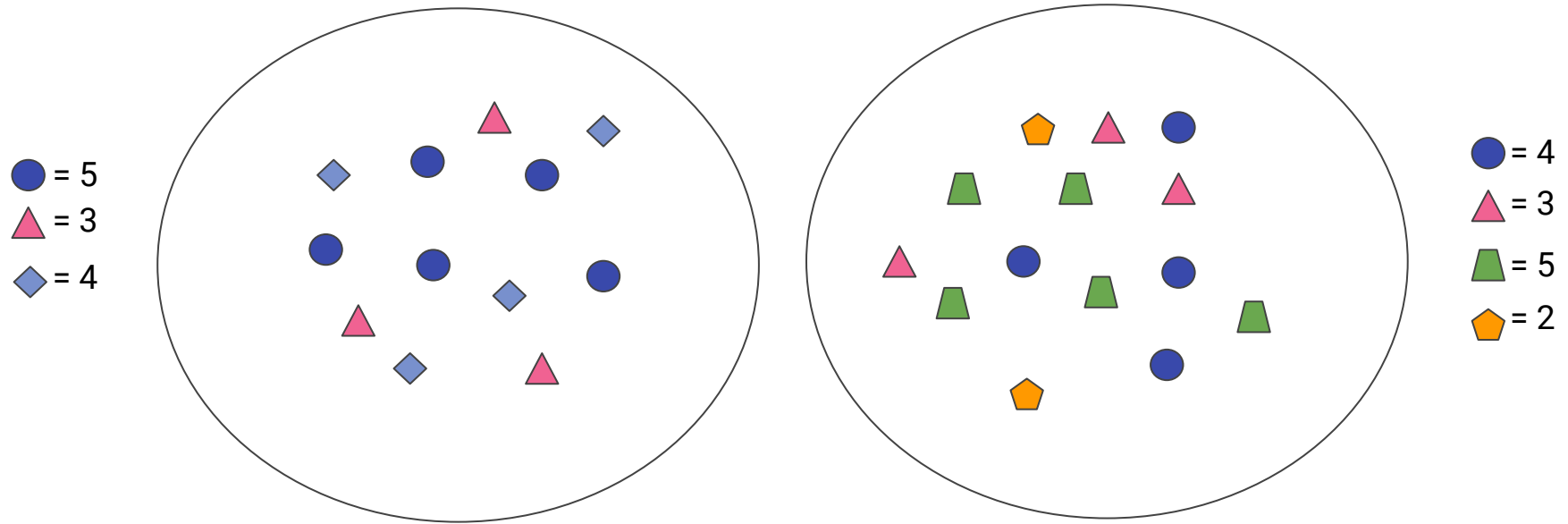
Group A: 3 distinct “species”

● = 4
▲ = 3
▱ = 5
⬠ = 2

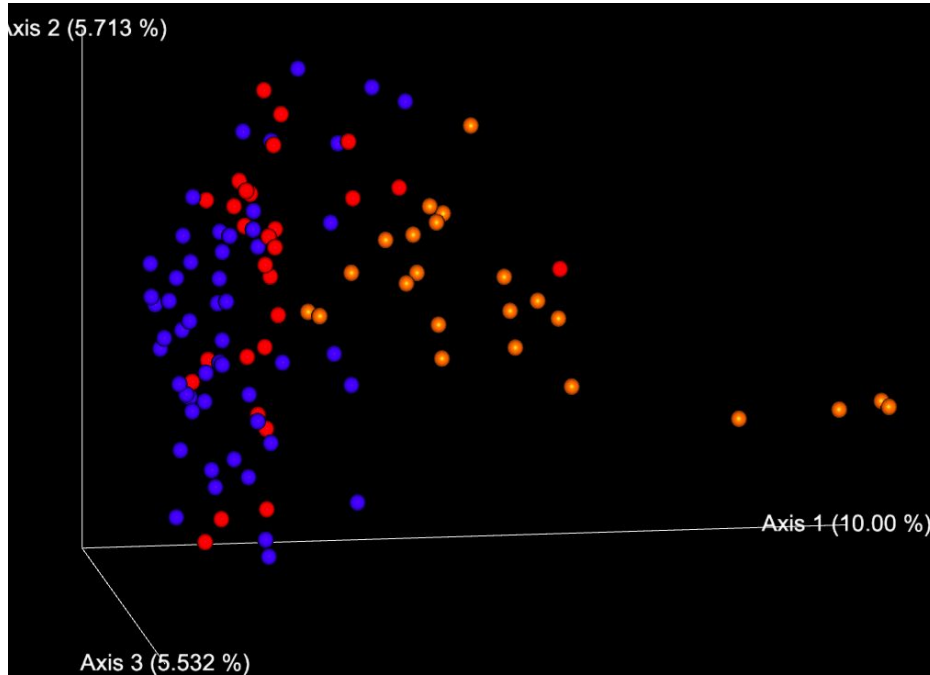


Group B: 4 distinct “species”

β -diversity: comparison of diversity **between** groups



7 distinct “species” represented by A and B together



β -diversity

Diet has strong impact on
baboon GM composition

PERMANOVA $F_{1,105} = 12.9$, $r^2 = 0.11$, $p < 0.01$

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α -diversity

Reduced microbial diversity in
baboons consuming a HFLF
diet

ANOVA $F_{1,91} = 77.6, p < 0.01$

β -diversity

Diet has strong impact on
baboon GM composition

PERMANOVA $F_{1,105} = 12.9, r^2 = 0.11, p < 0.01$

Summary

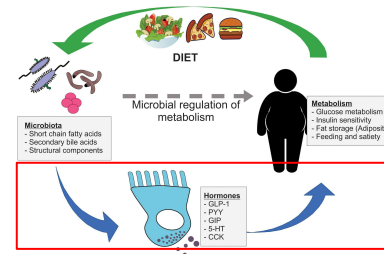
Diet has a significant impact on gut microbiome diversity and composition.

A high fat, low fiber diet is associated with reduced gut microbiota diversity.

Significance



Next Steps



Compare dataset with other NHPs and humans
Evaluate functionality with metabolomics

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