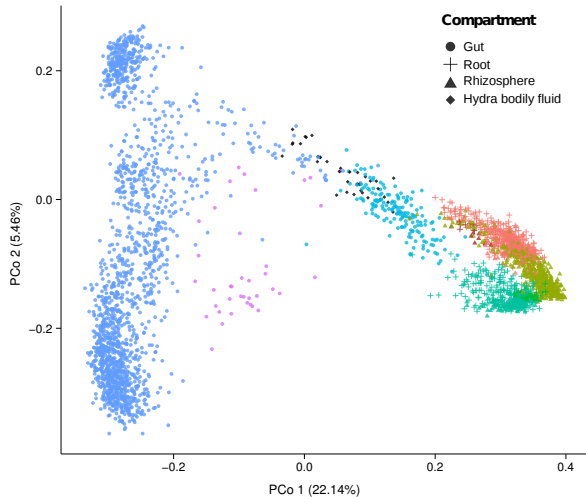# EMBO
Practical Course

Plant microbiota

26 March – 07 April 2017 | Cologne, Germany
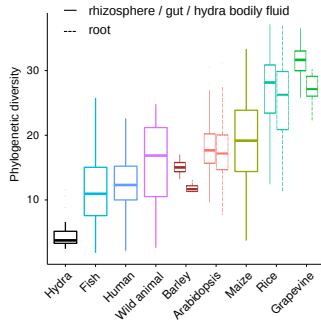
Alpha- and beta-diversity

Ruben Garrido-Oter

A **Beta-diversity**
(unweighted UniFrac distance)

PCo 2 (5.46%)

PCo 1 (22.14%)

Compartment
- ● Gut
- + Root
- ▲ Rhizosphere
- ◆ Hydra bodily fluid

B **Alpha-diversity**
(phylogenetic diversity)

— rhizosphere / gut / hydra bodily fluid
-- root

Phylogenetic diversity

Hydra Fish Human Wild animal Barley Arabidopsis Maize Rice Grapevine

Host description
- ● Human
- ● Wild animal
- ● Hydra
- ● Fish
- ● Arabidopsis and relatives
- ● Barley
- ● Maize
- ● Grapevine
- ● Rice

Indices of alpha-diversity (within sample diversity)

Chao index (Chao, 1984) is based on the number of low abundance OTUs (rare biota) found in a sample.

The **Shannon** index is based on the concept of entropy.
It takes into account simultaneously how many species and how evenly distributed they are in a community.

Observed species consists on simply counting the number of detected OTUs in a sample.

Faith's Phylogenetic Diversity is related to the phylogenetic diversity of a community, assuming that communities of consisting of highly unrelated species are more complex.

Indices of beta-diversity (between samples diversity)

beta-diversity metrics provide a quantitative evaluation of how much samples differ from one another. They can be classified in multiple ways:

	quantitative (take into account relative abundances)	qualitative (considers only OTU presence / absence)
phylogenetic (considers OTU relatedness)	**weighted UniFrac**	**unweighted UniFrac**
non phylogenetic (assumes all species are qualy related)	**Bray-Curtis**	**Jaccard**

Indices of beta-diversity (between samples diversity) (cont.)