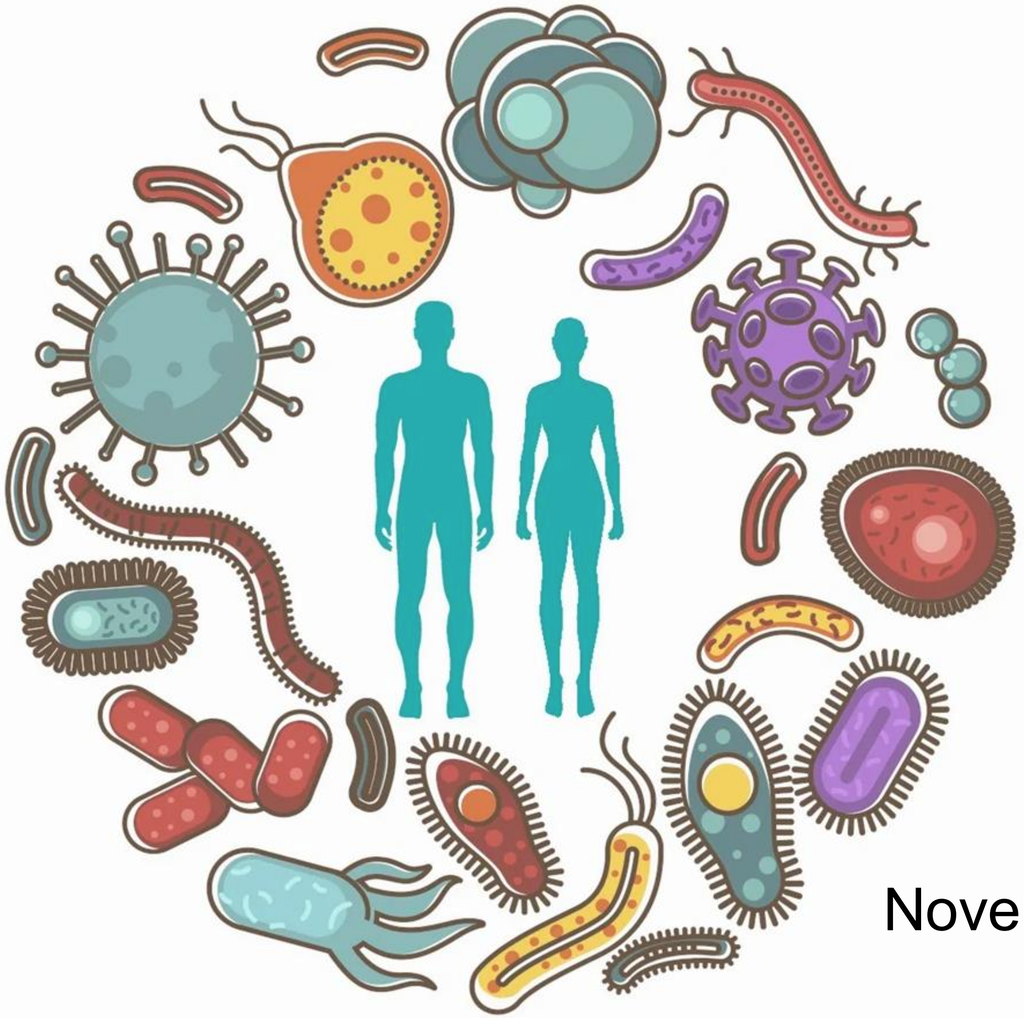
Practical I



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November 22, 2023

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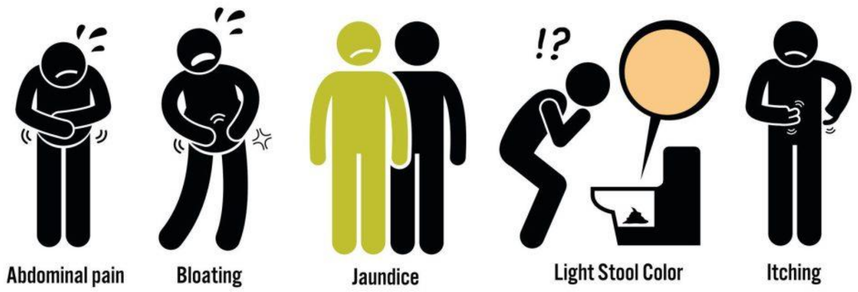
MEDIZINISCHE FAKULTÄT HEIDELBERG

