

# Supplementary information

Fig. S1 Showcases 9 specific categories of 324 R packages required for microbiome analysis. These packages have been classified into the following categories: dependent, data cleaning, visualization, diversity analysis, difference analysis, biomarker identification, correlation and network analysis, functional prediction, and other analysis (community construction process, association analysis with other indicators).

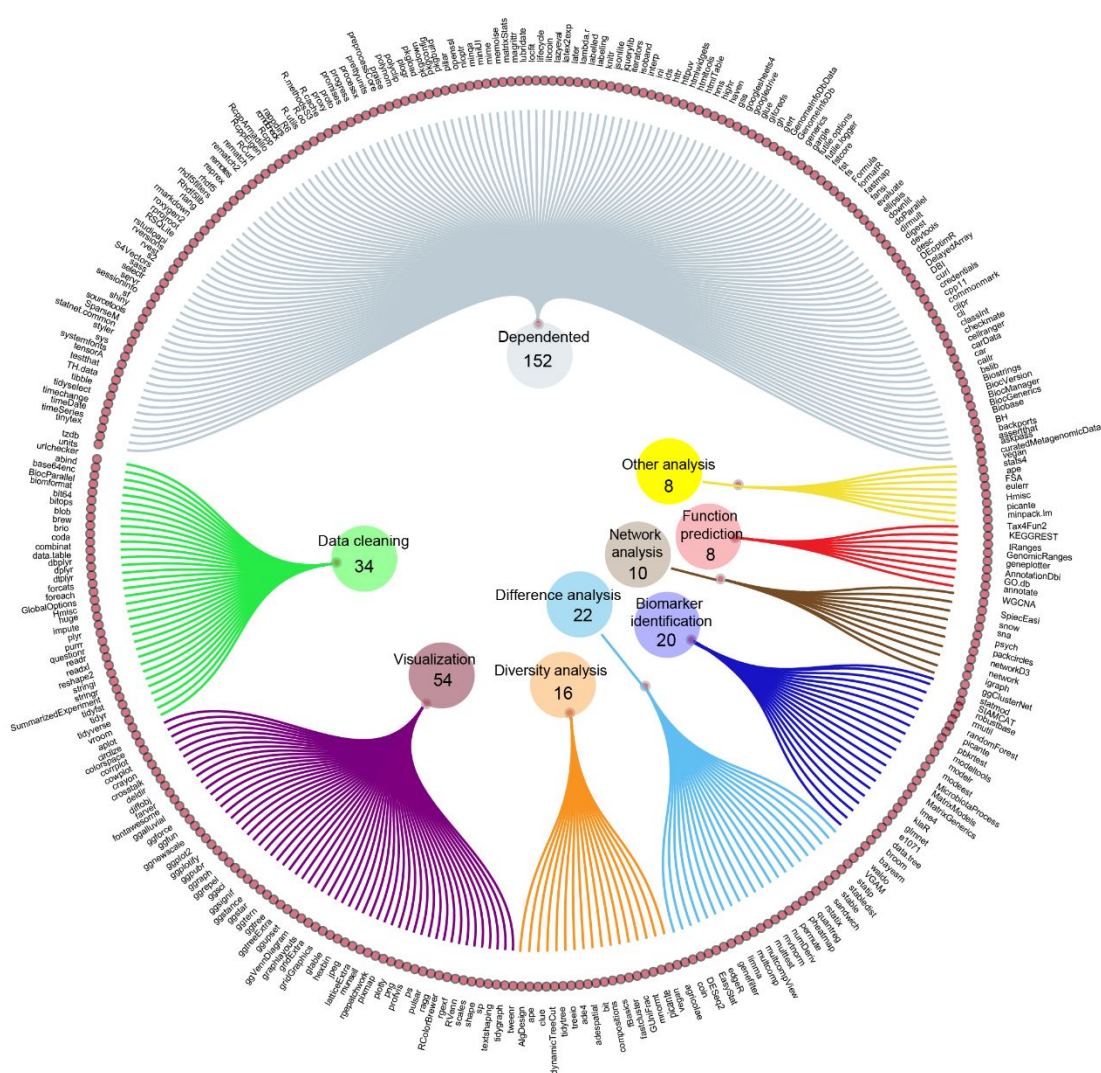


Fig. S2 Partial display of results from integrated R package phyloseq

