```
Bacteria;p Proteobacteria;c Gammaproteobacteria;o Enterobacterales;f Shewanellaceae;g Shewanella
\label{eq:d_Bacteria}  d\_Bacteria; \\ p\_Proteobacteria; \\ c\_Gamma proteobacteria; \\ o\_Enterobacterales; \\ f\_Yersiniaceae; \\ d\_Bacteria; \\ o\_Enterobacterales; \\ o\_Enterobacte
   {\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Enterobacterales;} \\ \\ \\ \underline{\tt d\_Bacteria;o\_Enterobacterales;} \\ \\ \underline{\tt d\_Bacteria;o\_Enterobacteria;} \\ \underline{\tt d\_Bacteria;o
   \label{lem:d_Bacteria}  \  \, d\_Bacteria; \\ p\_Proteobacteria; \\ c\_Gamma proteobacteria; \\ o\_Enterobacterales; \\ f\_Morganellaceae; \\ \_Gamma proteobacteria; \\ o\_Enterobacterales; \\ f\_Morganellaceae; \\ \_Gamma proteobacteria; \\ o\_Enterobacterales; \\ f\_Morganellaceae; \\ \_Gamma proteobacteria; \\ o\_Enterobacterales; \\ f\_Morganellaceae; \\ \bot Gamma proteobacteria; \\ O\_Enterobacterales; \\ \bot Gamma proteobacterales; \\ \bot Ga
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacterales;f_Shewanellaceae;g_Shewanella;s_Shewanella_morhuae
   \label{lem:d_Bacteria} \\ \mbox{d\_Bacteroidota;} \\ \mbox{d\_Bacteroidia;} \\ \mbox{o\_Flavobacteriales;} \\ \mbox{f\_Weeksellaceae;} \\ \mbox{g\_Chryseobacterium;} \\ \mbox{d\_Bacteroidota;} \\ \mbox{d\_Bacteroidia;} \\ \mbox{o\_Flavobacteriales;} \\ \mbox{f\_Weeksellaceae;} \\ \mbox{g\_Chryseobacterium;} \\ \mbox{d\_Bacteroidota;} \\ \mbox{d\_Bacteroidia;} \\ \mbox{d\_Bacteroidota;} \\ \mbox{d\_Bacteroidia;} \\ \mbox{d\_Bacteroidota;} \\ \mbox
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Xanthomonadales;f_Xanthomonadaceae;
d Bacteria;p Proteobacteria;c Gammaproteobacteria;o Enterobacterales;f Aeromonadaceae;g Aeromonas;
   \label{lem:d_Bacteria}  \displays the displays the disp
\label{lem:d_Bacteria}  \mbox{$d$\_Bacteria;$p$\_Firmicutes;$c$\_Bacilli;$o$\_Lactobacillales;$f$\_Enterococcaceae;$g$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcaceae;$g$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcaceae;$g$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_Enterococcus;$\_
   d__Bacteria;p__Firmicutes;c__Bacilli;o__Bacillales;__;__;_
      d__Bacteria;p__Firmicutes;c__Bacilli;o__Lactobacillales;f__Enterococcaceae;_
{\tt d\_Bacteria}; {\tt p\_Proteobacteria}; {\tt c\_Gammaproteobacteria}; {\tt o\_Pseudomonadales}; {\tt f\_Pseudomonadaceae}; {\tt g\_Pseudomonadaceae}; {\tt g\_Pseudomonadaceae}; {\tt d\_Pseudomonadaceae}; {\tt d\_Pseudom
   d__Bacteria;p__Firmicutes;c__Bacilli;o__Lactobacillales;__;__;
\label{local-control} $$ $d\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_Pseudomonadales; f\_Moraxellaceae; g\_Acinetobacter; and the second proteobacteria; between the second proteo
\label{lem:d_Bacteria} $$ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Corynebacteriales; f\_Corynebacteriaceae; and the substitution of t
   \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Gammaproteobacteria$;$o$\_Burkholderiales$;$f$\_Comamonadaceae$;$g$\_Surkholderiales$;$f$\_Comamonadaceae$;$g$\_Surkholderiales$;$f$\_Comamonadaceae$;$g$\_Surkholderiales$;$f$\_Comamonadaceae$;$g$\_Surkholderiales$;$f$\_Comamonadaceae$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Surkholderiales$;$g$\_Sur
\label{eq:d_Bacteria}  \mbox{$d$\_Bacteria$;p$\_Firmicutes$;c$\_Bacilli$;o$\_Lactobacillales$;f$\_Listeriaceae$;g$\_Listeria$;} 
   d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Propionibacteriales;f_Propionibacteriaceae;g_Cutibacterium;
   \label{eq:d_Bacteria} $$ $d\_Bacteria; $p\_Firmicutes; $c\_Bacilli; o\_Staphylococcales; $f\_Staphylococcaceae; $g\_Firmicutes; $g\_Bacilli; $g\_Firmicutes; $g\_Fi
      d__Bacteria;p__Proteobacteria;c__Gammaproteobacteria;o__Pseudomonadales;f__Moraxellaceae;g__Psychrobacter;
      d__Bacteria;p__Bacteroidota;c__Bacteroidia;o__Flavobacteriales;f__Flavobacteriaceae;g__Imtechella;s__Imtechella_halotolerans
   \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Alphaproteobacteria$;$o$\_Sphingomonadales$;$f$\_Sphingomonadaceae$;$d$\_Bacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphingomonadales$;$p$\_Sphin
   d_Bacteria;p_Campylobacterota;c_Campylobacteria;o_Campylobacterales;f_Campylobacteraceae;g_Campylobacter;
\label{lem:d_Bacteria}  d\_Bacteria; p\_Campylobacterota; c\_Campylobacteria; o\_Campylobacterales; f\_Arcobacteraceae; lem: d_Bacteria; p\_Campylobacterota; c\_Campylobacteria; o\_Campylobacteria; o\_Campyloba
\label{eq:d_bacteria} $$ d_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Burkholderiales; f\_Burkholderiaceae; g\_Burkholderia-Caballeronia-Paraburkholderia; burkholderiaceae; g\_Burkholderia-Caballeronia-Paraburkholderia; burkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Paraburkholderia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballeronia-Caballer
   {\tt d\_Bacteria}; {\tt p\_Proteobacteria}; {\tt c\_Alphaproteobacteria}; {\tt o\_Rhizobiales}; {\tt f\_Beijerinckiaceae}; {\tt g\_Methylobacterium-Methylorubrum}; {\tt o\_Rhizobiales}; {\tt f\_Beijerinckiaceae}; {\tt d\_Beijerinckiaceae}; {\tt d\_Be
\label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Alphaproteobacteria$;$o$\_Rhodobacterales$;$f$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae$;$g$\_Rhodobacteraceae
   d_Bacteria;p_Firmicutes;c_Clostridia;o_Lachnospirales;f_Lachnospiraceae;
   d Bacteria;p Actinobacteriota;c Actinobacteria;o Propionibacteriales;f Propionibacteriaceae
 \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_Burkholderiales; f\_Neisseriaceae and the substitution of the subs
   \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Corynebacteriales; f\_Corynebacteriaceae; g\_Corynebacterium; and the substitution of th
   {\tt d\_Bacteria;p\_Firmicutes;c\_Bacilli;o\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;f\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;g\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcaceae;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;g\_Streptococcus;\_Lactobacillales;_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lactobacillales;\_Lact
   d__Bacteria;p__Firmicutes;c__Bacilli;__;__;__;
      \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Pseudomonadales; f\_Moraxellaceae; g\_Enhydrobacter; \_Pseudomonadales; f\_Moraxellaceae; g\_Enhydrobacter; g\_Enhydroba
\label{eq:d_bacteria} \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_Pseudomonadales; f\_Halomonadaceae; g\_Halomonads; f\_Halomonadaceae; g\_Halomonadaceae; g\_Hal
d__Bacteria;p__Firmicutes;c__Bacilli;o__Bacillales;f__Bacillaceae;__;__
{\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Enterobacterales;f\_Enterobacteriaceae;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacteria;p\_Proteobacte
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacterales;f_Vibrionaceae;g_Vibrio;
   \label{lem:d_bacteria}  \ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Micrococcales; f\_Microbacteriaceae; d\_Bacteria; o\_Bacteria; o\_
d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Micrococcales;f_Brevibacteriaceae;g_Brevibacterium;_
   d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacterales;f_Vibrionaceae;g_Salinivibrio;
                                                                                                                                                                                                                                                                                                                                                                                                               __Actinobacteria;
{\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Enterobacterales;f\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;g\_Morganellaceae;
      d__Bacteria;p__Actinobacteriota;c__Actinobacteria;o__Micrococcales;
      \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Rhizobiales; f\_Xanthobacteraceae; and the substitution of the s
   d_Bacteria;p_Cyanobacteria;c_Cyanobacteriia;o_Chloroplast;f_Chloroplast;g_Chloroplast;
   \label{eq:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Alphaproteobacteria$;$o$\_Rhizobiales$;$f$\_Rhizobiaceae$;$g$\_Alphaproteobacteria$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rhizobiaceae$;$g$\_Rh
\label{eq:d_Bacteria} $$ $d\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Lactobacillales; f\_Streptococcaceae; g\_Lactococcus; \_\_Cactobacillales; f\_Streptococcaceae; g\_Lactobacillales; f\_Lactobacillales; f\_Lacto
 \  \  \, d\_Bacteria; \\ p\_Proteobacteria; \\ c\_Alphaproteobacteria; \\ o\_Rhizobiales; \\ f\_Beijerinckiaceae; \\ acceptable \\ 
   d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Corynebacteriales;_
{\tt d\_Bacteria;p\_Proteobacteria;o\_Gammaproteobacteria;o\_Burkholderiales;f\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;\_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delftia;_Comamonadaceae;g\_Delf
   d Bacteria;p Firmicutes;c Clostridia;o Oscillospirales;f Ruminococcaceae;g Faecalibacterium;
d Bacteria;p Firmicutes;c Clostridia;o Oscillospirales;f Oscillospiraceae;
d Bacteria;p Proteobacteria;c Gammaproteobacteria;o Burkholderiales;f Burkholderiaceae;g Ralstonia;
   \label{eq:d_Bacteroidota} \ d\_\_Bacteroidota; c\_\_Bacteroidia; o\_\_Bacteroidales; f\_\_Bacteroidaceae; g\_\_Bacteroides
   \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Pseudomonadales; f\_Pseudomonadaceae; \underline{\hspace{0.5cm}}; \underline{\hspace{0.5cm}}
   d__Bacteria;p__Firmicutes;c__Bacilli;o__Lactobacillales;f__Streptococcaceae;__;_
   d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Rhizobiales;__;_;
{\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Enterobacterales;f\_Pseudoalteromonadaceae;g\_Pseudoalteromonas;\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Interobacteria;o\_Inter
   {\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Enterobacterales;f\_Vibrionaceae;\_Gammaproteobacteria;o\_Enterobacterales;f\_Vibrionaceae;\_Gammaproteobacteria;o\_Enterobacterales;f\_Vibrionaceae;\_Gammaproteobacteria;o\_Enterobacterales;f\_Vibrionaceae;\_Gammaproteobacteria;o\_Enterobacterales;f\_Vibrionaceae;\_Gammaproteobacteria;o\_Enterobacterales;f\_Vibrionaceae;\_Gammaproteobacteria;o\_Enterobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;\_Gammaproteobacterales;f\_Vibrionaceae;_Gammaproteobacterales;f\_Vibrionaceae;_Gammaproteobacterales;f\_Vibrionaceae;_Gammaproteobacterales;f\_Vibrionaceae;_Gammaproteobacterales;f\_Vibrionaceae;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteobacterales;_Gammaproteoba