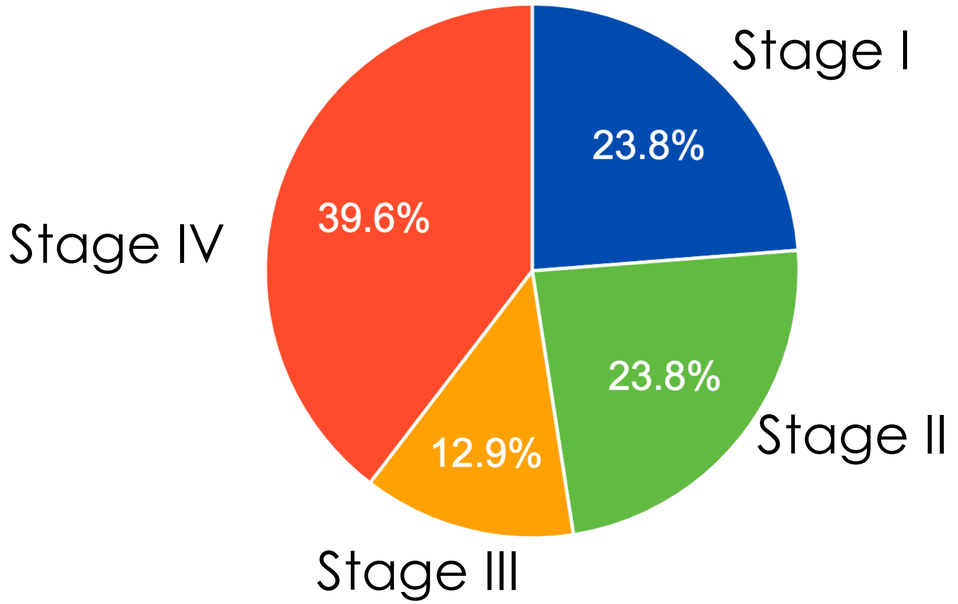
BioQuant MODEL base of LIFE

http://strongself.net/movement-and-our-gut-microbiome/

Pancreatic Ductal Adenocarcinoma (PDAC)

- 8th deadliest cancer worldwide
- Risk factors: pancreatitis, periodontitis, obesity, T2D, smoking, alcohol consumption
- The only FDA approved marker: CA19-9 antigen in serum (low PDAC specificity)
- **5 year survival rate is <10%**



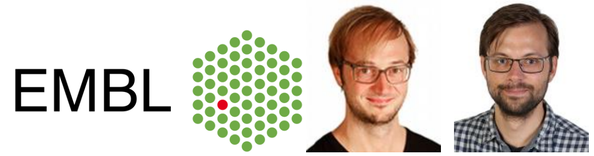


https://seer.cancer.gov/statfacts/html/common.html

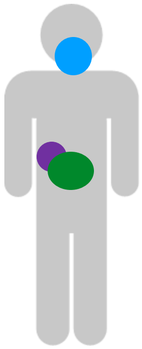
https://www.roswellpark.org/cancer/pancreatic/survival-rate