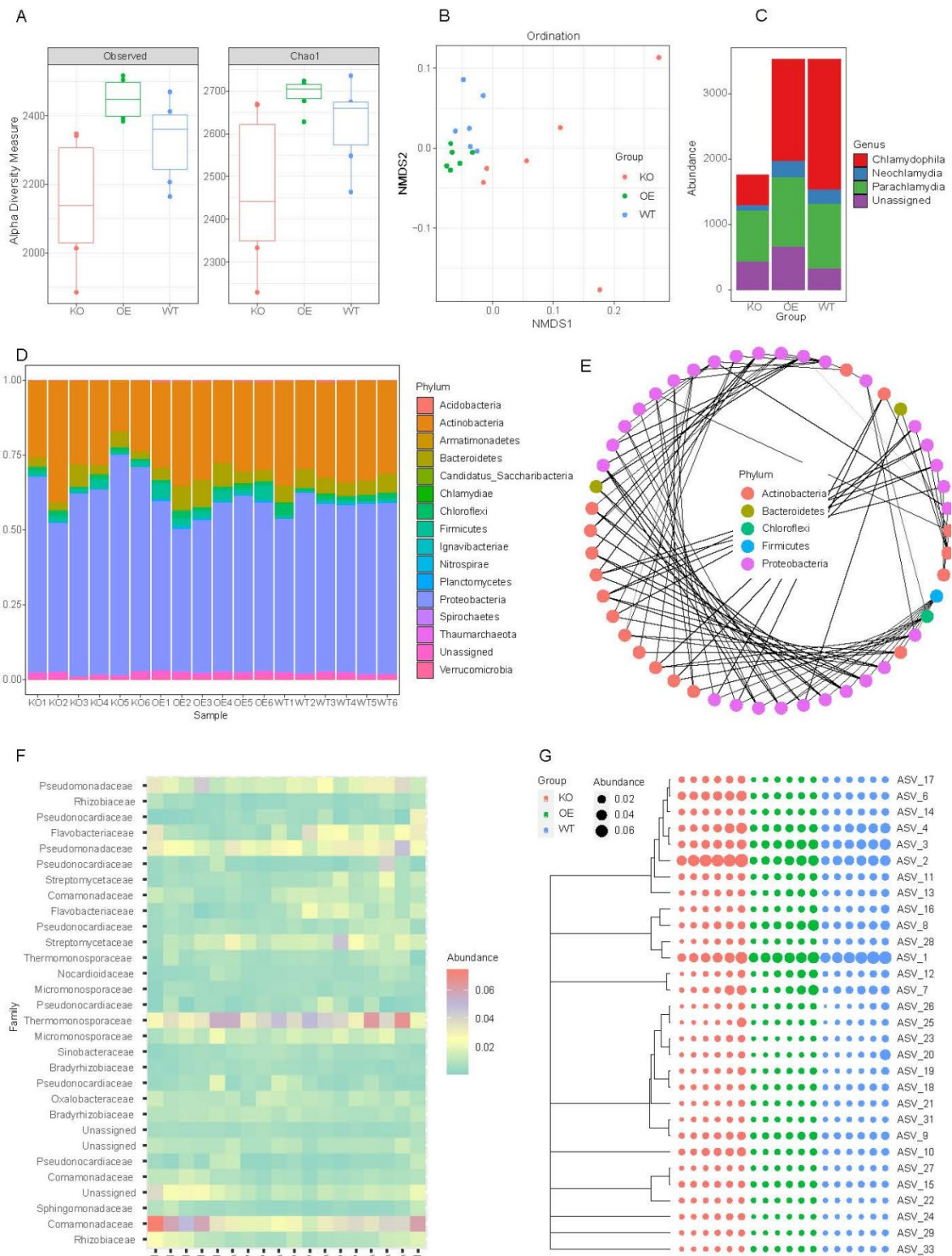


Fig. S3 Partial display of results from integrated R package microbiome

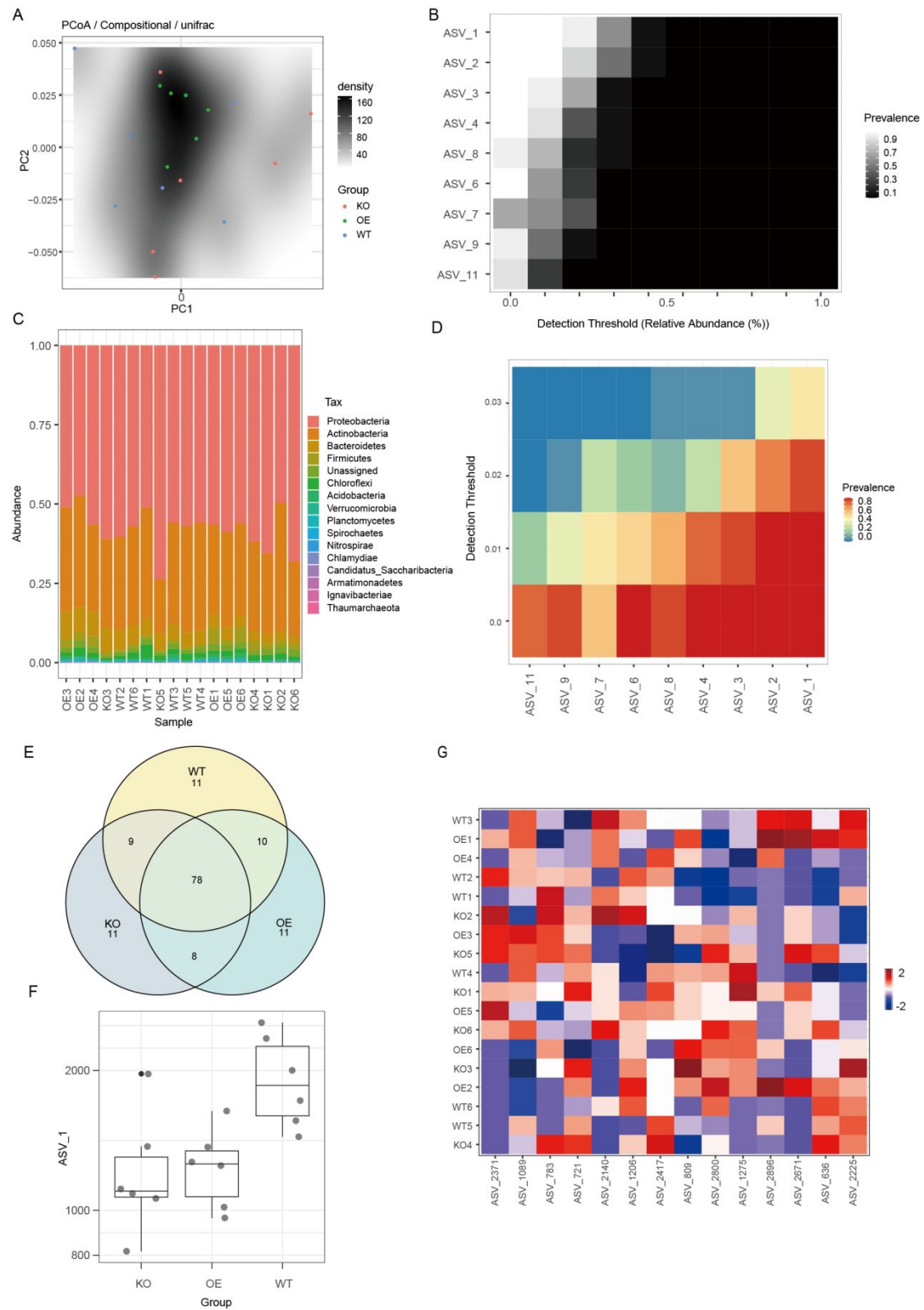


Fig. S4 Partial display of results from integrated R package MicrobiomeAnalystR

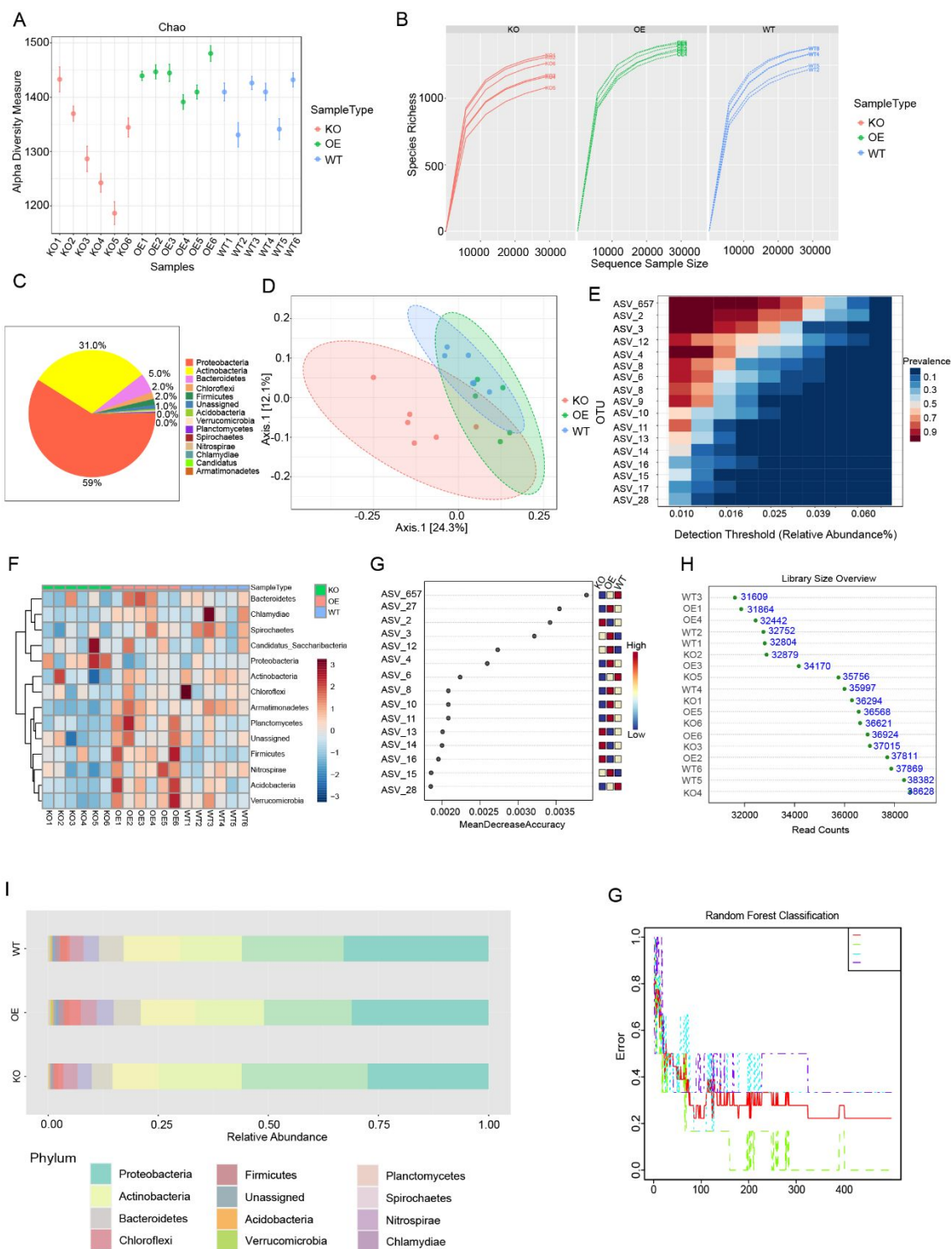