\label{eq:d_Bacteria} \\ \texttt{d}\_\texttt{Bacteroidota}; \\ \texttt{c}\_\texttt{Bacteroidia}; \\ \texttt{o}\_\texttt{Bacteroidales}; \\ \texttt{f}\_\texttt{Muribaculaceae}; \\ \texttt{g}\_\texttt{Muribaculaceae}; 
{\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Burkholderiales;f\_Neisseriaceae;g\_uncultured;s\_uncultured\_bacterium and {\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Burkholderiales;f\_Neisseriaceae;g\_uncultured;s\_uncultured\_bacterium and {\tt d\_Bacteria;p\_Proteobacteria;o\_Burkholderiales;f\_Neisseriaceae;g\_uncultured;s\_uncultured\_bacterium and {\tt d\_Bacteria;o\_Burkholderiales;f\_Neisseriaceae;g\_uncultured;s\_uncultured\_bacterium and {\tt d\_Bacteria;o\_Burkholderiales;f\_Neisseriaceae;g\_uncultured;s\_uncultured\_bacterium and {\tt d\_Bacteria;o\_Burkholderiales;f\_Neisseriaceae;g\_uncultured;s\_uncultured\_bacterium and {\tt d\_Bacteria;o\_Burkholderiales;f\_Neisseriaceae;g\_uncultured;s\_uncultured\_bacterium and {\tt d\_Bacteria}eae;g\_uncultured\_bacterium and {\tt d\_Bacteria}eae;g\_uncultured\_bacterium and {\tt d\_Bacteria}eae;g\_uncultured\_bacterium and {\tt d\_Bacteria}eae;g\_uncultured\_bacterium and {\tt d\_Bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria}eae;g\_uncultured\_bacteria
{\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Enterobacterales;f\_Pasteurellaceae;}
   {\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;}
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d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Acetobacterales;f_Acetobacteraceae
\label{eq:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Alphaproteobacteria$;$o$\_Rickettsiales$;$f$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiaceae$;$g$\_Rickettsiacea
       d__Bacteria;p__Actinobacteriota;c__Actinobacteria;o__Micrococcales;f__Dermabacteraceae;g__Brachybacterium;
    d__Bacteria;p__Proteobacteria;c__Gammaproteobacteria;o__Enterobacterales;f__Vibrionaceae;g__Photobacterium;__
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Oxalobacteraceae;
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Corynebacteriales; f\_Dietziaceae; g\_Dietzia; \_Corynebacteriales; f\_Dietziaceae; g\_Dietziaceae; g\_
\label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Alphaproteobacteria$;$o$\_Caulobacterales$;$f$\_Caulobacteraceae$;$d$\_Bacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria$;$p$\_Proteobacteria
\label{lem:d_Bacteria}  \display= Proteobacteria; \\ c\_Alphaproteobacteria; \\ o\_Acetobacterales; \\ f\_Acetobacteraceae; \\ g\_Roseomonas; \\ lem: d\_Bacteria; \\ o\_Acetobacteraceae; \\ \\ o\_Acetobacteraceae;
  \label{lem:d_bacteria}  d\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Lactobacillales; f\_Lactobacillaceae; g\_Lactobacillus; \_Lactobacillales; f\_Lactobacillales; f\_
{\tt d\_Bacteria;p\_Firmicutes;c\_Bacilli;o\_Lactobacillales;f\_Lactobacillaceae;} \\
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Flavobacteriales;f_Flavobacteriaceae;
  d Bacteria;p Firmicutes;c _Bacilli;o_Bacillales;f_Bacillaceae;g_Bacillus;
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Pseudomonadales;f_Moraxellaceae;
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Flavobacteriales;f_Weeksellaceae;_
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Peptostreptococcales-Tissierellales; f\_Family\_XI; g\_Fenollaria; \__Peptostreptococcales-Tissierellales; f\_Family\_XI; g\_Fenollaria; f\_Family\_XI; g\_Family\_XI; g
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Burkholderiaceae;_;_
  d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Micrococcales;f_Micrococcaceae;__;
d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Prevotellaceae;g_Prevotella_9;
  {\tt d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Sphingomonadales;f\_Sphingomonadaceae;g\_Sphingobium;\_Sphingomonadaceae;g\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphingobium;\_Sphing
d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Frankiales;__;__;_
d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Bifidobacteriales;f_Bifidobacteriaceae;g_Bifidobacterium;_
  {\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Gammaproteobacteria\_Incertae\_Sedis;f\_Unknown\_Family;g\_Acidibacter;acidibacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Proteobacteria;b\_Pro
d_Bacteria;p_Patescibacteria;c_Parcubacteria;o_Candidatus_Kaiserbacteria;f_Candidatus_Kaiserbacteria;g_Candidatus_Kaiserbacteria;
  d_Bacteria;p_Patescibacteria;c_Saccharimonadia;o_Saccharimonadales
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Actinomycetales; f\_Actinomycetaceae; g\_Actinomyces; lem: $$ d\_Bacteria; p\_Actinomycetaceae; g\_Actinomyces; lem: $$ d\_Bacteria; p\_Actinomyces; lem: $$ d\_Bacteria; p\_Actinomycetaceae; g\_Actinomyces; lem: $$ d\_Bacteria; p\_Actinomycetaceae; g\_Actinomyces; lem: $$ d\_Bacteria; p\_Actinomyces; lem: $$ d\_Bacteria; p\_Actinomyces;
d_Bacteria;p_Actinobacteriota;c_Thermoleophilia;o_Gaiellales;
    d__Bacteria;p__Firmicutes;c__Bacilli;o__Bacillales;f__Bacillaceae;g__Anoxybacillus;__
    d_Bacteria;p_Chloroflexi;c_Chloroflexia;o_Thermomicrobiales;f_JG30-KF-CM45;g_JG30-KF-CM45;
\label{lem:d_Bacteria} $$ d\_Bacteria; p\_Cyanobacteria; c\_Sericytochromatia; o\_Sericytochromatia; f\_Sericytochromatia; g\_Sericytochromatia; s\_uncultured\_bacterium $$ d\_Bacteria; p\_Cyanobacteria; d\_Sericytochromatia; d\_
  \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Clostridia$;$o$\_Oscillospirales$;$f$\_Ruminococcaceae$;$g$\_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligranulum$;$g$_Subdoligran
\label{eq:d_Bacteria} $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Rikenellaceae; g\_Alistipes; \_Alistipes; \_Aliatipes; \_Aliatipe
{\tt d\_Bacteria;p\_Bacteroidota;c\_Bacteroidia;o\_Sphingobacteriales;f\_Sphingobacteriaceae;g\_Mucilaginibacter;\_Sphingobacteriaceae;g\_Mucilaginibacter;\_Sphingobacteriaceae;g\_Mucilaginibacter;\_Sphingobacterialea;f\_Sphingobacteriaceae;g\_Mucilaginibacter;\_Sphingobacterialea;f\_Sphingobacteriaceae;g\_Mucilaginibacter;\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacterialea;f\_Sphingobacteri
d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Propionibacteriales;f_Nocardioidaceae;
  \label{lem:d_Bacteria} $$ d\_Bacteroidota; $c\_Bacteroidia; o\_Chitinophagales; $f\_Chitinophagaceae; g\_Sediminibacterium; $a_c = a_c 
\label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Peptostreptococcales-Tissierellales; f\_Peptostreptococcaceae; f\_Peptostrepto
  d_Bacteria;p_Acidobacteriota;c_Acidobacteriae;o_Acidobacteriales;f_Acidobacteriaceae_(Subgroup_1);g_Terriglobus;_
  \label{lem:d_Bacteria} \\ \mbox{d\_Bacteriaip\_Bacteroidota;c\_Bacteroidia;o\_Flavobacteriales;f\_Flavobacteriaceae;g\_Flavobacterium;\_Plavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriaceae;g\_Flavobacteriacea
  d_Bacteria;p_Actinobacteriota;c_Acidimicrobiia;o_Microtrichales;f_Ilumatobacteraceae;__;
  d_Bacteria;p_Firmicutes;c_Clostridia;o_Peptostreptococcales-Tissierellales;f_Family_XI;g_Anaerococcus;_
 \begin{tabular}{ll} $d$\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Sphingobacteriales; f\_Sphingobacteriaceae; \_; \_ \\ \end{tabular} 
\verb|d_Archaea;p_Euryarchaeota;c_Methanobacteria;o_Methanobacteriales;f_Methanobacteriaceae;g_Methanobrevibacter;\\
d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;_;_;_;
d_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridia_UCG-014;f_Clostridia_UCG-014;g_Clostridia_UCG-014;
  \label{eq:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Alphaproteobacteria$;$o$\_Rickettsiales$;$f$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitochondria$;$g$\_Mitoch
d Bacteria;p Firmicutes;c Clostridia;
  d Bacteria;p Actinobacteriota;c
                                                                                                                                                                                                                                                                                                         _Actinobacteria;o__Propionibacteriales;f__Nocardioidaceae;g__Nocardioides
    \label{eq:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Lactobacillales; f\_Listeriaceae; g\_Brochothrix $$ d\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Lactobacillales; f\_Listeriaceae; g\_Brochothrix $$ d\_Bacteria; p\_Firmicutes; d\_Bacilli; o\_Lactobacillales; f\_Listeriaceae; g\_Brochothrix $$ d\_Bacteria; p\_Firmicutes; d\_Bacilli; o\_Lactobacillales; d\_Bacilli; o\_Lactobacillales; d\_Bacilli; o\_Bacilli; o\_Bac
\label{lem:d_bacteria}  \mbox{$d$\_Bacteria;$p$\_Firmicutes;$c$\_Bacilli;$o$\_Lactobacillales;$f$\_Lactobacillaceae;$g$\_Limosilactobacillus;$\_$
    \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Micrococcales; f\_Micrococcaceae; g\_Rothia; \_Actinobacteriota; c\_Actinobacteria; o\_Micrococcaceae; f\_Micrococcaceae; g\_Rothia; \_Actinobacteriota; c\_Actinobacteria; o\_Micrococcaceae; f\_Micrococcaceae; f\_M
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;_
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Sutterellaceae;g_Sutterella;
  {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Clostridiales;f\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Clostridiaceae;\_Cl
d__Bacteria;p__Actinobacteriota;c__Thermoleophilia;__;__;_
d Bacteria;p Firmicutes;c Negativicutes;o Veillonellales-Selenomonadales;f Veillonellaceae;g Veillonella;
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Acidobacteriota; c\_Blastocatellia; o\_Pyrinomonadales; f\_Pyrinomonadaceae; g\_RB41; \_Pyrinomonadaceae; g\_RB41; \_Pyrinomonaceae; g\_RB41; _Pyrinomonaceae; g\_RB41; _Pyrinomonaceae; g\_RB41; _Pyrinomonaceae; g\_RB41; _Pyrinomonaceae; g\_RB41; _Pyrinomonaceae
d Bacteria;p Firmicutes;c Bacilli;o Lactobacillales;f Carnobacteriaceae;g Atopostipes;
  d_Bacteria;p_Acidobacteriota;c_Acidobacteriae;o_Subgroup_2;f_Subgroup_2;g_Subgroup_2;