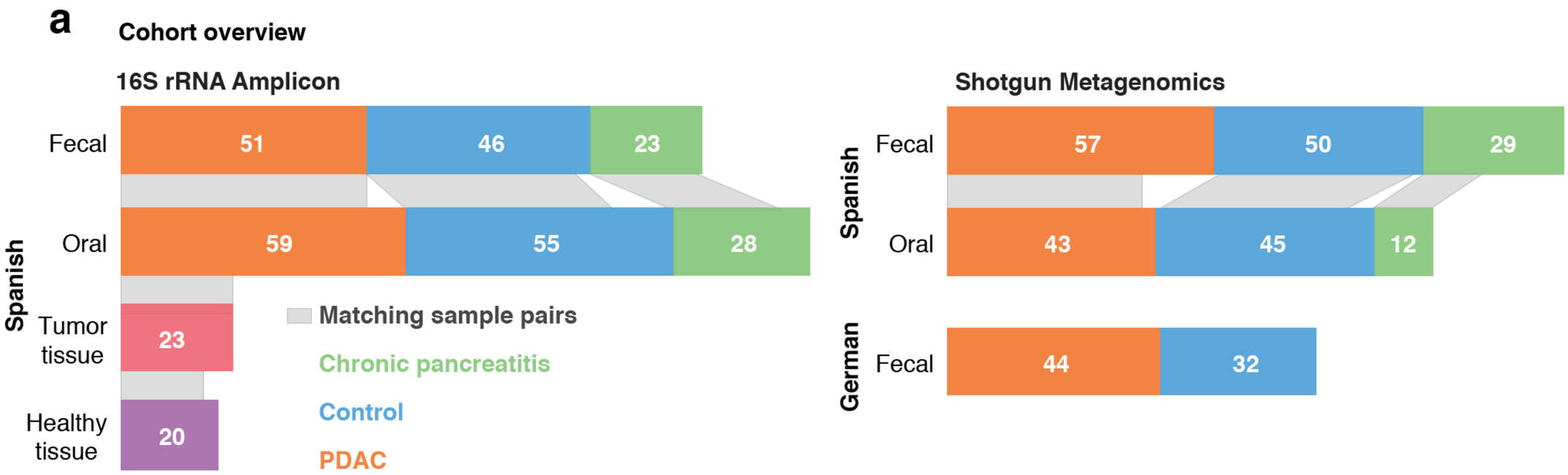
Potential of fecal microbiota for specific detection of PDAC