Fig. S5 Partial display of results from integrated R package Animalcules

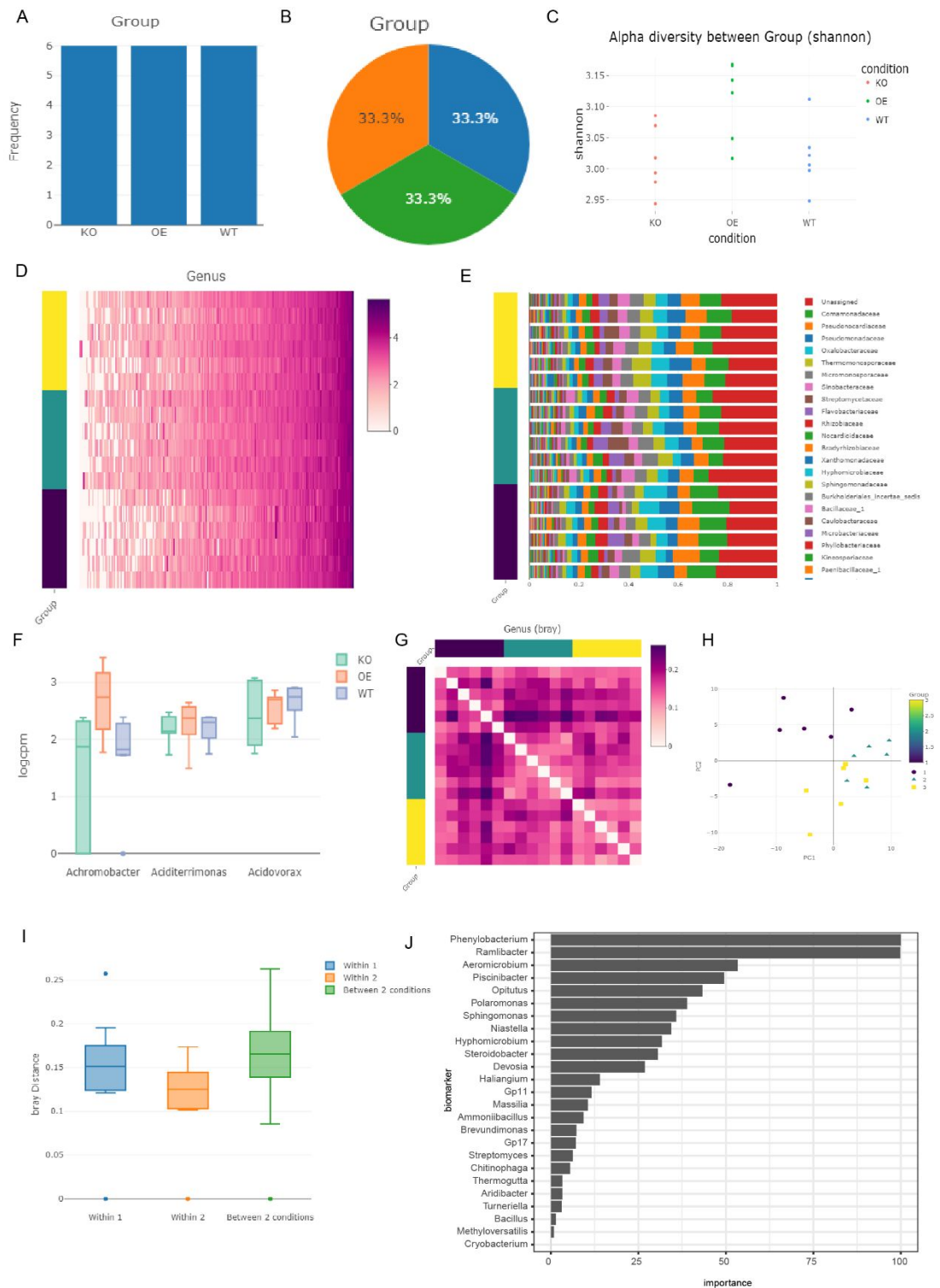


Fig. S6 Partial display of results from integrated R package microeco

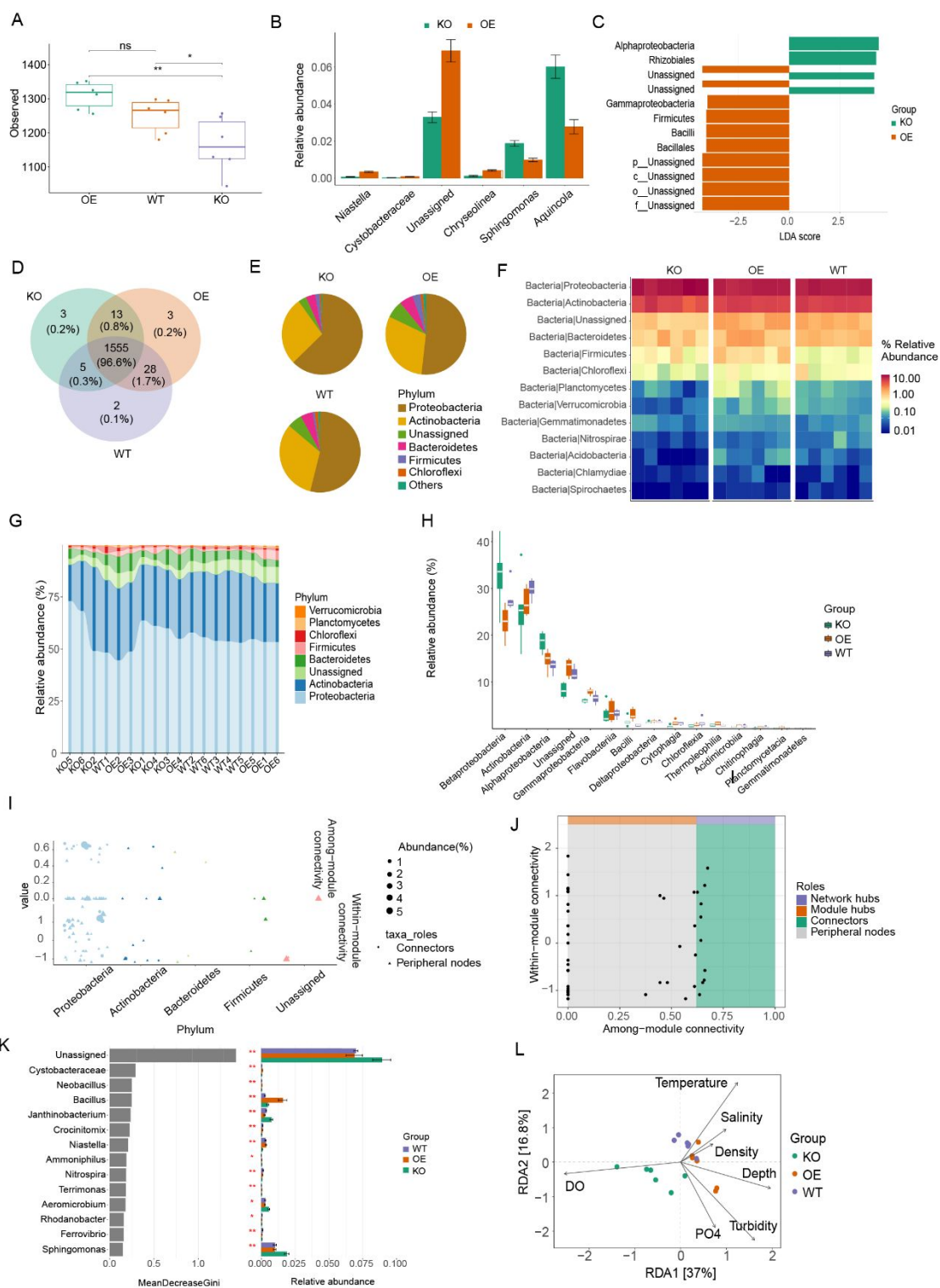


Fig. S7 Partial display of results from integrated R package amplicon