d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Corynebacteriales;f_Nocardiacea
d_Bacteria;p_Actinobacteriota;c_Rubrobacteria;o_Rubrobacterales;f_Rubrobacteriaceae;g_Rubrobacter;_
    d__Bacteria;p__Myxococcota;c__Polyangia;__;__;__;
d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Cytophagales;f_Hymenobacteraceae;g_Hymenobacter;_
   \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Lachnospirales; f\_Lachnospiraceae; g\_Blautia; \_Lachnospiraceae; g\_Blautia; _Lachnospiraceae; g\_Blautia; g\_B
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Acidobacteriota; c\_Acidobacteriae; o\_Acidobacteriales; f\_Acidobacteriaceae\_(Subgroup\_1); \_Acidobacteriaceae\_(Subgroup\_1); \_
    \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Corynebacteriales; f\_Nocardiaceae; g\_Rhodococcus; \_Actinobacteriota; o\_Corynebacteriota; o\_Corynebacteriota
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d Bacteria;p Proteobacteria;c Gammaproteobacteria;o Salinisphaerales;† Salinisphaeraceae;g Salinisphaera;
{\tt d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Caulobacterales;f\_Caulobacteraceae;g\_Brevundimonas;}
  d Bacteria;p Firmicutes;c_Clostridia;o_Oscillospirales;f_Ruminococcaceae;g_Negativibacillus
d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Rhodobacterales;f_Rhodobacteraceae;g_Rubellimicrobium;
   \\ \underline{\text{d\_Bacteria}; p\_\text{Actinobacteriota; c\_Actinobacteria; o\_Propionibacteriales; f\_Propionibacteriaceae; g\_\text{Friedmanniella} } 
    d_Bacteria;p_Actinobacteriota;c_Thermoleophilia;o_Solirubrobacterales;f_67-14;g_67-14;
 \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Lactobacillales; f\_Lactobacillaceae; g\_Lacticasei bacillus; \__Lactobacillaceae; g\_Lacticasei bacillus; \__Lactobacillaceae; g\_Lacticasei bacillus; \__Lactobacillaceae; g\_Lactobacillaceae; g\_Lactobacillace
  d_Bacteria;p_Firmicutes;c_Clostridia;o_Oscillospirales;_;
   \begin{tabular}{ll} $d$\_Bacteria; p$\_Actinobacteriota; c$\_Coriobacteriia; o$\_Coriobacteriales; f$\_Coriobacteriaceae; g$\_Collinsella; and the context of t
d_Bacteria;p_Actinobacteriota;c_Coriobacteriia;o_Coriobacteriales;f_Atopobiaceae;__;
  \label{local-problem} $$ \underline{d}_B$ acteria; $p\_B$ acteroidota; $\underline{c}_B$ acteroidota; $\underline{d}_B$ acteroidota; $\underline{
d__Bacteria;p__Actinobacteriota;c__Acidimicrobiia;__;
  {\tt d\_Bacteria}; {\tt p\_Proteobacteria}; {\tt c\_Gammaproteobacteria}; {\tt o\_Enterobacteriales}; {\tt f\_Enterobacteriaceae}; {\tt g\_Escherichia-Shigella}; {\tt f\_Enterobacteriaceae}; {\tt
d Bacteria;p Cyanobacteria;c Cyanobacteriia;o Cyanobacteriales;
   \label{lem:d_Bacteria}  \  \, d\_Bacteria; p\_Actinobacteriota; c\_Thermoleophilia; o\_Solirubrobacterales; f\_Solirubrobacteraceae; and the solirubrobacteriota; because of the 
  d_Bacteria;p_Firmicutes;c_Bacilli;o_Lactobacillales;f_Lactobacillaceae;g_Ligilactobacillus;_
d_Bacteria;p_Verrucomicrobiota;c_Verrucomicrobiae;o_Verrucomicrobiales;f_Akkermansiaceae;g_Akkermansia;_
  d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Azospirillales;f_Azospirillaceae;g_Skermanella;_
  \label{lem:d_bacteria} $$ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Pseudonocardiales; f\_Pseudonocardiaceae; g\_Actinomycetospora; \_Pseudonocardiales; f\_Pseudonocardiaceae; g\_Actinomycetospora; \_Pseudonocardiaceae; g\_Actinomycetospora; g\_Actinomyceto
  \label{lem:d_Bacteria} \\ \mbox{d\_Bacteroidota;} \mbox{c\_Bacteroidia;} \mbox{o\_Flavobacteriales;} \mbox{f\_Flavobacteriaceae;} \mbox{g\_Capnocytophaga;} \mbox{d\_Bacteroidota;} \mbox{c\_Plavobacteriales;} \mbox{f\_Flavobacteriaceae;} \mbox{g\_Capnocytophaga;} \mbox{d\_Bacteroidota;} \mbox{c\_Capnocytophaga;} \mbox{d\_Bacteroidota;} \mbox{c\_Capnocytophaga;} \mbox{d\_Bacteroidota;} \mbox{d\_Bacteroi
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Neisseriaceae;g_Neisseria;_
  \label{lem:d_Bacteria}  d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Chitinophagales; f\_Chitinophagaceae; \_Chitinophagaceae; 
d__Bacteria;p__Firmicutes;c__Bacilli;o__Bacillales;f__Planococcaceae;
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Sphingobacteriales;f_Sphingobacteriaceae;g_Pedobacter;
d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Bifidobacteriales;f_Bifidobacteriaceae;g_Gardnerella
  \label{lem:d_Bacteria}  \  \, \underline{\text{Monteria}}; \underline{\text{Proteobacteria}}; \underline{\text{Cammaproteobacteria}}; \underline{\text{Ca
    d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacterales;f_Alteromonadaceae;g_Rheinheimera;_
  {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Oscillospirales;f\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostanoligenes\_group;g\_[Eubacterium]\_coprostano
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Staphylococcales; f\_Staphylococcaceae; g\_Jeotgalicoccus; \_Staphylococcaceae; g\_Jeotgalicoccus; g\_Jeot
\label{eq:d_Bacteria} $$ $$ d\_Bacteria; $$ p\_Bdellovibrionota; $$ c\_Oligoflexia; $$ o\_0319-6G20; $$ f\_0319-6G20; $$ g\_0319-6G20; $$ $$ $$ d\_Bacteria; $$ p\_Bdellovibrionota; $$ c\_Oligoflexia; $$ b_0 = 0.0000; $$ f_0 = 0.0000; 
  \label{lem:d_bacteria}  \mbox{$d$\_Bacteria;$p$\_Firmicutes;$c$\_Clostridia;$o$\_Monoglobales;$f$\_Monoglobaceae;$g$\_Monoglobus;$\_$
d_Bacteria;p_Firmicutes;c_Clostridia;o_Oscillospirales;f_Butyricicoccaceae;g_Butyricicoccus;_
  {\tt d\_Bacteria;p\_Acidobacteriota;c\_Vicinamibacteria;o\_Vicinamibacterales;f\_uncultured;g\_uncultured;\underline{}
  d_Bacteria;p_Chloroflexi;c_Gitt-GS-136;o_Gitt-GS-136;f_Gitt-GS-136;g_Gitt-GS-136;
d_Bacteria;p_Firmicutes;c_Clostridia;o_Oscillospirales;f_Ruminococcaceae;g_Ruminococcus;
  d_Bacteria;p_Firmicutes;c_Clostridia;o_Peptostreptococcales-Tissierellales;f_Family_XI;g_Finegoldia;
  {\tt d\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidia; 
 \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Oscillospirales; f\_Oscillospiraceae; g\_UCG-005; \_Oscillospirales; f\_Oscillospiraceae; g\_UCG-005; \_Oscillospiraceae; g\_UCG-005; \_Oscillospiraceae;
  d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Acetobacterales;f_Acetobacteraceae;g_Craurococcus-Caldovatus;_
d_Bacteria;p_Acidobacteriota;c_Vicinamibacteria;o_Vicinamibacterales;f_Vicinamibacteraceae;g_Vicinamibacteraceae;
d_Bacteria;p_Desulfobacterota;c_Desulfovibrionia;o_Desulfovibrionales;f_Desulfovibrionaceae;g_uncultured;_
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Burkholderiales; f\_Neisseriaceae; g\_uncultured; \_Proteobacteria; o\_Burkholderiales; f\_Neisseriaceae; g\_uncultured; \_Proteobacteriaceae; g\_uncultured; g\_uncultured; g\_uncultured; g\_uncultured; g\_uncultured; g\_uncultured; g\_uncultured; g\_uncultured
{\tt d\_Bacteria;p\_Campylobacterota;c\_Campylobacteria;o\_Campylobacterales;f\_Helicobacteraceae;g\_Helicobacter;\_Campylobacterales;f\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae;g\_Helicobacteraceae
  \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria;$p$\_Actinobacteriota;$c$\_Actinobacteria;$o$\_Actinomycetales;$f$\_Actinomycetaceae;$g$\_Varibaculum;$\_$actinomycetales;$f$\_Actinomycetaceae;$g$\_Varibaculum;$\_$actinomycetales;$f$\_Actinomycetaceae;$g$\_Varibaculum;$\_$actinomycetales;$f$\_Actinomycetaceae;$g$\_Varibaculum;$\_$actinomycetales;$f$\_Actinomycetaceae;$g$\_Varibaculum;$\_$actinomycetales;$f$\_Actinomycetaceae;$g$\_Varibaculum;$\_$actinomycetales;$f$\_$actinomycetaceae;$g$\_Varibaculum;$\_$actinomycetales;$f$\_$actinomycetaceae;$g$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetaceae;$g$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinomycetales;$f$\_$actinom
d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Prevotellaceae;g_Prevotella_7;_
   \  \  \, d\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_Pseudomonadales; \\ \  \  \, a \  \  \, b \  \  \, a \  \  \, b \  \  \, a \  \  \, b \  \  \, a \  \  \, a \  \  \, b \  \  \, a \  \ \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \ \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \ \, a \  \ \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \ \, a \  \  \, a \  \  \, a \  \  \, a \  \  \, a \  \ \, a \  \ \, a \  \  \, a \  \  \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \  \, a \  \  \, a \  \ \, a \  \ \, a \  \ \, a \  \  \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \  \, a \  \  \, a \  \ \, a \  \ \, a \  \  \, a \  \  \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \  \ \, a \ \ \, a \
d__Bacteria;p__Chloroflexi
    d__Bacteria;p__Actinobacteriota;c__Actinobacteria;o__PeM15;f__PeM15;g__PeM15;
                        _Bacteria;p__Firmicutes;c__Clostridia;o__Clostridiales;f__Clostridiaceae;g__Clostridium_sensu_stricto_1;__
  {\tt d\_Bacteria;p\_Firmicutes;c\_Bacilli;o\_Erysipelotrichales;f\_Erysipelotrichaceae;g\_Dubosiella;s\_uncultured\_bacterium}
  d Bacteria;p Acidobacteriota;c Blastocatellia;o Blastocatellales;f Blastocatellaceae;
 \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_Burkholderiales; f\_Alcaligenaceae; g\_Alcaligenes; and the control of the co
d__Bacteria;p__Desulfobacterota;c__Desulfobulbia;o__Desulfobulbales;f__Desulfocapsaceae;__;_
\label{eq:d_Bacteroidota} \begin{tabular}{ll} $\tt d\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Bacteroidaceae; g\_Bacteroides; s\_Bacteroides\_coprophilus \\ \end{tabular}
  d_Bacteria;p_Chloroflexi;c_AD3;o_AD3;f_AD3;g_AD3;_
  d Bacteria;p Actinobacteriota;c Acidimicrobiia;o Microtrichales;f Microtrichaceae;
d__Bacteria;p__Myxococcota;c__Polyangia;o__Polyangiales;
  {\tt d\_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Corynebacteriales;f\_Corynebacteriaceae;g\_Corynebacterium;s\_Corynebacterium\_glucuronolyticum
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Xanthomonadales;__;__;_
  d__Bacteria;p__Patescibacteria;c__Parcubacteria;__;__;__;
  \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteroidota$;$c$\_Bacteroidia$;$o$\_Cytophagales$;$f$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$\_Spirosomaceae$;$g$\_Dyadobacter$;$_Spirosomaceae$;$g$\_Dyadobacter$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_Spirosomaceae$;$_S