PanGen & MAGIC Consortiums



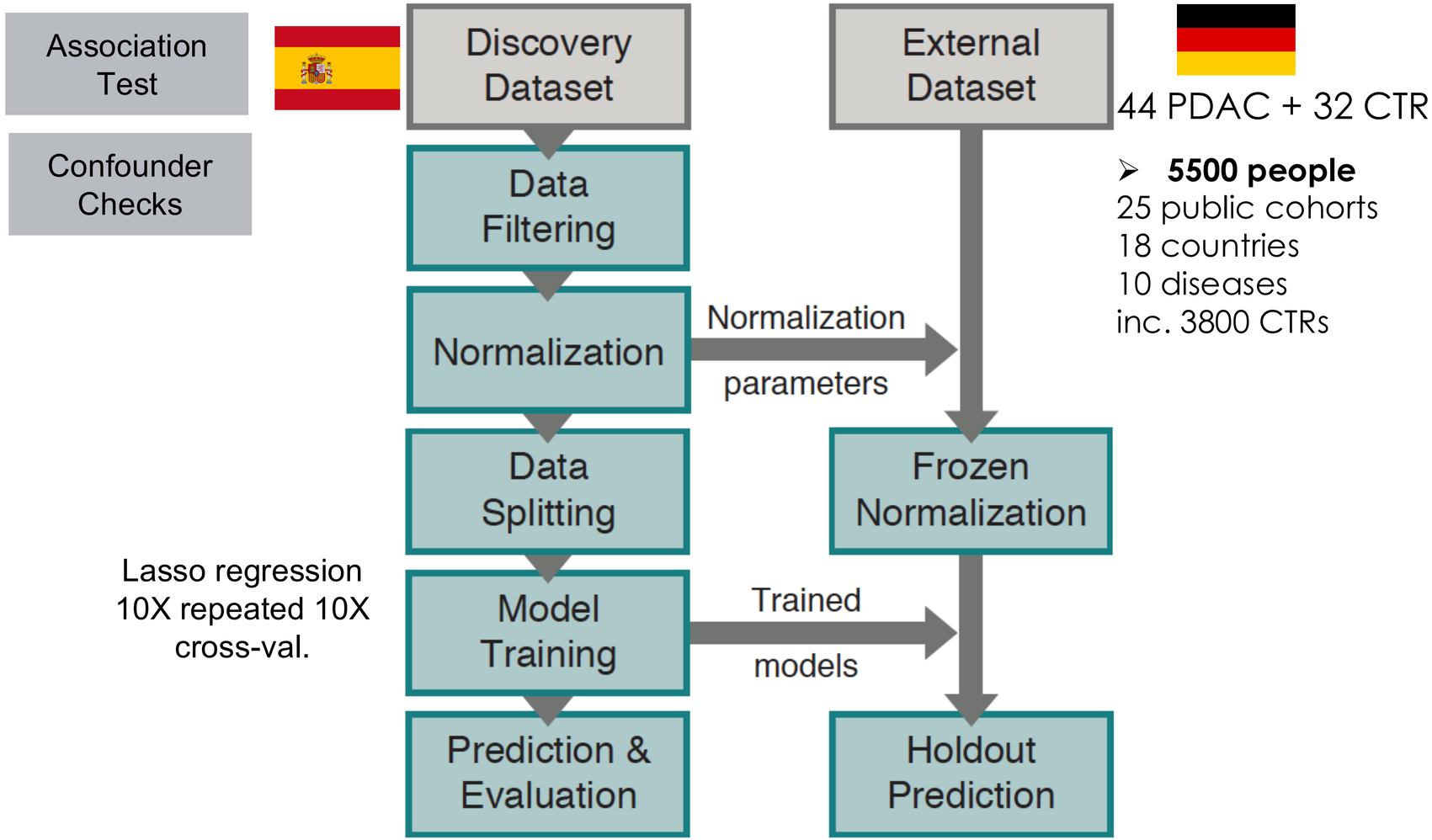
Bork & Zeller Groups





Kartal et al 2022, GUT

Model building steps for classification problems