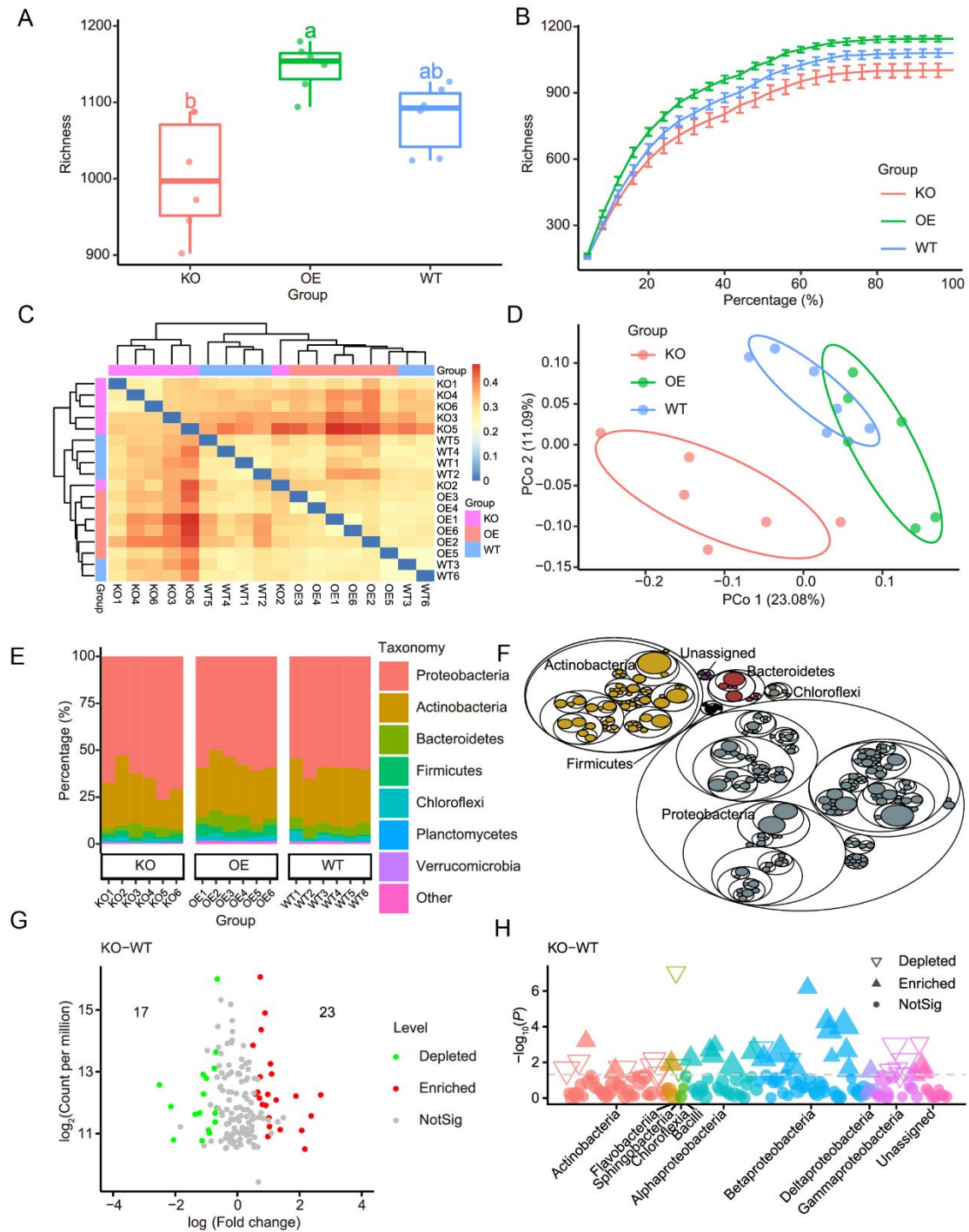


Fig. S8 Best practice analysis flow chart for microbiome data analysis

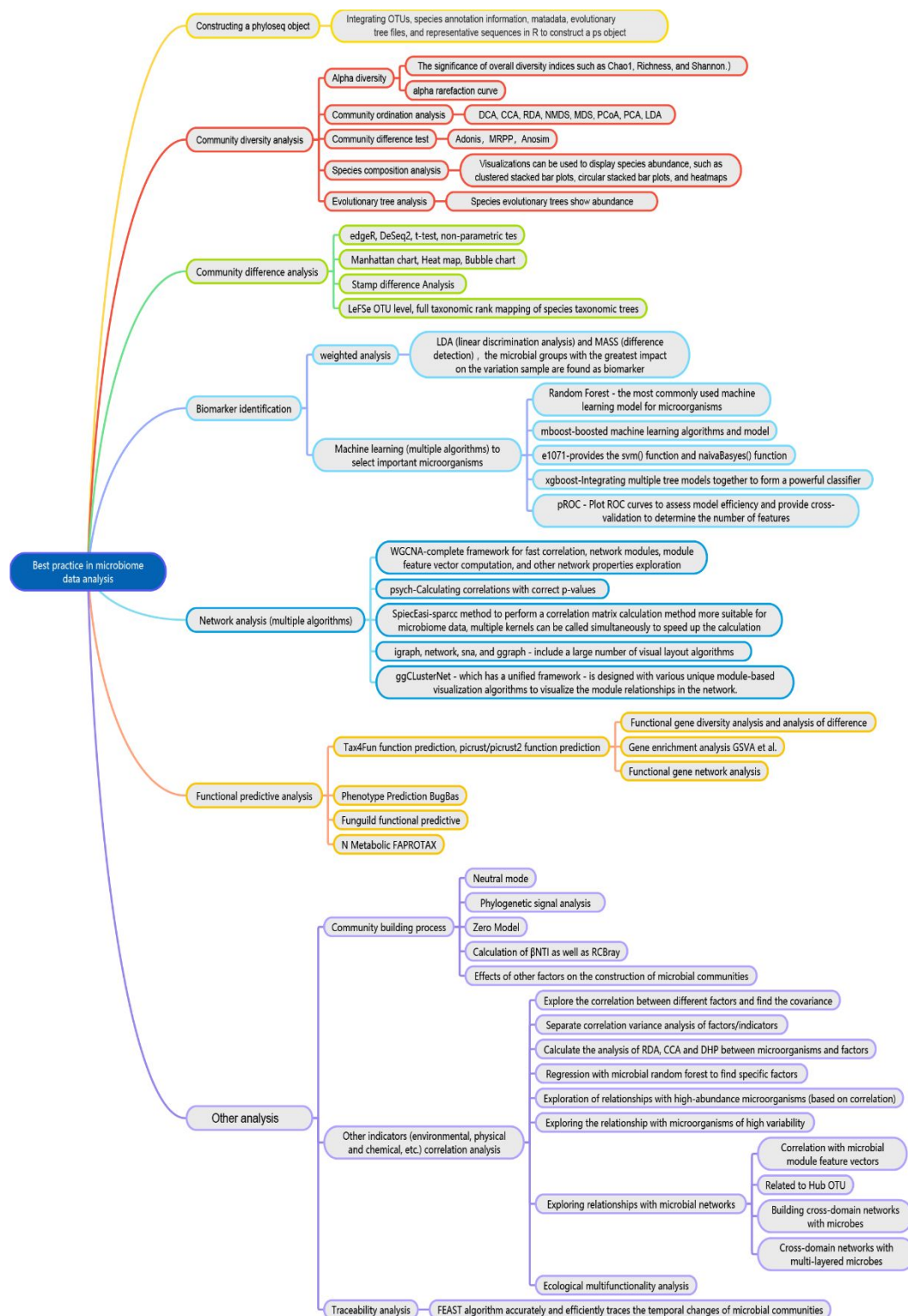


Fig. S9 Partial display of results from best practices in microbiome data analysis. (A-I) diversity analysis