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\label{eq:d_Bacteria} $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; \_; $$
  \label{lem:d_Bacteria}  \mbox{$d$\_Bacteroidota$;$c$\_Bacteroidia$;$o$\_Cytophagales$;$f$\_Spirosomaceae$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spirosoma$;$g$\_Spi
\verb|d_Bacteria;p_Deferribacterota;c_Deferribacteres;o_Deferribacterales;f_Deferribacteraceae;g_Mucispirillum;
  \label{eq:d_Bacillaceae}  \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Bacillales; f\_Bacillaceae; g\_Geobacillus; \_Geobacillus; \_Geobacillu
d Bacteria;p Bacteroidota;c Bacteroidia;o Bacteroidales;f Bacteroidaceae;g Bacteroides;s Bacteroides plebeius
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Pseudomonadales;f_Nitrincolaceae;g_Nitrincola;
  d__Bacteria;p__Campylobacterota;c__Campylobacteria;o__Campylobacterales
  {\tt d\_Bacteroidota;c\_Bacteroidia;o\_Bacteroidales;f\_Muribaculaceae;g\_Muribaculaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultured\_Porphyromonadaceae;s\_uncultur
     d_Bacteria;p_Firmicutes;c_Clostridia;o_Peptostreptococcales-Tissierellales;f_Family_XI;g_Ezakiella;_
        d__Bacteria;p__Actinobacteriota;c__Acidimicrobiia;o__IMCC26256;f__IMCC26256;g__IMCC26256;
d_Bacteria;p_Firmicutes;c_Bacilli;o_Lactobacillales;f_Aerococcaceae;g_Abiotrophia;s_uncultured_bacterium
  {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Oscillospirales;f\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;\_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_Oscillospiraceae;g\_uncultured;_
  \label{local_decomposition} \\ \mbox{$d$\_Bacteria$;$p$\_Actinobacteriota$;$c$\_Actinobacteria$;$o$\_Micrococcales$;$f$\_Micrococcaceae$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenkonia$;$g$\_Nesterenk
\label{eq:d_Bacteria}  \mbox{$d$\_Bacteria$;p$\_Firmicutes$;c$\_Clostridia$;o$\_Oscillospirales$;f$\_Ruminococcaceae$;} 
  {\tt d\_Bacteria;p\_Gemmatimonadota;c\_Gemmatimonadetes;o\_Gemmatimonadales;f\_Gemmatimonadaceae;}
\verb|d_Bacteria|; \verb|p_Bacteroidota|; \verb|c_Bacteroidia|; \verb|o_Flavobacteria| es; \verb|f_Weeksellaceae|; \verb|g_Moheibacter|; \verb|s_uncultured_bacterium| especially a superiority of the superiority
  d Bacteria;p Cyanobacteria;c Vampirivibrionia;o Obscuribacterales;f Obscuribacteraceae;g Obscuribacteraceae;s uncultured bacterium
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Nitrosomonadaceae;g_Ellin6067;_
{\tt d\_Bacteria;p\_Desulfobacterota;c\_Desulfovibrionia;o\_Desulfovibrionales;f\_Desulfovibrionaceae}
     d_Bacteria;p_Firmicutes;c_Clostridia;o_Peptostreptococcales-Tissierellales;f_Anaerovoracaceae;g_Family_XIII_UCG-001;s_uncultured_bacterium
  \label{eq:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Myxococcota$;$c$\_Polyangia$;$o$\_Nannocystales$;$f$\_Nannocystaceae$;$g$\_Nannocysts$;$c$\_Polyangia$;$o$\_Nannocystales$;$f$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$;$g$\_Nannocystaceae$
  d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Rhizobiales;f_Hyphomicrobiaceae;g_Hyphomicrobium;_
  {\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Burkholderiales;f\_Sutterellaceae;g\_Parasutterella;\_Gammaproteobacteria;o\_Burkholderiales;f\_Sutterellaceae;g\_Parasutterella;\_Gammaproteobacteria;o\_Burkholderiales;f\_Sutterellaceae;g\_Parasutterella;\_Gammaproteobacteria;o\_Burkholderiales;f\_Sutterellaceae;g\_Parasutterella;\_Gammaproteobacteria;o\_Burkholderiales;f\_Sutterellaceae;g\_Parasutterella;\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteria;o\_Gammaproteobacteri
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Alcaligenaceae;__;
  \label{eq:d_mb-A2-108}  \displays a d_Bacteria; p\_Actinobacteriota; c\_MB-A2-108; o\_MB-A2-108; f\_MB-A2-108; g\_MB-A2-108; d\_MB-A2-108; 
  \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Gammaproteobacteria$;$o$\_Enterobacterales$;$f$\_Colwelliaceae$;$g$\_Colwellia$;}
\label{lem:d_Bacteria}  \textbf{d} \underline{\hspace{0.3cm}} \textbf{Bacteria}; \textbf{p} \underline{\hspace{0.3cm}} \textbf{Firmicutes}; \textbf{c} \underline{\hspace{0.3cm}} \textbf{Bacilli}; \textbf{o} \underline{\hspace{0.3cm}} \textbf{Erysipelotrichales}; \textbf{f} \underline{\hspace{0.3cm}} \textbf{Erysipelotrichaceae}; \textbf{g} \underline{\hspace{0.3cm}} \textbf{[Clostridium]\_innocuum\_group}; \underline{\hspace{0.3cm}} \textbf{g} \underline{\hspace{0.3cm}} \textbf{a} \underline{\hspace{0.3cm}} \textbf{g} \underline{\hspace{0.3cm}} \underline{\hspace{0.3cm}} \textbf{g} \underline{\hspace{0.3cm}} \textbf{g} \underline{\hspace{0.3cm}} \underline{\hspace{0.3cm}} \textbf{g} \underline{\hspace{0.3cm}} \underline{\hspace{0.3cm}} \textbf{g} \underline{\hspace{0.3cm}} \underline{\hspace{0.3cm}} \underline{\hspace{0.3cm}} \textbf{g} \underline{\hspace{0.3cm}} \underline
     \label{lem:d_Bacteria} \\ \text{d} \underline{\hspace{0.5cm}} \text{Bacteria}; \\ \text{p} \underline{\hspace{0.5cm}} \text{Proteobacteria}; \\ \text{c} \underline{\hspace{0.5cm}} \text{Alphaproteobacteria}; \\ \text{o} \underline{\hspace{0.5cm}} \text{Acetobacterales}; \\ \text{f} \underline{\hspace{0.5cm}} \text{Acetobacteraceae}; \\ \text{g} \underline{\hspace{0.5cm}} \text{Belnapia}; \\ \text{g} \underline{\hspace{0.5cm}} \text{Belnapia}; \\ \text{f} \underline{\hspace{0.5cm}} \text{Acetobacteraceae}; \\ \text{g} \underline{\hspace{0.5cm}} \text{Belnapia}; \\ \text{g} \underline{\hspace{0.5cm}} \text{Belnapia
d Bacteria;p__Cyanobacteria;c__Cyanobacteriia;
                            Archaea:p Nanoarchaeota;c Nanoarchaeia;o_Woesearchaeales;f_Woesearchaeales;g_Woesearchaeales;
     \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteriales;} \\ \mbox{$f$\_Crocinitomicaceae;} \\ \mbox{$g$\_Brumimicrobium;} \\ \mbox{$d$\_Bacteriales;} \\ \mbox{$d$\_Crocinitomicaceae;} \\ \mbox{$g$\_Brumimicrobium;} \\ \mbox{$d$\_Bacteriales;} \\ \mbox{$d$\_Crocinitomicaceae;} \\ \mbox{$d$\_Bacteriales;} \\ \mbox{$d$\_Crocinitomicaceae;} \\ \
                                 _Bacteria;p__Bacteroidota;c__Bacteroidia;
  \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteroidota$;$c$\_Bacteroidia$;$o$\_Bacteroidales$;$f$\_Marinifilaceae$;$g$\_Odoribacter$;$s$\_unidentified $$\mbox{$d$\_Bacteroidota$;$c$\_Bacteroidia$;$o$\_Bacteroidales$;$f$\_Marinifilaceae$;$g$\_Odoribacter$;$s$\_unidentified $$\mbox{$d$\_Bacteroidota$;$o$\_Bacteroidales$;$f$\_Marinifilaceae$;$g$\_Odoribacter$;$s$\_unidentified $$\mbox{$d$\_Bacteroidota$;$o$\_Bacteroidales$;$f$\_Marinifilaceae$;$g$\_Odoribacter$;$s$\_unidentified $$\mbox{$d$\_Bacteroidota$;$o$\_Bacteroidales$;$f$\_Marinifilaceae$;$g$\_Odoribacter$;$s$\_unidentified $$\mbox{$d$\_Bacteroidota$;$o$\_Bacteroidales$;$f$\_Marinifilaceae$;$g$\_Odoribacter$;$g$\_unidentified $$\mbox{$d$\_Bacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales$;$f$\_Aacteroidales
        d__Bacteria;p__Firmicutes;c__Bacilli;o__Lactobacillales;f__Carnobacteriaceae;g__Alkalibacterium;
\label{lem:condition} $$ d\_Bacteria; p\_Gemmatimonadota; c\_S0134\_terrestrial\_group; o\_S0134\_terrestrial\_group; f\_S0134\_terrestrial\_group; g\_S0134\_terrestrial\_group; o_S0134\_terrestrial\_group; o_S0134\_terrestri
  \label{eq:d_bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Caulobacterales; f\_Hyphomonadaceae; g\_SWB02; \_Proteobacteria; o\_Caulobacteria; o\_Caulobacteria
  {\tt d\_Bacteria}; {\tt p\_Firmicutes}; {\tt c\_Clostridia}; {\tt o\_Oscillospirales}; {\tt f\_Ruminococcaceae}; {\tt g\_Ruminococcus}; {\tt s\_Ruminococcus\_bicirculans}
\label{lem:d_Bacteria}  \display= 
  \label{lem:d_Bacteria} \\ \mbox{d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhizobiales;f\_Hyphomicrobiaceae;\_;} \\ \mbox{d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhizobiales;f\_Hyphomicrobiaceae;\_;} \\ \mbox{d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhizobiales;f\_Hyphomicrobiaceae;\_;} \\ \mbox{d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhizobiales;f\_Hyphomicrobiaceae;\_;} \\ \mbox{d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhizobiales;f\_Hyphomicrobiaceae;\_;} \\ \mbox{d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhizobiales;f\_Hyphomicrobiaceae;} \\ \mbox{d\_Bacteria;p\_Proteobacteria;o\_Rhizobiales;f\_Hyphomicrobiaceae;} \\ \mbox{d\_Bacteria;p\_Rhizobiales;f\_Hyphomicrobiaceae;} \\ \mbox{d\_Bacteria;p\_Rhizobiales;} \\ \mbox{d\_Bacteria;p\_Rhiz
d_Bacteria;p_Proteobacteria;_;_;_;_;
  d_Bacteria;p_Firmicutes;c_Clostridia;o_Christensenellales;f_Christensenellaceae;g_Christensenellaceae_R-7_group;_
  d_Bacteria;p__Firmicutes;c__Negativicutes;o__Veillonellales-Selenomonadales;f__Selenomonadaceae;g__Megamonas;
 \begin{tabular}{lll} $d$\_Bacteroidota; &c&Bacteroidota; &c&Bacteroidota
     d_Bacteria;p_Firmicutes;c_Bacilli;o_Staphylococcales;f_Gemellaceae;g_Gemella;
     \label{eq:d_Bacteria} $$ d\_Bacteria; $p\_Deinococcota; $c\_Deinococci; o\_Deinococcales; $f\_Deinococcaceae; $g\_Deinococcus; $\_Deinococcaceae; $g\_Deinococcus; $g\_Deinococcaceae; $g\_Deinococcus; $g\_Deinococcaceae; $g\_Deinococcus; $g\_Deinococcaceae; $g\_Deinococcus; $g\_Deinococcaceae; $g\_Deinococcus; $g\_Deinococcus; $g\_Deinococcaceae; $g\_Deinococcus; $g\_Deinococcaceae; $g\_Deinococcus; $g\_Deinococcaceae; $g\_Deinococcus; $g\_Deinococcus; $g\_Deinococcus; $g\_Deinococcaceae; $g\_Deinococcus; $g\_Deinoc
  d_Bacteria;p_Actinobacteriota;c_Acidimicrobiia;o_Microtrichales;__;__;_
  d_Bacteria;p_Latescibacterota;c_Latescibacterota;o_Latescibacterota;_Latescibacterota;
\label{lem:d_Bacteria} $$ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Micrococcales; f\_Microbacteriaceae; g\_Subtercola; f_Microbacteriaceae; g\_Subtercola; f_Microbacteriaceae; f_Microbacte
  d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Streptomycetales;f_Streptomycetaceae;g_Streptomyces;
\label{eq:d_Bacteria} $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Chitinophagales; f\_Chitinophagaceae; g\_Hydrotalea; and a substitution of the context of the context
  d_Bacteria;p_Myxococcota;c_Polyangia;o_Haliangiales;f_Haliangiaceae;g_Haliangium
  d Bacteria;p Bacteroidota;c Bacteroidia;o Flavobacteriales;f Weeksellaceae;g Elizabethkingia;
 \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_Steroidobacterales; f\_Steroidobacteraceae; g\_uncultured; and the statement of 