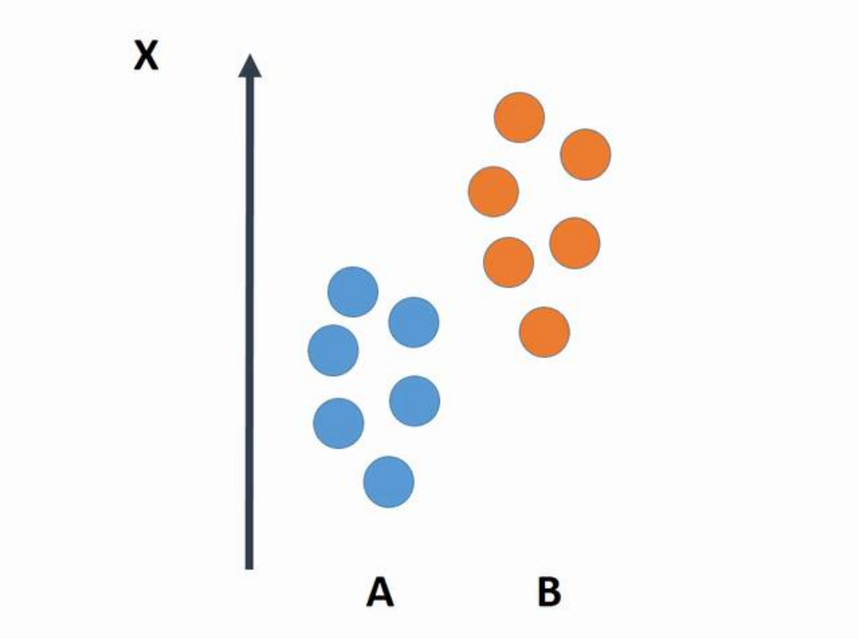
44 PDAC + 32 CTR

- **5500 people**

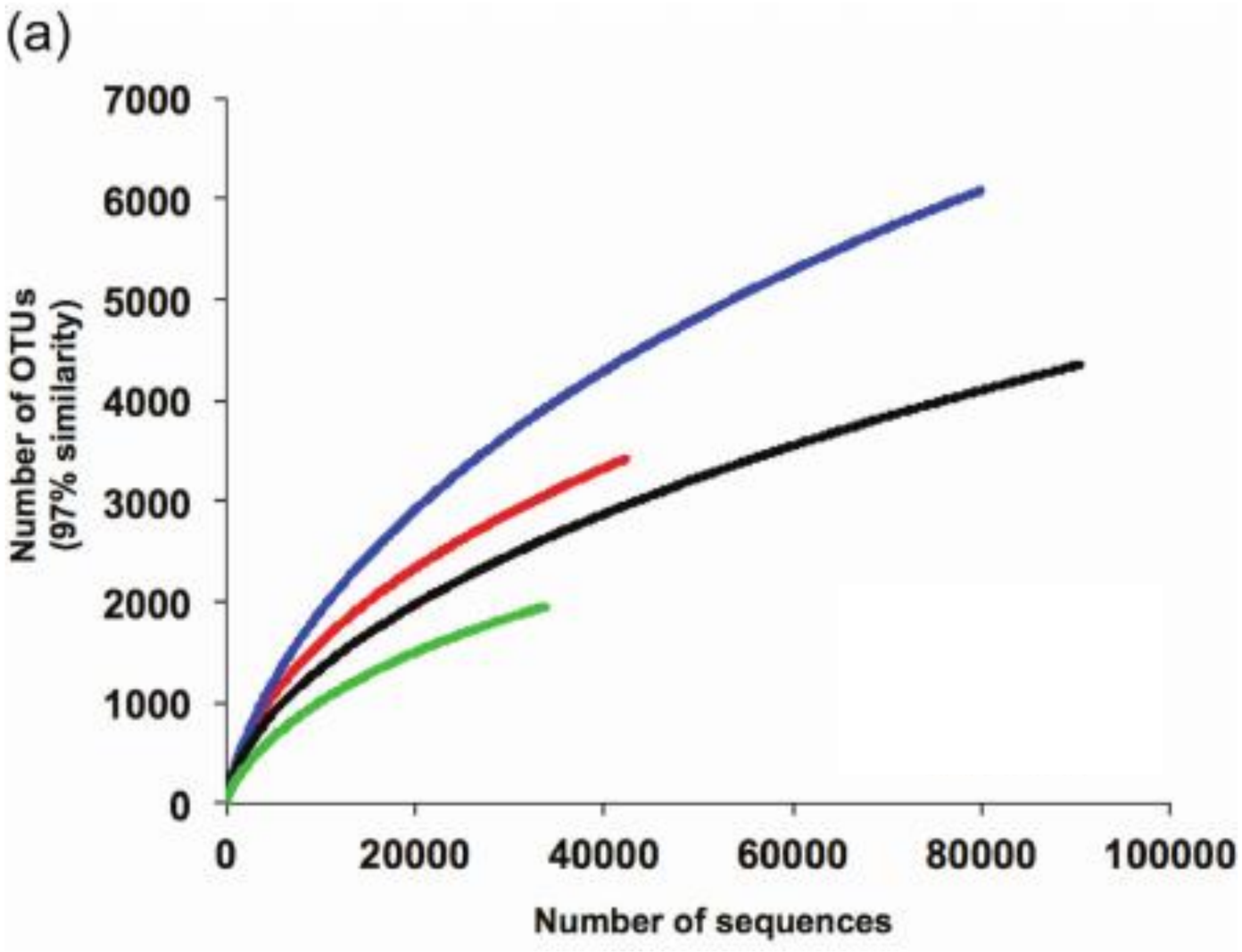
25 public cohorts
18 countries
10 diseases
inc. 3800 CTRs