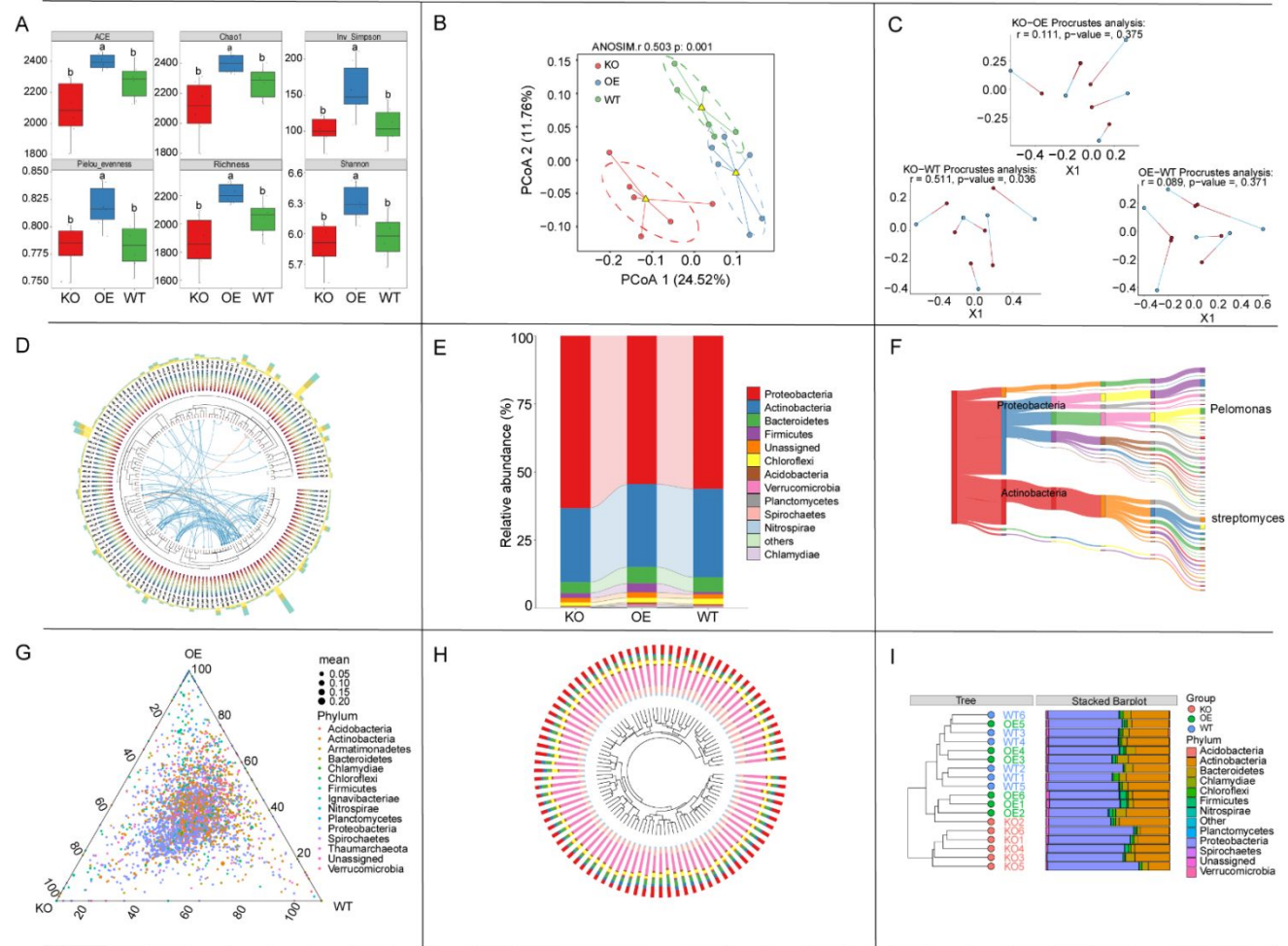


Fig. S10 Partial display of results from best practices in microbiome data analysis. (A-E) diversity analysis, (F-I) difference analysis