  d_Bacteria;p_Chloroflexi;c_Dehalococcoidia;o_S085;f_S085;g_S085;
  \label{lem:d_Bacteria}  \textbf{d} \underline{\hspace{0.3cm}} \textbf{Bacteria}; \underline{\hspace{0.3cm}} \textbf{p} \underline{\hspace{0.3cm}} \textbf{Actinobacteriota}; \underline{\hspace{0.3cm}} \textbf{C} \underline{\hspace{0.3cm}} \textbf{Microbacteriota}; \underline{\hspace
  {\tt d\_Bacteria;p\_Desulfobacterota;c\_Desulfobacteria;o\_Desulfobacteriaes;f\_Desulfosarcinaceae;g\_uncultured;\_Desulfobacteriaes;f\_Desulfosarcinaceae;g\_uncultured;\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desulfobacteriaes;f\_Desul
     d Bacteria;p Patescibacteria;c Saccharimonadia;o Saccharimonadales;f Saccharimonadaceae
\label{local_decomposition} $$ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Corynebacteriales; f\_Corynebacteriaceae; g\_Turicella; local_decomposition for the property of the propert
 \begin{tabular}{ll} $d$\_Bacteria; $p$\_Bacteroidota; $c$\_Bacteroidia; $o$\_Bacteroidales; $f$\_Prevotellaceae; $g$\_Paraprevotella; $g$\_Paraprevote
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Comamonadaceae;g_Tepidimonas;
  \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Gammaproteobacteria$;$o$\_Thiotrichales$;$f$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichales$;$f$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichales$;$f$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichales$;$f$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichales$;$f$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichales$;$f$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichales$;$f$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichales$;$f$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$g$\_uncultured$;$\_Sammaproteobacteria$;$o$\_Thiotrichaceae$;$o$\_Thiotrichaceae$;$o$\_Thiotrichaceae$;$o$\_Thiotrichaceae$;$o$\_Thiotri
\label{lem:d_Bacteria} \begin{tabular}{ll} $d$\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Micrococcales; f\_Dermabacteraceae; g\_Dermabacter;\_Dermabacteraceae; g\_Dermabacter;\_Dermabacteraceae; g\_Dermabacter;\_Dermabacteraceae; g\_Dermabacteraceae; g\_Dermabacter
  d Bacteria;p Firmicutes;c Clostridia;o Oscillospirales;f Oscillospiraceae;g NK4A214 group
  \label{lem:d_Bacteria} $$ \underline{\ \ }$ Erysipelotric hales; $f$ \underline{\ \ }$ Erysipelotric haceae; $g$ \underline{\ \ }$ Faecalibaculum half for the lemma of the l
  d Bacteria:n Bdellovibrionota:c Olinoflexia:n Olinoflexales:f Olinoflexaceae:n Olinoflexus
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_Bacteria;p__Fusobacteriota;c__Fusobacteriia;o__Fusobacteriales;f__Leptotrichiaceae;g__Hypnocyclicus;__
     d_Bacteria;p_Firmicutes;c_Bacilli;o_Paenibacillales;f_Paenibacillaceae;g_Paenibacillus;_
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacterales;f_Idiomarinaceae;g_Aliidiomarina;_
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Gemmatimonadota; c\_Longimicrobia; o\_Longimicrobiales; f\_Longimicrobiaceae; \_; and a substitution of the context of
d__Bacteria;p__Actinobacteriota;__;__;__;
d__Bacteria;p__Firmicutes;__;__;__;_
  {\tt d\_Bacteria;p\_Desulfobacterota;c\_Desulfobacteria;o\_Desulfobacterales;f\_Desulfosarcinaceae;}
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacterales;f_Morganellaceae;g_Buchnera;
  d Bacteria;p Patescibacteria;c Saccharimonadia;o Saccharimonadales;f Saccharimonadales;g
  d_Bacteria;p_Spirochaetota;c_Spirochaetia;o_Spirochaetales;f_Spirochaetaceae;g_Sphaerochaeta
d__Bacteria;p__Acidobacteriota;c__Vicinamibacteria;o__Subgroup_17;f__Subgroup_17;g__Subgroup_17;_
     \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Erysipelotrichales; f\_Erysipelotrichaceae; g\_Allobaculum and the substitution of the substitution o
  \label{lem:d_Archaea} $$ d_Archaea; p_Crenarchaeota; c_Nitrososphaeria; o_Nitrososphaerales; f_Nitrososphaeraceae; g_Nitrososphaeraceae; g_Nitrososphaer
  {\tt d\_Bacteria;p\_Bacteroidota;c\_Bacteroidia;o\_Bacteroidales;f\_Prevotellaceae;g\_Prevotella;s\_Prevotella\_timonensised and {\tt d\_Bacteroidota;c\_Bacteroidales} and {\tt d\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidales} and {\tt d\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidota;c\_Bacteroid
     d__Bacteria;p__Firmicutes;c__Bacilli;o__Erysipelotrichales;f__Erysipelotrichaceae;_
d__Bacteria;p__Dependentiae;c__Babeliae;o__Babeliales;__;
{\tt d\_Bacteria;p\_Firmicutes;c\_Bacilli;o\_Lactobacillales;f\_Aerococcaceae;g\_Eremococcus;s\_uncultured\_bacterium}
{\tt d\_Bacteria}; {\tt p\_Gemmatimonadota}; {\tt c\_Gemmatimonadetes}; {\tt o\_Gemmatimonadales}; {\tt f\_Gemmatimonadaceae}; {\tt g\_uncultured}; {\tt o_Gemmatimonadaceae}; {\tt o\_Gemmatimonadaceae}; {\tt o\_Gemmatimo
d_Bacteria;p_Chloroflexi;c_TK10;o_TK10;f_TK10;g_TK10;_
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Oscillospirales; f\_Ruminococcaceae; g\_Incertae\_Sedis; \_Clostridia; o\_Oscillospirales; f\_Ruminococcaceae; g\_Incertae\_Sedis; g\_Incertae\_
d Bacteria;p Firmicutes;c Bacilli;o Erysipelotrichales;f Erysipelotrichaceae;g Dubosiella;
  d_Bacteria;p_Firmicutes;c_Bacilli;o_Bacillales;f_Planococcaceae;g_Kurthia
  {\tt d\_Bacteria}; {\tt p\_Proteobacteria}; {\tt c\_Gammaproteobacteria}; {\tt o\_Acidiferrobacterales}; {\tt f\_Acidiferrobacteraceae}; {\tt g\_Sulfurifustis}; {\tt o\_Acidiferrobacteraceae}; {\tt o\_Acidiferrob
  d_Bacteria;p_Actinobacteriota;c_Thermoleophilia;o_Gaiellales;f_uncultured;g_uncultured;
     d__Bacteria;p__Proteobacteria;c__Gammaproteobacteria;o__B2M28;f__B2M28;g__B2M28;_
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Prevotellaceae;__;_
\label{eq:d_bacteria} $$ $$ d\_Bacteria; $p\_Chloroflexi; $c\_Ktedonobacteria; $o\_C0119; $f\_C0119; $g\_C0119; $\_C0119; $\_C
   \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Paenibacillales; f\_Paenibacillaceae; \_; and the context of the
\label{eq:d_bacteria} \\ \texttt{d\_Bacteria}; \texttt{p\_Actinobacteriota}; \texttt{c\_Acidimicrobiia}; \texttt{o\_Actinomarinales}; \texttt{f\_uncultured}; \texttt{g\_uncultured}; \texttt{d\_bacteria}; 
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Lachnospirales; f\_Lachnospiraceae; g\_Lachnospiraceae\_NK4A136\_group; \_Clostridia; o\_Lachnospirales; f\_Lachnospiraceae; g\_Lachnospiraceae\_NK4A136\_group; \_Clostridia; o\_Lachnospirales; f\_Lachnospiraceae; g\_Lachnospiraceae; g\_Lachnospiraceae \_NK4A136\_group; \_Clostridia; o\_Lachnospirales; f\_Lachnospiraceae; g\_Lachnospiraceae; g\_Lachnospiraceae \_NK4A136\_group; \_Clostridia; o\_Lachnospiraceae; g\_Lachnospiraceae; g\_Lachnosp
d Archaea;p Crenarchaeota;c Nitrososphaeria;o Group 1.1c;f Group 1.1c;g Group 1.1c;
     d Bacteria;p__Proteobacteria;c__Alphaproteobacteria;o__Rhizobiales;f__Labraceae;g__Labrys
  d Bacteria;p Desulfobacterota;c Desulfobacteria;o Desulfobacterales
 \  \  d\_Bacteria; p\_Cyanobacteria; c\_Cyanobacteriia; o\_Cyanobacteriales; f\_Coleo fasciculaceae; and the collection of the collection of
  \label{eq:d_bacteria} $$ d\_Bacteria; p\_Bdellovibrionota; c\_Oligoflexia; o\_0319-6G20; f\_0319-6G20; g\_0319-6G20; s\_uncultured\_soil for the context of the co
  {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostridia;o\_Peptostreptococcales-Tissierellales;\_Clostreptococcales-Tissierellales;\_Clostreptococcales-Tissierellales;\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales,\_Clostreptococcales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierella
  d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Micrococcales;f_Intrasporangiaceae;
     d_Bacteria;p_Firmicutes;c_Bacilli;o_Lactobacillales;f_Lactobacillaceae;g_Latilactobacillus;_
d_Archaea;p_Euryarchaeota;c_Methanobacteria;o_Methanobacteriales;f_Methanobacteriaceae;g_Methanobacterium;
\label{lem:d_bacteria}  \  \, d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Rhizobiales; f\_Beijerinckiaceae; g\_Bosea; beijerinckiaceae; beijerinck
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacterales;f_Pasteurellaceae;g_Aggregatibacter;_
\label{lem:d_Bacteria}  d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Rhizobiales; f\_Beijerinckiaceae; g\_Microvirga; lem: d_Bacteria; p\_Proteobacteria; b_Beijerinckiaceae; g\_Microvirga; lem: d_Bacteria; b_Beijerinckiaceae; b_Beijerinck
  d_Bacteria;p_Verrucomicrobiota;c_Verrucomicrobiae;o_Verrucomicrobiales;f_Verrucomicrobiaceae;g_Prosthecobacter;
     d_Bacteria;p_Firmicutes;c_Bacilli;o_Thermoactinomycetales;f_Thermoactinomycetaceae;g_Thermoactinomyces
  {\tt d\_Bacteria;p\_Firmicutes;c\_Bacilli;o\_Erysipelotrichales;f\_Erysipelatoclostridiaceae;g\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae\_UCG-003;\_Erysipelotrichaceae_UCG-003;\_Erysipelotrichaceae_UCG-003;\_Erysipelotrichaceae_UCG-003;\_Erysipelotric
     d__Bacteria;p__Firmicutes;c__Bacilli;o__Thermoactinomycetales;f__Thermoactinomycetaceae;g__Kroppenstedtia;__
  d_Bacteria;p_Firmicutes;c_Bacilli;o_Alicyclobacillales;f_Alicyclobacillaceae;g_Tumebacillus;_
d__Bacteria;p__Proteobacteria;c__Gammaproteobacteria;o__Burkholderiales;f__Neisseriaceae;g__Eikenella;_
  d__Bacteria;p__Patescibacteria;__;__;__;_
\label{eq:d_Bacteria}  \mbox{$d$\_Bacteroidota$;$c$\_Bacteroidia$;$o$\_Bacteroidales$;$f$\_Marinifilaceae$;$g$\_Butyricimonas$;$\_$
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Bacteroidaceae;g_Bacteroides;s_Bacteroides_massiliensis
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Desulfitobacteria; o\_Desulfitobacteriales; f\_Desulfitobacteriaceae; g\_Desulfosporosinus; and the substitution of the substitution 
d_Bacteria;p_Planctomycetota;c_Phycisphaerae;o_Tepidisphaerales;f_WD2101_soil_group;g_WD2101_soil_group;
  d_Archaea;p_Halobacterota;c_Methanosarcinia;o_Methanosarciniales;f_Methanosaetaceae;g_Methanosaeta
  {\tt d\_Bacteria}; {\tt p\_Patescibacteria}; {\tt c\_Gracilibacteria}; {\tt o\_Candidatus\_Peribacteria}; {\tt f\_Candidatus\_Peribacteria}; {\tt d\_Bacteria}; {\tt d\_Bacteria}; {\tt d\_Candidatus\_Peribacteria}; {\tt d\_Candidatus\_Peribacteria
\label{eq:d_Bacteria} $$ $d\_Bacteria; $p\_Firmicutes; $c\_Clostridia; o\_Peptostreptococcales-Tissierellales; $f\_Family\_XI; $g\_Parvimonas $f_Family\_XI; $g\_Parvimonas $f_Family\_XI; $g_Family\_XI; $g_Fa