Wirbel et al., 2019 Genome Biology

Sanity checks: Confounding covariate



Sanity checks: Rarefaction

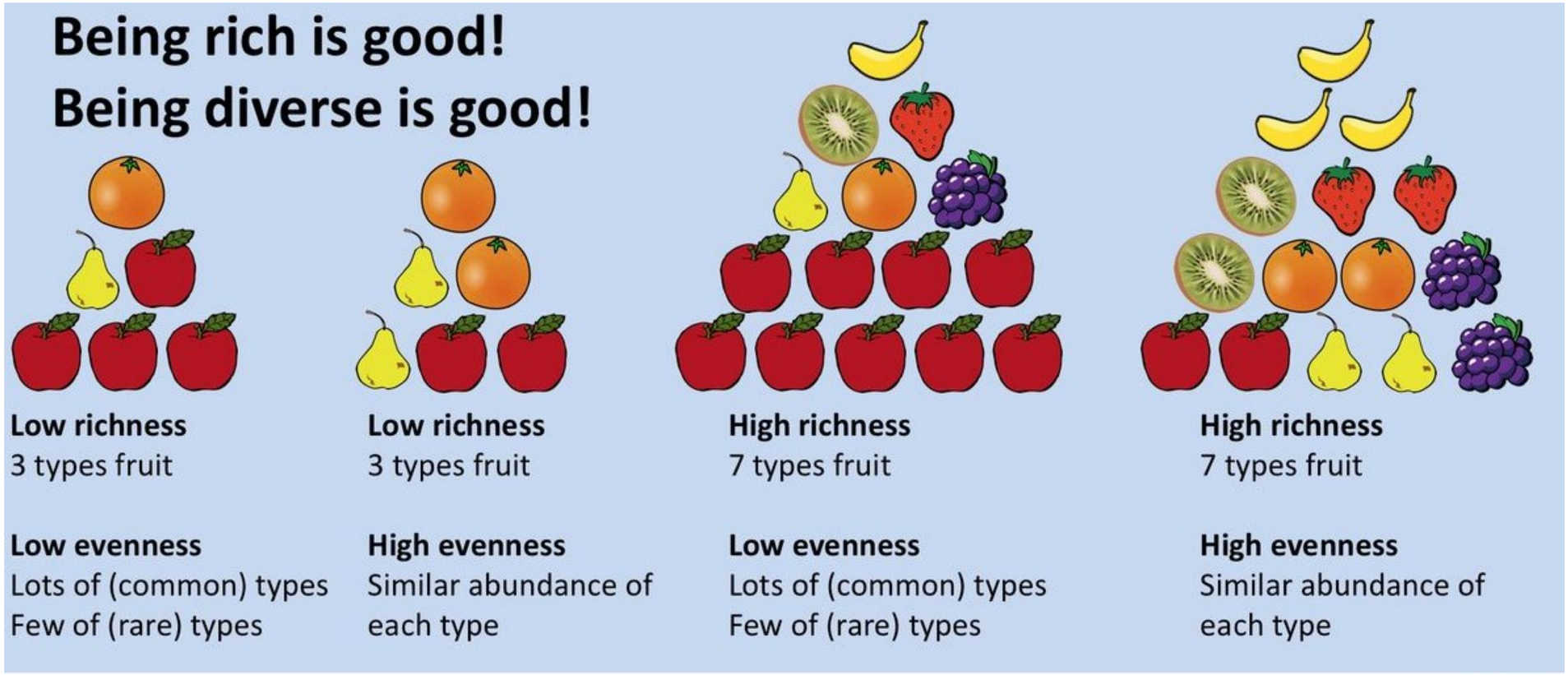


Kroer et al., 2013

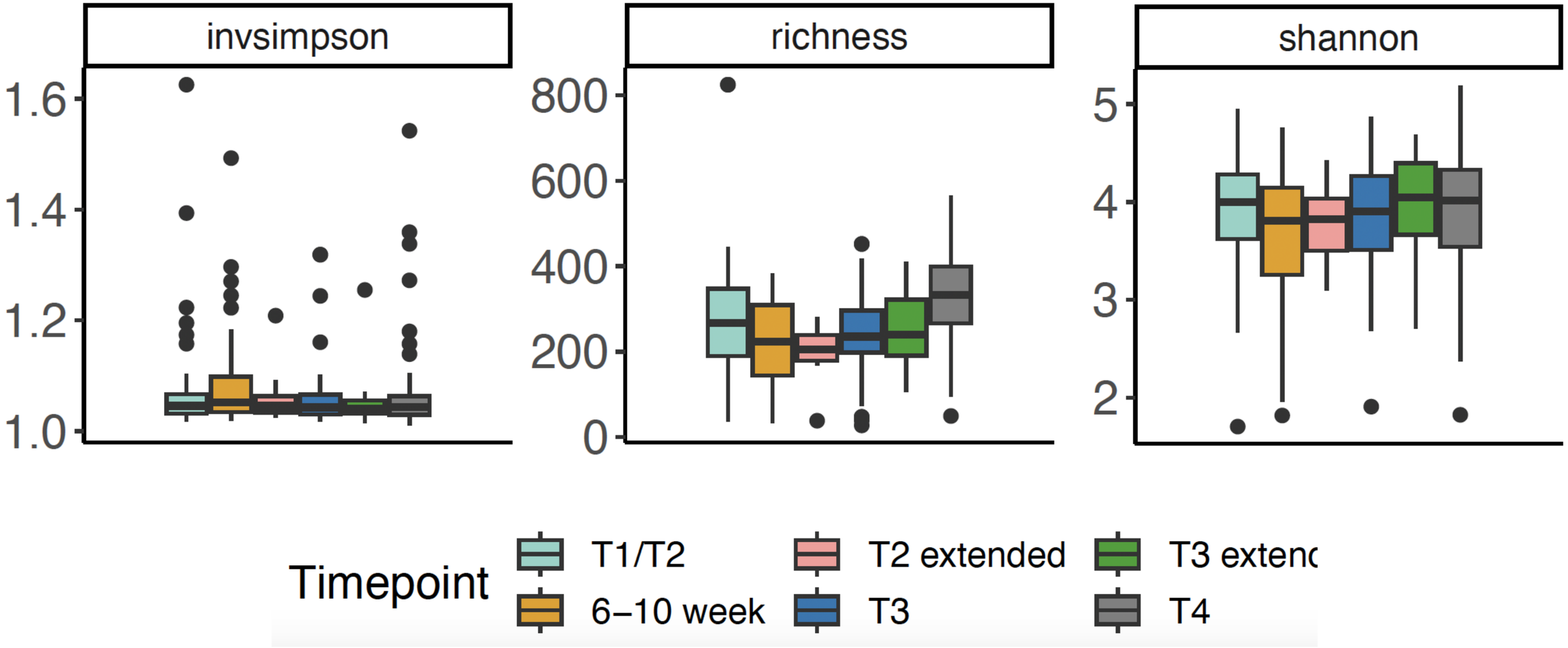