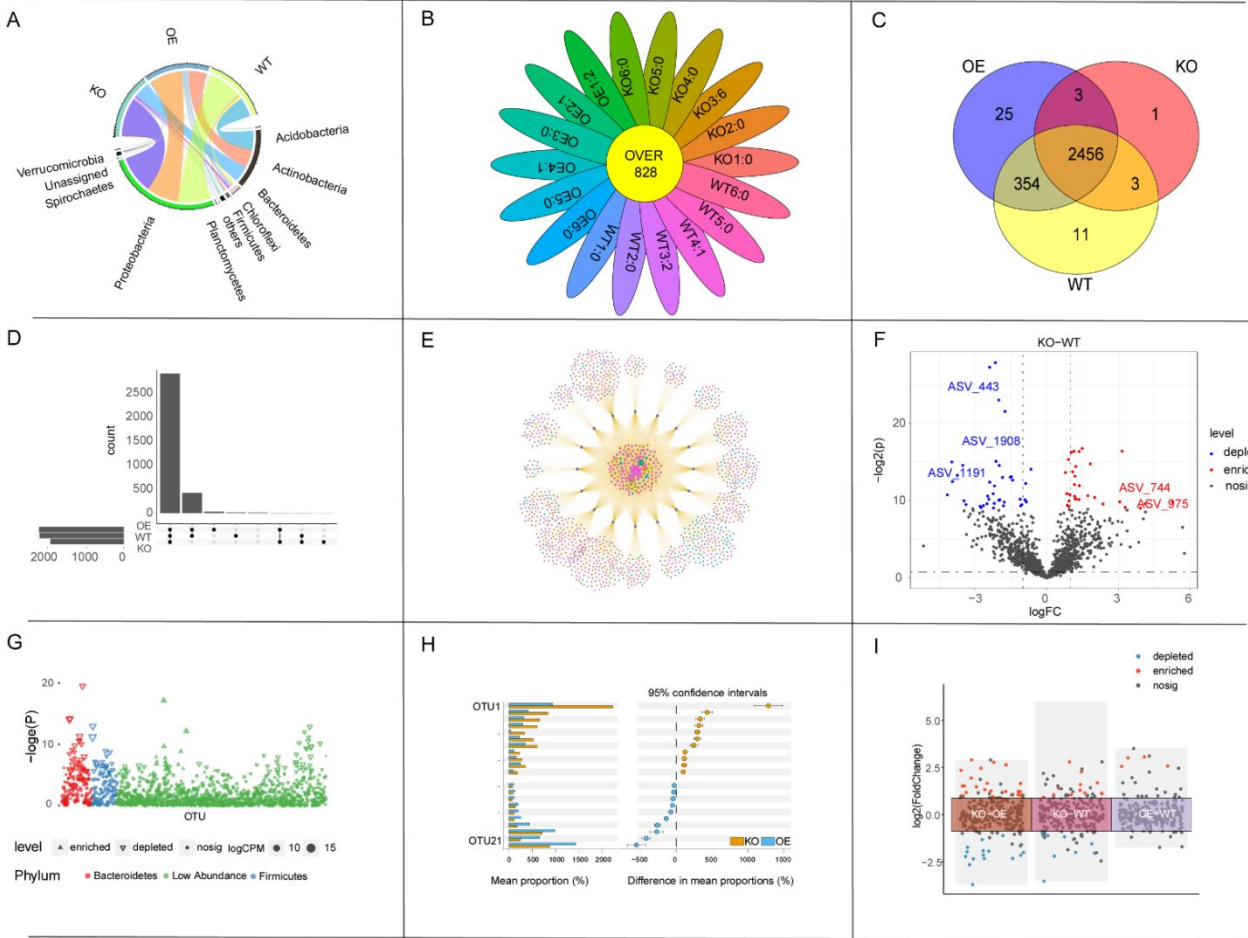
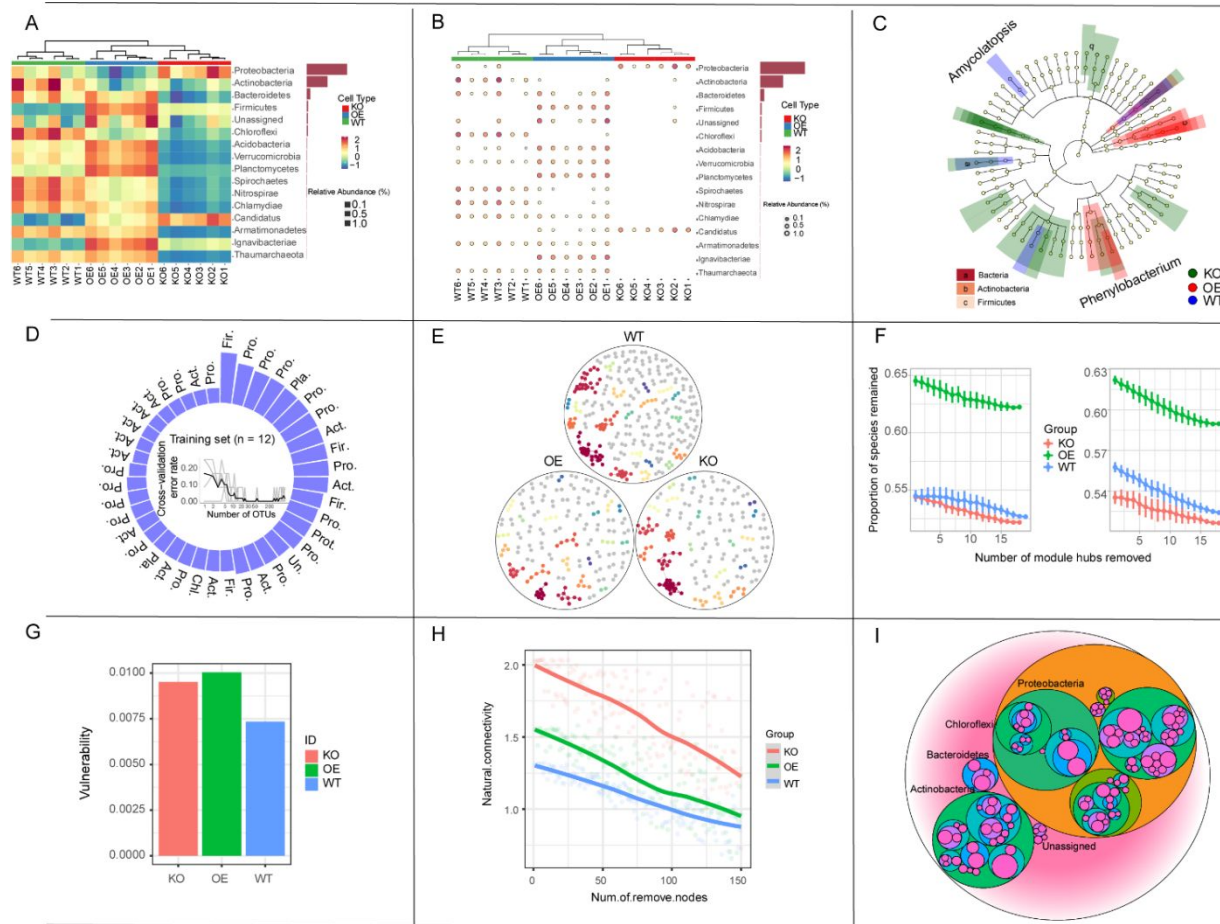


Fig. S11 Partial display of results from best practices in microbiome data analysis. (A-B) difference analysis, (C-D) biomarker identification, (E-I) network analysis





Sup. Table. Specific classification of 324 R packages in microbiome analysis.

Package	Classification
abind	Data cleaning
ade4	Diversity analysis
agricolae	Difference analysis
AlgDesign	Diversity analysis
annotate	Function prediction
AnnotationDbi	Function prediction
ape	Diversity analysis
aplot	Visualization
askpass	Depended
assertthat	Depended
backports	Depended
base64enc	Data cleaning
bayesm	Biomarker identification
BH	Depended
Biobase	Depended
BiocGenerics	Depended
BiocManager	Depended
BiocParallel	Data cleaning
BiocVersion	Depended
biomformat	Data cleaning
Biostrings	Depended
bit	Diversity analysis
bit64	Data cleaning
bitops	Data cleaning
blob	Data cleaning
brew	Data cleaning
brio	Data cleaning
broom	Biomarker identification
bslib	Depended
cachem	Depended
callr	Depended
car	Depended
carData	Depended
cellranger	Depended
checkmate	Depended
circlize	Visualization
classInt	Depended
cli	Depended
clipr	Depended

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4	clue	Diversity analysis
5	coda	Data cleaning
6	coin	Difference analysis
7	colorspace	Visualization
8	combinat	Data cleaning
9	commonmark	Depended
10	compositions	Diversity analysis
11	corrplot	Visualization
12	cowplot	Visualization
13	cpp11	Depended
14	crayon	Visualization
15	credentials	Depended
16	crosstalk	Visualization
17	curl	Depended
18	data.table	Data cleaning
19	data.tree	Biomarker identification
20	DBI	Depended
21	dbplyr	Data cleaning
22	DelayedArray	Depended
23	deldir	Visualization
24	DEoptimR	Depended
25	desc	Depended
26	DESeq2	Difference analysis
27	devtools	Depended
28	diffobj	Visualization
29	digest	Depended
30	dirmult	Depended
31	doParallel	Depended
32	downlit	Depended
33	dplyr	Data cleaning
34	dtplyr	Data cleaning
35	dynamicTreeCut	Diversity analysis
36	e1071	Biomarker identification
37	EasyStat	Difference analysis
38	edgeR	Difference analysis
39	ellipsis	Depended
40	evaluate	Depended
41	fansi	Depended
42	farver	Visualization
43	fastcluster	Diversity analysis
44	fastmap	Depended
45	fBasics	Diversity analysis
46	fontawesome	Visualization
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forcats	Data cleaning
foreach	Data cleaning
formatR	Depended
Formula	Depended
fs	Depended
fst	Depended
fstcore	Depended
futile.logger	Depended
futile.options	Depended
gargle	Depended
genefilter	Difference analysis
geneplotter	Function prediction
generics	Depended
GenomeInfoDb	Depended
GenomeInfoDbData	Depended
GenomicRanges	Function prediction
gert	Depended
ggalluvial	Visualization
ggClusterNet	Network analysis
ggforce	Visualization
ggfun	Visualization
ggnewscale	Visualization
ggplot2	Visualization
ggplotify	Visualization
ggpubr	Visualization
ggraph	Visualization
ggrepel	Visualization
ggsci	Visualization
ggsignif	Visualization
ggstance	Visualization
ggstar	Visualization
ggtern	Visualization
ggtree	Visualization
ggtreeExtra	Visualization
ggupset	Visualization
ggVennDiagram	Visualization
gh	Depended
gitcreds	Depended
glmnet	Biomarker identification
GlobalOptions	Data cleaning
glue	Depended
GO.db	Function prediction
googledrive	Depended