     {\tt d\_Bacteria;p\_Gemmatimonadota;c\_Longimicrobia;o\_Longimicrobiales;f\_Longimicrobiaceae;g\_Longimicrobiaceae;\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiaceae;g\_Longimicrobiacea
d_Bacteria;p_Fusobacteriota;c_Fusobacteriia;o_Fusobacteriales;f_Leptotrichiaceae;g_Leptotrichia;_
  d Bacteria;p Proteobacteria;c Gammaproteobacteria;o Pseudomonadales;f Halomonadaceae;
     \label{local-problem} $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Rikenellaceae; g\_Alistipes; s\_Alistipes\_indistinctus $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Rikenellaceae; g\_Alistipes; s\_Alistipes\_indistinctus $$ d\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Rikenellaceae; g\_Alistipes; s\_Alistipes_indistinctus $$ d\_Bacteroidia; o\_Bacteroidales; f\_Rikenellaceae; g\_Alistipes; s\_Alistipes_indistinctus $$ d\_Bacteroidia; o\_Bacteroidales; f\_Rikenellaceae; g\_Alistipes; s\_Alistipes_indistinctus $$ d\_Bacteroidia; o\_Bacteroidales; f\_Rikenellaceae; g\_Alistipes; s\_Alistipes_indistinctus $$ d\_Bacteroidales; f\_Bacteroidales; f\_Bacteroidal
\label{eq:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Holosporales; f\_Holosporaceae; g\_uncultured; and the substitution of the substitutio
\label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;p$\_Chloroflexi$;c$\_Chloroflexia$;o$\_Chloroflexales$;f$\_Roseiflexaceae$;\_Chloroflexaceae$;$$\mbox{$d$\_Bacteria$;p$\_Chloroflexia$;o$\_Chloroflexaceae$;}$$\mbox{$d$\_Shackeria$;p$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloroflexia$;o$\_Chloro
  {\tt d\_Bacteria;p\_Firmicutes;c\_Bacilli;o\_Lactobacillales;f\_Aerococcaceae;g\_Facklamia;\_Comparison of the control of the control
 \begin{tabular}{ll} $d$\_Bacteria; p\_Methylomirabilota; c\_Methylomirabilia; o\_Rokubacteriales; f\_Rokubacteriales; g\_Rokubacteriales; d\_Rokubacteriales; d\_Rokubacte
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d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Pseudomonadales;f_Moraxellaceae;g_Acinetobacter;s_Acinetobacter_towneri
d_Bacteria;p_Actinobacteriota;c_Acidimicrobiia;o_Microtrichales;f_Microtrichaceae;g_uncultured;
    \label{local_decomposition} $$ d\_Bacteria; p\_Elusimicrobiota; c\_Elusimicrobia; o\_Lineage_IV; f\_Lineage_IV; g\_Lineage_IV $$ and $$ d_Bacteria; p\_Elusimicrobiota; c\_Elusimicrobia; o\_Lineage_IV; f\_Lineage_IV; d_Bacteria; p\_Elusimicrobiota; d_Bacteria; p\_Elusimicrobiota; d_Bacteria; p\_Elusimicrobiota; d_Bacteria; p\_Elusimicrobiota; d_Bacteria; p\_Elusimicrobiota; d_Bacteria; p\_Elusimicrobiota; d_Bacteria; d_Bacter
    d__Bacteria;p__Actinobacteriota;c__Actinobacteria;o__Frankiales;f__Nakamurellaceae;g__Nakamurella;__
  d_Bacteria;p_Patescibacteria;c_CPR2;o_CPR2;f_CPR2;g_CPR2;_
    {\tt d\_Bacteria}; {\tt p\_Actinobacteriota}; {\tt c\_Actinobacteria}; {\tt o\_Corynebacteriales}; {\tt f\_Mycobacteriaceae}; {\tt g\_Mycobacterium}; {\tt o\_Corynebacteriales}; {\tt f\_Mycobacteriaceae}; {\tt g\_Mycobacteriaceae}; {\tt f\_Mycobacteriaceae}; {\tt 
d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Tannerellaceae;g_Parabacteroides;
d_Bacteria;p_Chloroflexi;c_Anaerolineae;o_Anaerolineales;f_Anaerolineaceae;g_uncultured;
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Rhizobiales; f\_Methyloligellaceae; g\_uncultured; \_Proteobacteria; b_Rhizobiales; f\_Methyloligellaceae; g\_uncultured; f\_Methyloligellaceae; g\_uncultured; f\_Methyloligellaceae; f\_Methyloligellaceae; g\_uncultured; f\_Methyloligellaceae; f\_Methylol
{\tt d\_Bacteria}; {\tt p\_Actinobacteriota}; {\tt c\_Actinobacteria}; {\tt o\_Propionibacteriales}; {\tt f\_Nocardioidaceae}; {\tt g\_Nocardioides}; {\tt s\_Nocardioides}; {\tt g\_Nocardioides}; {\tt o\_Cardioides}; 
  d__Bacteria;p__Acidobacteriota;c__Acidobacteriae;__;_
  {\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Burkholderiales;f\_Comamonadaceae;g\_Comamonas;s\_Comamonas\_koreensis}
d_Bacteria;p_Firmicutes;c_Bacilli;o_Erysipelotrichales;f_Erysipelatoclostridiaceae;g_Erysipelatoclostridium
    d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Xanthomonadales;f_Rhodanobacteraceae;g_Luteibacter;
     \label{eq:d_Bacteria}  \  \, d\_\_Bacteria; p\_\_Proteobacteria; c\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Rhodobacteraceae; g\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Alphaproteobacteria; o\_\_Rhodobacterales; f\_\_Rhodobacteraceae; g\_\_Rhodobacteraceae; g\_\_Rhodobact
{\tt d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhizobiales;f\_Rhizobiales\_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Incertae\_Sedis;\_Rhizobiales_Inc
    d__Bacteria;p__Actinobacteriota;c__Actinobacteria;o__0319-7L14;f__0319-7L14;g__0319-7L14;_
d_Bacteria;p_Myxococcota;c_Polyangia;o_Polyangiales;f_Polyangiaceae;g_Polyangium;
   \begin{tabular}{ll} $d$\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Chitinophagales; f\_Saprospiraceae; \\ \end{tabular} 
    d_Bacteria;p_Patescibacteria;c_Parcubacteria;o_Candidatus_Zambryskibacteria;f_Candidatus_Zambryskibacteria;g_Candidatus_Zambryskibacteria;s_Parcubacteria_group
\label{thm:d_bacteria} $$ $d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Pseudonocardiales; f\_Pseudonocardiaceae; g\_Pseudonocardia; c\_Actinobacteriota; c\_Actinobacteria; o\_Pseudonocardiales; f\_Pseudonocardiaceae; g\_Pseudonocardiales; f\_Pseudonocardiales; f\_Pseudonocardiales
\label{eq:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Clostridia$;$o$\_Peptostreptococcales-Tissierellales$;$f$\_Anaerovoracaceae$;$\_Clostridia$;$o$\_Peptostreptococcales$.
{\tt d\_Bacteria;p\_Firmicutes;c\_Negativicutes;o\_Veillonellales-Selenomonadales;f\_Veillonellaceae;g\_Dialister;s\_Veillonellaceae\_bacterium}
{\tt d\_Bacteria}; {\tt p\_Actinobacteriota}; {\tt c\_Actinobacteria}; {\tt o\_Bifidobacteriales}; {\tt f\_Bifidobacteriaceae}; {\tt g\_Bifidobacterium}; {\tt s\_Bifidobacterium}; {\tt s\_Bifidobacterium}; {\tt o\_Bifidobacterium}; {\tt o\_Bifidobacterium};
  d Bacteria;p Actinobacteriota;c Acidimicrobiia;o Microtrichales;f Ilumatobacteraceae;g Ilumatobacter
d_Bacteria;p_Firmicutes;c_Bacilli;o_Erysipelotrichales;f_Erysipelotrichaceae;g_Merdibacte
                    _Bacteria;p__Proteobacteria;c__Gammaproteobacteria;o__Burkholderiales;f__Burkholderiaceae;g__Polynucleobacter;_
                        _Bacteria;p__Acidobacteriota;c__Holophagae;o__Subgroup_7;f__Subgroup_7;g__Subgroup_7;__
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Thermotogota; c\_Thermotogae; o\_Petrotogales; f\_Petrotogaceae; g\_Oceanotoga; s\_Oceanotoga\_sp. $$ \end{substitute} $$ d\_Bacteria; p\_Thermotogota; c\_Thermotogae; o\_Petrotogales; f\_Petrotogaceae; g\_Oceanotoga; s\_Oceanotoga\_sp. $$ \end{substitute} $$ d\_Bacteria; p\_Thermotogota; c\_Thermotogae; o\_Petrotogales; f\_Petrotogaceae; g\_Oceanotoga; s\_Oceanotoga; s\_
  d__Bacteria;p__Bacteroidota;c__Bacteroidia;o__Cytophagales;f__Microscillaceae;__;_
  {\tt d\_Bacteria}; {\tt p\_Patescibacteria}; {\tt c\_Parcubacteria}; {\tt o\_Parcubacteria}; {\tt p\_Parcubacteria}; {\tt p\_Parcubacteria}; {\tt p\_Parcubacteria}; {\tt o\_Parcubacteria}; {\tt o\_Parcu
d__Bacteria;p__Desulfobacterota;c__Desulfuromonadia;__;__;__;__
 \begin{tabular}{ll} $d$\_Bacteria; $p$\_Firmicutes; $c$\_Bacilli; $o$\_Lactobacillales; $f$\_Carnobacteriaceae; $g$\_Alloiococcus; $g$\_Alloio
\label{eq:d_Bacteria} \\ \mbox{$d$\_Bacteroidota$;$c$\_Bacteroidia$;$o$\_Cytophagales$;$f$\_Flammeovirgaceae$;$g$\_Rapidithrix$;}
  d Bacteria;p Deinococcota;c Deinococci;o Deinococcales;f Trueperaceae;g Truepera
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Diplorickettsiales;f_Diplorickettsiaceae;g_Rickettsiella
    d__Bacteria;p__Proteobacteria;c__Alphaproteobacteria;o__Rhodospirillales;f__uncultured;g__uncultured;s_
  d_Bacteria;p_Patescibacteria;c_Parcubacteria;o_Candidatus_Nomurabacteria;f_Candidatus_Nomurabacteria;g_Candidatus_Nomurabacteria;s_uncultured_bacterium
                        _Bacteria;p__Bacteroidota;c__Bacteroidia;o__Bacteroidales;f__Bacteroidetes_BD2-2;g__Bacteroidetes_BD2-2;__
    d__Bacteria;p__Myxococcota;c__Polyangia;o__Polyangiales;f__BIrii41;g__BIrii41;_
\label{eq:d_bacteria}  d\_Bacteria; \\ p\_Actinobacteriota; \\ c\_Actinobacteria; \\ o\_Micrococcales; \\ f\_Dermabacteraceae; \\ \_; \\ \_
  \label{localization} $$ d\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Peptostreptococcales-Tissierellales; f\_Proteiniboraceae; g\_Proteiniborus; and the substitution of 
    d__Bacteria;p__Proteobacteria;c__Alphaproteobacteria;o__Rickettsiales;f__SM2D12;g__SM2D12;_
\label{eq:d_bacteria}  \mbox{$d$\_Bacteria;$p$\_Firmicutes;$c$\_Bacilli;$o$\_Lactobacillales;$f$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Globicatella;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Aerococcaceae;$g$\_Ae
  d_Bacteria;p_Proteobacteria;c_Zetaproteobacteria;o_Mariprofundales;f_Mariprofundaceae;g_Mariprofundus;_
d_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridia_vadinBB60_group;f_Clostridia_vadinBB60_group;g_Clostridia_vadinBB60_group;
  d Bacteria;p Desulfobacterota;c Desulfuromonadia;o Geobacterales;f Geobacteraceae;
  \label{eq:d_Bacteria} $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Sphingobacteriales; $$ and $$ and $$ and $$ are also as a function of the second sec
                            Archaea;p_Thermoplasmatota;c_Thermoplasmata;o_Marine_Benthic_Group_D_and_DHVEG-1;f_Marine_Benthic_Group_D_and_DHVEG-1;g_Marine_Benthic_Group_D_and_DHVEG-1;
                          _Bacteria;p__Cyanobacteria;c__Cyanobacteriia;o__Cyanobacteriales;f__Xenococcaceae;g__Pleurocapsa_PCC-7319
d_Bacteria;p__Proteobacteria;c__Gammaproteobacteria;o__Xanthomonadales;f__Rhodanobacteraceae;g__Rhodanobacter;__
   \underline{\text{d\_Bacteria;} p\_\text{Proteobacteria;} c\_\text{Gammaproteobacteria;} o\_\text{Enterobacterales;} f\_\text{Vibrionaceae;} g\_\text{Aliivibrio;} \underline{\text{d\_Bacteria;} p\_\text{Proteobacteria;} c} \underline{\text{d-Bacteria;} p\_\text{Proteobacteri
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Porphyromonadaceae;g_Porphyromonas;s_Porphyromonas_crevioricanis
{\tt d\_Bacteria;p\_Deferribacterota;c\_Deferribacteres;o\_Deferribacterales;f\_Deferribacteraceae;g\_Mucispirillum;s\_Mucispirillum\_sp.