Diversity measures: Alpha (within sample) diversity

Different estimates

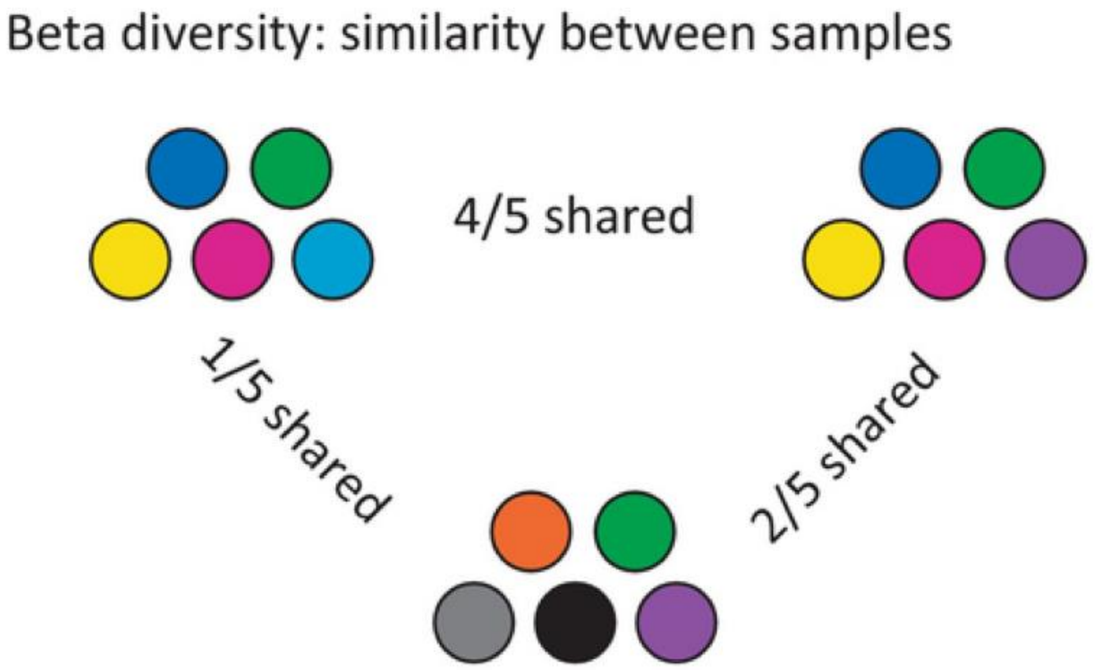
- Richness: # of different species
- Shannon: statistical information
- inv-Simpson's: dominance