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3	googlesheets4	Depended
4	graphlayouts	Visualization
5	gridExtra	Visualization
6	gridGraphics	Visualization
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8	gss	Depended
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10	gtable	Visualization
11	GUniFrac	Diversity analysis
12		
13	haven	Depended
14	hexbin	Visualization
15	highr	Depended
16	Hmisc	Data cleaning
17	hms	Depended
18	htmlTable	Depended
19	htmltools	Depended
20	htmlwidgets	Depended
21	httpuv	Depended
22	httr	Depended
23	huge	Data cleaning
24	ids	Depended
25	igraph	Network analysis
26	impute	Data cleaning
27	ini	Depended
28	interp	Depended
29	IRanges	Function prediction
30	isoband	Depended
31	iterators	Depended
32	jpeg	Visualization
33	jquerylib	Depended
34	jsonlite	Depended
35	KEGGREST	Function prediction
36	klaR	Biomarker identification
37	knitr	Depended
38	labeling	Depended
39	labelled	Depended
40	lambda.r	Depended
41	later	Depended
42	latex2exp	Depended
43	latticeExtra	Visualization
44	lazyeval	Depended
45	libcoin	Depended
46	lifecycle	Depended
47	limma	Difference analysis
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49	lme4	Biomarker identification
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locfit	Depended
lubridate	Depended
magrittr	Depended
MatrixGenerics	Biomarker identification
MatrixModels	Biomarker identification
matrixStats	Depended
memoise	Depended
curatedMetagenomicData	Depended
MicrobiotaProcess	Biomarker identification
mime	Depended
miniUI	Depended
minqa	Depended
mnormt	Diversity analysis
modeest	Biomarker identification
modelr	Biomarker identification
modeltools	Biomarker identification
multcomp	Difference analysis
multcompView	Difference analysis
multtest	Difference analysis
munsell	Visualization
mvtnorm	Difference analysis
network	Network analysis
networkD3	Network analysis
nloptr	Depended
numDeriv	Difference analysis
openssl	Depended
packcircles	Network analysis
patchwork	Visualization
pbkrtest	Biomarker identification
permut	Difference analysis
pheatmap	Difference analysis
picante	Biomarker identification
pillar	Depended
pixmap	Visualization
pkgbuild	Depended
pkgconfig	Depended
pkgdown	Depended
pkgload	Depended
plogr	Depended
plotly	Visualization
plyr	Data cleaning
png	Visualization
polyclip	Depended

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4	polynom	Depended
5	praise	Depended
6	preprocessCore	Depended
7	prettyunits	Depended
8	processx	Depended
9	profvis	Visualization
10	progress	Depended
11	promises	Depended
12	proto	Depended
13	proxy	Depended
14	ps	Visualization
15	psych	Network analysis
16	pulsar	Visualization
17	purrr	Data cleaning
18	quantreg	Difference analysis
19	questionr	Data cleaning
20	R.cache	Depended
21	R.methodsS3	Depended
22	R.oo	Depended
23	R.utils	Depended
24	R6	Depended
25	ragg	Visualization
26	randomForest	Biomarker identification
27	SIAMCAT	Biomarker identification
28	rappdirs	Depended
29	rcmdcheck	Depended
30	RColorBrewer	Visualization
31	Rcpp	Depended
32	RcppArmadillo	Depended
33	RcppEigen	Depended
34	RCurl	Depended
35	readr	Data cleaning
36	readxl	Data cleaning
37	rematch	Depended
38	rematch2	Depended
39	remotes	Depended
40	reprex	Depended
41	reshape2	Data cleaning
42	rgexf	Visualization
43	rhdf5	Depended
44	rhdf5filters	Depended
45	Rhdf5lib	Depended
46	rlang	Depended
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rmarkdown	Depended
rmutil	Biomarker identification
robustbase	Biomarker identification
roxygen2	Depended
rprojroot	Depended
RSQLite	Depended
rstatix	Difference analysis
rstudioapi	Depended
RVenn	Visualization
rversions	Depended
rvest	Depended
s2	Depended
S4Vectors	Depended
sandwich	Difference analysis
sass	Depended
scales	Visualization
selectr	Depended
servr	Depended
sessioninfo	Depended
sf	Depended
shape	Visualization
shiny	Depended
sna	Network analysis
snow	Network analysis
sourcetools	Depended
sp	Visualization
SparseM	Depended
SpiecEasi	Network analysis
stable	Difference analysis
stabledist	Difference analysis
statip	Difference analysis
statmod	Biomarker identification
statnet.common	Depended
stringi	Data cleaning
stringr	Data cleaning
styler	Depended
SummarizedExperiment	Data cleaning
sys	Depended
systemfonts	Depended
Tax4Fun2	Function prediction
tensorA	Depended
testthat	Depended
textshaping	Visualization

TH.data	Depended
tibble	Depended
tidyfst	Data cleaning
tidygraph	Visualization
tidyr	Data cleaning
tidyselect	Depended
tidytree	Diversity analysis
tidyverse	Data cleaning
timechange	Depended
timeDate	Depended
timeSeries	Depended
tinytex	Depended
treeio	Diversity analysis
tweenr	Visualization
tzdb	Depended
units	Depended
urlchecker	Depended
vegan	Diversity analysis
VGAM	Difference analysis
vroom	Data cleaning
waldo	Difference analysis
WGCNA	Network analysis
adespatial	Diversity analysis
minpack.lm	Other analysis
eulerr	Other analysis
FSA	Other analysis
stats4	Other analysis