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Tistrellales; f\_Geminicoccaceae; g\_uncultured; \_Proteobacteria; o\_Tistrellales; f\_Geminicoccaceae; g\_Uncultured; g\_
\label{eq:d_Bacteria}  \textbf{d} \underline{\hspace{0.3cm}} \textbf{Bacteria}; \\ \textbf{p} \underline{\hspace{0.3cm}} \textbf{Proteobacteria}; \\ \textbf{c} \underline{\hspace{0.3cm}} \textbf{Alphaproteobacteria}; \\ \textbf{o} \underline{\hspace{0.3cm}} \textbf{Rhizobiaceae}; \\ \textbf{g} \underline{\hspace{0.3cm}} \textbf{uncultured}; \\ \underline{\hspace{0.3cm}} \textbf{d} \underline{\hspace{0.3cm}} \underline{\hspace{0.3cm}} \textbf{d} \underline{\hspace{0.3cm}} \textbf{d} \underline{\hspace{0.3cm}} \underline{\hspace{0.3c
  {\tt d\_Bacteria;p\_Chloroflexi;c\_Dehalococcoidia;o\_GIF9;f\_GIF9;g\_GIF9;\_GIF9;}
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Sphingobacteriales;f_AKYH767;g_AKYH767;s_metagenome
\label{lem:d_Bacteria} $$ \underline{\ \ \ }$ \underline{\ \ \ \ \ }$ \underline{\ \ \ \ \ }$ \underline{\ \ \ }$ Veillonellales-Selenomonadales; } \underline{\ \ \ \ \ \ }$ \underline{\ \ \ }$ \underline{\ \ \ }$ \underline{\ \ \ }$ Dialister excepts a function of the property of the proper
    \label{eq:d_bacteria} $$ d\_Bacteria; p\_Myxococcota; c\_Myxococcia; o\_Myxococcales; f\_Myxococcaceae; g\_KD3-10; s\_metagenome and the substitution of the substitution o
  d_Bacteria;p_Firmicutes;c_Negativicutes;o_Veillonellales-Selenomonadales;f_Veillonellaceae;g_Megasphaera;
  {\tt d\_Bacteria}; {\tt p\_Proteobacteria}; {\tt c\_Gammaproteobacteria}; {\tt o\_Pseudomonadales}; {\tt f\_Nitrincolaceae}; {\tt o\_Pseudomonadales}; {\tt f\_Nitrincolaceae}; {\tt o\_Pseudomonadales}; {\tt 
  \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Alphaproteobacteria$;$o$\_Caulobacterales$;$f$\_Hyphomonadaceae$;$g$\_Simplifies the control of the con
d_Bacteria;p_Gemmatimonadota;c_AKAU4049;o_AKAU4049;f_AKAU4049;g_AKAU4049;
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Steroidobacterales;f_Steroidobacteraceae;
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{\tt d\_Bacteria;p\_Bacteroidota;c\_Bacteroidia;o\_Cytophagales;\_}
{\tt d\_Bacteria}; {\tt p\_Proteobacteria}; {\tt c\_Gammaproteobacteria}; {\tt o\_Pseudomonadales}; {\tt f\_Moraxellaceae}; {\tt g\_Moraxella}; {\tt s\_Moraxella} {\tt atlantaceae}; {\tt o\_Pseudomonadales}; {\tt o\_Pseudomonadales};
  \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Alphaproteobacteria$;$o$\_Rhodospirillales$;$f$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Rhodospirillales$;$f$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Rhodospirillales$;$f$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Bacteria$;$o$\_Alphaproteobacteria$;$o$\_Rhodospirillales$;$f$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Bacteria$;$o$\_Alphaproteobacteria$;$o$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Alphaproteobacteria$;$o$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Alphaproteobacteria$;$o$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Alphaproteobacteria$;$o$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Alphaproteobacteria$;$o$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Alphaproteobacteria$;$o$\_Rhodospirillaceae$;$g$\_uncultured$;$\_$includes $$\mbox{$d$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_Alphaproteobacteria$;$o$\_A
\label{thm:continuous} $$ $d_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Enterobacterales; f\_Morganellaceae; g\_Moellerella; s\_Providencia\_sp. $$ $d_Bacteria; p\_Proteobacteria; o\_Enterobacteria; o\_Ent
d Bacteria;p Patescibacteria;c Parcubacteria;o Candidatus Nomurabacteria;f Candidatus Nomurabacteria;g Candidatus Nomurabacteria;
  d_Bacteria;p_Actinobacteriota;c_MB-A2-108;o_MB-A2-108;f_MB-A2-108;g_MB-A2-108;s_uncultured_actinobacterium
\label{lem:d_Bacteria}  \textbf{d} \underline{\hspace{0.3cm}} \textbf{Bacteria}; \textbf{p} \underline{\hspace{0.3cm}} \textbf{Proteobacteria}; \textbf{c} \underline{\hspace{0.3cm}} \textbf{Gammaproteobacteria}; \textbf{o} \underline{\hspace{0.3cm}} \textbf{Burkholderiales}; \textbf{f} \underline{\hspace{0.3cm}} \textbf{Comamonadaceae}; \textbf{g} \underline{\hspace{0.3cm}} \textbf{Rhizobacter}; \underline{\hspace{0.3cm}} \textbf{Comamonadaceae}; \textbf{g} \underline{\hspace{0.3cm}} \textbf{Rhizobacter}; \underline{\hspace{0.3cm}} \textbf{Gammaproteobacteria}; \textbf{g} \underline{\hspace{0.3cm}} \textbf{Surkholderiales}; \textbf{g} \underline{\hspace{0.3cm}} \textbf{Comamonadaceae}; \textbf{g} \underline{\hspace{0.3cm}} \textbf{Rhizobacter}; \underline{\hspace{0.3cm}} \textbf{Gammaproteobacteria}; \textbf{g} \underline{\hspace{0.3cm}} \textbf{Surkholderiales}; \textbf{g} \underline{\hspace{0.
     d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacterales;f_Yersiniaceae;g_Serratia;_
     \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Limnochordia; o\_Limnochordales; f\_Limnochordaceae; g\_Limnochordaceae; g
                                   _Bacteria;p__Proteobacteria;c__Gammaproteobacteria;o__Burkholderiales;f__Comamonadaceae;g__Aquabacterium;_
  \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteroidota$;$c$\_Bacteroidia$;$o$\_Chitinophagales$;$f$\_Chitinophagaceae$;$g$\_Flaviaesturariibacter$;$f$\_Chitinophagaceae$;$g$\_Flaviaesturariibacter$;$f$\_Chitinophagaceae$;$g$\_Flaviaesturariibacter$;$f$\_Chitinophagaceae$;$g$\_Flaviaesturariibacter$;$f$\_Chitinophagaceae$;$g$\_Flaviaesturariibacter$;$f$\_Chitinophagaceae$;$g$\_Flaviaesturariibacter$;$f$\_Chitinophagaceae$;$g$\_Flaviaesturariibacter$;$f$\_Chitinophagaceae$;$g$\_Flaviaesturariibacter$;$f$\_Chitinophagaceae$;$g$\_Flaviaesturariibacter$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae$;$g$\_Chitinophagaceae
  d_Bacteria;p_Actinobacteriota;c_MB-A2-108;o_MB-A2-108;f_MB-A2-108;g_MB-A2-108;s_uncultured_bacterium
\label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Syntrophomonadia$;$o$\_Syntrophomonadales$;$f$\_Syntrophomonadaceae$;$\mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Syntrophomonadia$;$p$\_Syntrophomonadaceae$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syntrophomonadaceae}$;$\mbox{$d$\_Syn
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Barnesiellaceae;g_Barnesiella;
d__Bacteria;p__Gemmatimonadota;__;__;
  {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Oscillospirales;f\_Ruminococcaceae;g\_Subdoligranulum;s\_uncultured\_Subdoligranulum}
  d Bacteria;p Proteobacteria;c Gammaproteobacteria;o Burkholderiales;f Comamonadaceae;g Limnohabitans
  {\tt d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhodobacterales;f\_Rhodobacteraceae;g\_Limibaculum}
   \begin{tabular}{ll} $d$\_Bacteria; p$\_Actinobacteriota; c$\_Actinobacteria; o$\_Micromonosporales; f$\_Micromonosporales; f$\_Micromon
     \label{lem:d_bacteria} \\ \text{d_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Actinomycetales;f\_Actinomycetaceae;g\_Actinotignum;} \\ \\ \text{d_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Actinomycetales;f\_Actinomycetaceae;g\_Actinotignum;} \\ \\ \text{d_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Actinomycetales;f\_Actinomycetaceae;g\_Actinotignum;} \\ \\ \text{d_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Actinomycetales;f\_Actinomycetaceae;g\_Actinotignum;} \\ \\ \text{d_Bacteria;p\_Actinobacteria;o\_Actinobacteria;o\_Actinomycetales;f\_Actinomycetaceae;g\_Actinotignum;} \\ \\ \text{d_Bacteria;p\_Actinobacteria;o\_Actinobacteria;o\_Actinomycetales;f\_Actinomycetaceae;g\_Actinotignum;} \\ \\ \text{d_Bacteria;p\_Actinobacteria;o\_Actinobacteria;o\_Actinomycetaceae;g\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Actinobacteria;o\_Acti
  \label{eq:d_bacteria} \\ \texttt{d\_Bacteria}; \texttt{p\_Firmicutes}; \texttt{c\_Bacilli}; \texttt{o\_Lactobacillales}; \texttt{f\_Carnobacteriaceae}; \texttt{g\_Jeotgalibaca}; \texttt{s\_Trichococcus\_sp.} \\
     d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Sutterellaceae;g_uncultured
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Rhodocyclaceae;
 \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Reyranellales; f\_Reyranellaceae; g\_Reyranella; \_Reyranellaceae; g\_Reyranella; \_Reyranellaceae; g\_Reyranellaceae; g\_Reyranellaceae;
  {\tt d\_Bacteria}; {\tt p\_Patescibacteria}; {\tt c\_Saccharimonadia}; {\tt o\_Saccharimonadales}; {\tt f\_Saccharimonadaceae}; {\tt g\_Saccharimonadaceae}; {\tt d\_Saccharimonadaceae}; {\tt d\_Sa
d_Bacteria;p_Verrucomicrobiota;c_Verrucomicrobiae;o_Chthoniobacterales;f_Chthoniobacteraceae;g_Candidatus_Udaeobacter;_
  \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Bacilli$;$o$\_Erysipelotrichales$;$f$\_Erysipelatoclostridiaceae$;$\_$;$\_$
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Muribaculaceae;g_Muribaculaceae;s_unidentified
\label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Nitrospirota$;$c$\_Thermodesulfovibrionia$;$o$\_uncultured$;$f$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$
     \label{lem:d_Bacteria} \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Clostridiales; f\_Clostridiaceae; g\_Clostridium\_sensu\_stricto\_13; \_Clostridiaceae; g\_Clostridium\_sensu\_stricto\_13; \_Clostridiaceae; g\_Clostridiaceae; g\_Clostr
     \label{eq:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Clostridia$;$o$\_Oscillospirales$;$f$\_Hungateiclostridia$ceae$;$
d_Bacteria;p__Firmicutes;c__Clostridia;o__Peptostreptococcales-Tissierellales;f__Family_XI;_