Alpha (within sample) diversity

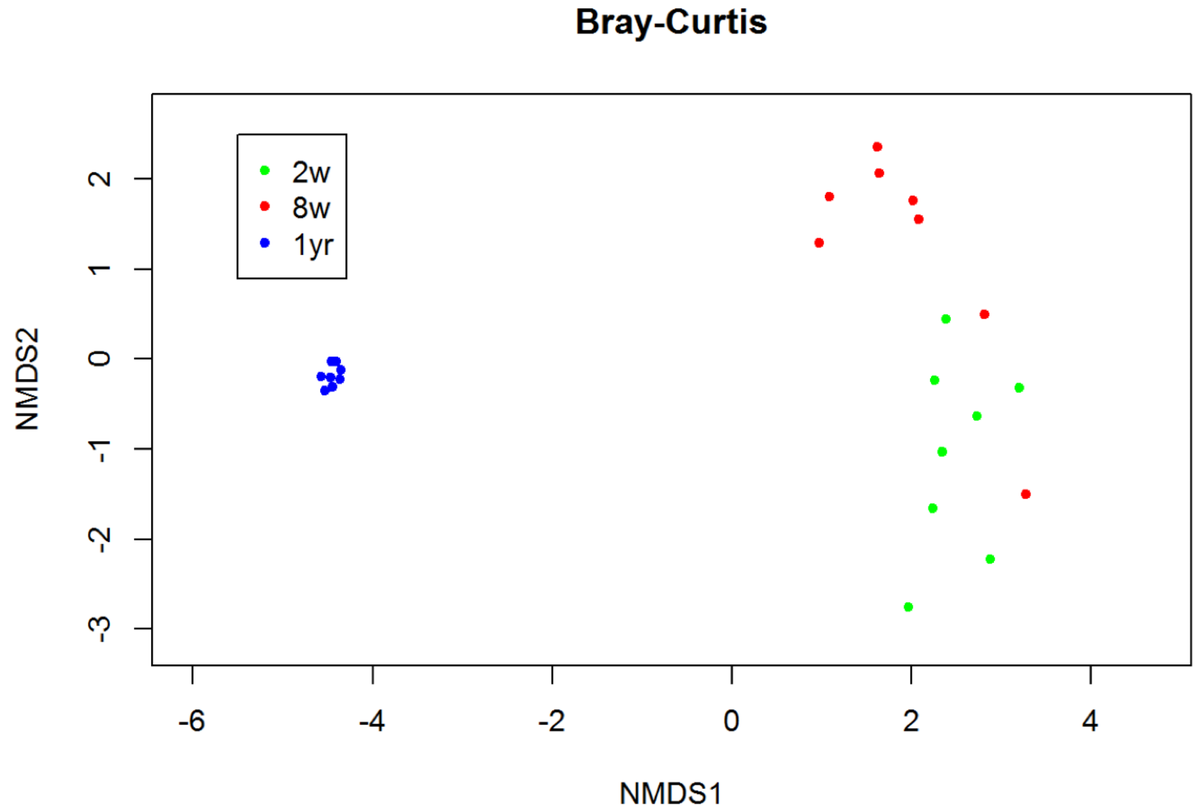


Diversity measures: Beta (between sample) diversity



Dimensional reduction methods

	supervised ordination	unsupervised ordination
Euclidean distance	RDA	PCA
non-Euclidean distance	dbRDA	PCoA/MDS, NMDS and UMAP



Lets go!

https://www.nationalgeographic.com/magazine/2020/01/how-trillions-of-microbes-affect-every-stage-of-our-life-from-birth-to-old-age-feature/