```
# ## install.packages("devtools")
devtools::install_github("Hy4m/linkET", force = TRUE)
library(linkET)
install.packages("devtools")
require(devtools)
install_github("ibartomeus/fundiv")
require(fundiv)
```

```
library(linkET)
library("xlsx")
library(ggplot2)
library(dplyr)
require(devtools)
require(fundiv)
mam <- read.xlsx("omstrup33_sillebotten_mam.xlsx", "amo_-cox_Sib", header=TRUE)
FeCaN <- read.xlsx("omstrup33_sillebotten_mam.xlsx", "FeCa-N_Sib", header=TRUE)
mam[is.na(mam)] <- 0
FeCaN[is.na(FeCaN)] <- 0
rownames(mam)=mam[,1]
mam=mam[,-1]
rownames(FeCaN)=FeCaN[,1]
FeCaN=FeCaN[,-1]
colnames(FeCaN) = c("Fe2+",
                    "Ca2+",
                    "NOx",
                    "NH3")
```

```
###mantel test
mantel <- mantel_test(mam, FeCaN,
                      spec_select = list(amoA_AOA = 1:1,
                          AmoA_AOB = 2:2,
                          AmoA_comammox = 3:3,
                          dnfA= 4:4,
                          hzsA = 5:5)) %>%
  mutate(rd = cut(r, breaks = c(-Inf, 0.2, 0.4, Inf),
                  labels = c("< 0.2", "0.2 - 0.4", ">= 0.4")),
         pd = cut(p, breaks = c(-Inf, 0.01, 0.05, Inf),
```

```
                labels = c("< 0.01", "0.01 - 0.05", ">= 0.05")))
```

```
qcorrplot(correlate(FeCaN %>% type.convert(as.is=TRUE)), type =
"lower", diag = FALSE) +
 geom_square() +
```

```
  geom_mark(
    sep = '\n',
    size = 4,
    sig_level = c(0.05, 0.01, 0.001),
   mark = c("*", "**", "***"),
    colour = "#000000") +
```

```
  scale_fill_gradientn(
    colours = colorRampPalette(colors
=c("darkgreen","white","red"),space="Lab")(10),
    limits = c(-1, 1),
    breaks = seq(-1,1,0.5))+
```

```
  geom_couple(aes(x = .x - 0.2, colour = pd, size = rd),
              data = mantel,
              curvature = nice_curvature(0.1)) +
  scale_size_manual(values = c(0.5, 1, 2)) +
```

```
  scale_color_manual(values = c("#d9d9d9")) +
```

```
  guides(size = guide_legend(title = "Mantel's r",
                             override.aes = list(colour = "grey35"),
                             order = 2),
         colour = guide_legend(title = "Mantel's p",
                               override.aes = list(size = 3),
                               order = 1),
         fill = guide_colorbar(title = "Pearson's r", order = 3))
```