   \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Acholeplasmatales; f\_Acholeplasmataceae; g\_Anaeroplasma; \\ \end{tabular} Anaeroplasma; \\ \end{tabular} 
  \label{eq:d_Bacteria} $$ d\_Bacteria; p\_Planctomycetota; c\_Planctomycetes; o\_Pirellulales; f\_Pirellulaceae; \_; and a substitute of the property of the proper
\verb|d_Bacteria;p_Armatimonadota;c_Fimbriimonadia;o_Fimbriimonadales;f_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonadaceae;g_Fimbriimonaceae;g_Fimbriimonaceae;g_Fimbriimonaceae;g_Fimbriimonaceae;g_Fimb
  \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Alphaproteobacteria$;$o$\_Rhizobiales$;$f$\_Xanthobacteraceae$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncult
{\tt d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Defluviicoccales;f\_Defluviicoccaceae;g\_Defluviicoccus;\_Defluviicoccaceae;g\_Defluviicoccus;\_Defluviicoccaceae;g\_Defluviicoccus;\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_Defluviicoccaceae;g\_De
   \underline{d\_Bacteria;} \underline{p\_Firmicutes;} \underline{c\_Bacilli;} o\underline{-Erysipelotrichales;} \underline{f\_Erysipelotrichaceae;} \underline{g\_Faecalicoccus} 
  d_Bacteria;p_Methylomirabilota;c_Methylomirabilia;o_Rokubacteriales;f_Rokubacteriales;g_Rokubacteriales;s_uncultured_bacterium
\label{eq:d_bacteria} \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Rhizobiales; f\_Xanthobacteraceae; g\_Pseudorhodoplanes and bacteria; b_Alphaproteobacteria; b_Alphaproteob
     d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Prolixibacteraceae;g_Prolixiba
     d__Bacteria;p__Bacteroidota;c__Kapabacteria;o__Kapabacteriales;f__Kapabacteriales;g__Kapabacteriales;s__uncultured_bacterium
  \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Clostridia$;$o$\_Oscillospirales$;$f$\_Ethanoligenenaceae$;$g$\_Incertae\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;$g$\_Sedis$;
     d__Bacteria;p__Actinobacteriota;c__Coriobacteriia;o__Coriobacteriales;f__Eggerthellaceae;__
{\tt d\_Bacteria;p\_Bacteroidota;c\_Bacteroidia;o\_Bacteroidales;f\_Prevotellaceae;g\_Prevotellaceae\_UCG-001;\_Description of the content of the con
\label{eq:d_Bacteria}  \mbox{$d$\_Bacteria;$p$\_Firmicutes;$c$\_Bacilli;$o$\_Lactobacillales;$f$\_Aerococcaceae;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g$\_Aerococcus;$g
  {\tt d\_Bacteria; p\_Cyanobacteria; c\_Vampirivibrionia; o\_Vampirovibrionales; \_}
d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Euzebyales;f_Euzebyaceae;__;
  {\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Gammaproteobacteria\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Berkiella;\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Berkiella;\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Berkiella;\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Berkiella;\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Berkiella;\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Berkiella;\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Berkiella;\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Berkiella;\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Sedis;f\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unknown\_Family;g\_Unk
d_Bacteria;p_Firmicutes;c_Bacilli;o_Erysipelotrichales;f_Erysipelotrichaceae;g_Holdemanella;
d Bacteria;p Actinobacteriota;c Thermoleophilia;o Solirubrobacterales;f Solirubrobacteraceae;g Solirubrobacter;
  \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Elusimicrobiota$;$c$\_Lineage\_IIa$;$o$\_Lineage\_IIa$;$f$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lineage\_IIa$;$g$\_Lin
  d_Bacteria;p_Firmicutes;c_Bacilli;o_Erysipelotrichales;f_Erysipelotrichaceae;g_Turicibacter;
     \label{lem:d_Archaea;p_Crenarchaeota;c_Nitrososphaeria;o_Nitrososphaerales;f_Nitrososphaeraceae;\__litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litrososphaeraceae;_litros
  {\tt d\_Bacteria;p\_Desulfobacterota;c\_Desulfobacteria;o\_Desulfobacterales;f\_Desulfosarcinaceae;g\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva0081\_sediment\_group;\_Sva008
 \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Azospirillales; f\_Azospirillalee; g\_uncultured; s\_metagenome and proteobacteria; b_uncultured; b_uncultu
  \label{lem:d_Bacteria}  \textbf{d} \underline{\hspace{0.3cm}} \textbf{Bacteria}; \underline{\hspace{0.3cm}} \textbf{p} \underline{\hspace{0.3cm}} \textbf{Patescibacteria}; \underline{\hspace{0.3cm}} \textbf{Gracilibacteria}; \underline{\hspace{0.3cm}} \textbf{Gracili
\label{eq:d_Bacteria} \\ \mbox{$d$\_Bacteroidota;$c$\_Bacteroidia;$o$\_Flavobacteriales;$f$\_Flavobacteriaceae;$g$\_Myroides;$g$\_Starting and $g$\_Starting and $g$\_
  {\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Burkholderiales;f\_Hydrogenophilaceae;g\_Hydrogenophilus;\_Indicated a constraint of the control of th
{\tt d\_Bacteria;p\_Myxococcota;c\_Polyangia;o\_VHS-B4-70;f\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-B4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-P4-70;g\_VHS-70;g\_VHS-70;g\_VHS-70;g\_VHS-70;g\_VHS-70;g\_VHS-70;g\_VHS-70;g\_VHS-70;g\_VHS-70;g\_VHS-70;g\_VHS-
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Thiomicrospirales;f_Thiomicrospiraceae
  d_Bacteria;p_Desulfobacterota;c_Desulfobaccia;o_Desulfobaccales;f_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desulfobaccaceae;g_Desu
  \label{lem:d_bacteria} \\ \mbox{$d$\_Bacteria;$p$\_Firmicutes;$c$\_Clostridia;$o$\_Eubacteriales;$f$\_Eubacteriaceae;$g$\_Eubacterium;$f$\_Eubacteriaceae;$g$\_Eubacterium;$f$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$g$\_Eubacteriaceae;$
     d__Bacteria;p__Myxococcota;c__Myxococcia;o__Myxococcales;f__Anaeromyxobacteraceae;g__Anaeromyxobacter;
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_Bacteria;p__Proteobacteria;c__Gammaproteobacteria;o__Burkholderiales;f__Nitrosomonadaceae;g__MND1;_
  \label{local_decomposition} $$ \underline{\ \ \ \ } $$ Dacteria; $p\_Bacteroidota; $c\_Bacteroidales; $f\_Tannerellaceae; $g\_Macellibacteroides; $f\_Tannerellaceae; $g\_Macellibacteroides; $f\_Tannerellaceae; $g\_Macellibacteroides; $g\_Macelli
  d_Bacteria;p__Acidobacteriota;c__Vicinamibacteria;o__Vicinamibacterales;f__Vicinamibacteraceae;_
\label{lem:d_bacteria} \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Rhodospirillales; f\_uncultured; g\_uncultured; s\_gut\_metagenome \\ \begin{tabular}{ll} $d$\_Notember (a) & $d$\_Notember (b) & $d$\_Notember (b)
\label{eq:d_Bacteria} \\ \text{d\_Bacteria}; \\ \text{p\_Firmicutes}; \\ \text{c\_Bacilli}; \\ \text{o\_Erysipelotrichales}; \\ \text{f\_Erysipelotrichaceae}; \\ \text{g\_Erysipelotrichaceae}; \\ \text{s\_Faecalitalea\_sp.} \\ \\ \text{d\_Bacteria}; \\ \text{p\_Erysipelotrichaceae}; \\ \text{d\_Erysipelotrichaceae}; \\ \text{d\_Erysipelotrichacea
  {\tt d\_Bacteria;p\_Planctomycetota;c\_Phycisphaerae;o\_Tepidisphaerales;f\_Tepidisphaerales;g\_Tepidisphaerales;\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_Tepidisphaerales;g\_
d__Bacteria;p__Elusimicrobiota;__;__;
  {\tt d\_Bacteria;p\_Desulfobacterota;c\_Desulfobacteria;o\_Desulfatiglandales;f\_Desulfatiglandaceae;g\_Desulfatiglans;\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandaceae;g\_Desulfatiglandacea
  d Bacteria;p Bdellovibrionota;c Bdellovibrionia;o Bacteriovoracales;f Bacteriovoracaceae;g Peredibacter;
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_Aquaspirillaceae;g_Microvirgula;_
  \label{lem:d_Bacillaceae} \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Bacillales; f\_Bacillaceae; g\_Bacillus; s\_Bacillus\_cytotoxicus; and the substitution of the substi
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Pseudomonadales;f_Moraxellaceae;g_uncultured;_
  d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Rhizobiales;f_Beijerinckiaceae;g_1174-901-12;_
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Flavobacteriales;f_Crocinitomicaceae;g_Fluviicola;_
d__Bacteria;p__Actinobacteriota;c__Actinobacteria;o__Frankiales;f__Geodermatophilaceae;g__Klenkia;_
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Peptococcales; f\_Peptococcaceae; g\_Peptococcus; \_Peptococcaceae; g\_Peptococcus; \_Peptococcaceae; g\_Peptococcus; \_Peptococcaceae; g\_Peptococcus; \_Peptococcaceae; g\_Peptococcaceae; g\_Peptococcaceae; g\_Peptococcus; \_Peptococcaceae; g\_Peptococcaceae; g
  \label{lem:d_Bacteria} $$ d\_Bacteroidota; c\_Bacteroidia; o\_Cytophagales; f\_Microscillaceae; g\_uncultured; s\_Algoriphagus\_sp. $$ and $
\label{thm:continuous} \begin{tabular}{lll} $d$\_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Pseudomonadales; f\_Alcanivoracaceae1; g\_Alcanivoracx; alcanivoracaceae1; g\_Alcanivoracaceae1; g
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacterales;f_Idiomarinaceae;g_Idiomarina;
\label{local-decomposition} $$ d\_Bacteroidota; c\_Bacteroidales\_Bacteroidales; f\_Bacteroidales\_UCG-001; g\_Bacteroidales\_UCG-001; s\_uncultured\_rumen $$ d\_Bacteroidales\_UCG-001; d\_Bacteroidales\_UCG
  d Bacteria;p Bacteroidota;c Bacteroidia;o Flavobacteriales;
  {\tt d\_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Propionibacteriales;f\_Propionibacteriaceae;g\_Cutibacterium;s\_Cutibacterium\_avidum}
 \verb|d_Bacteria|; \verb|p_Bacteroidota|; \verb|c_Bacteroidota|; \verb|c_Bacteroidota|; \verb|d_Bacteroidota|; \verb|d_Prevotella|; \|d_Prevotella|; \|d_Prevotella
       d__Bacteria;p__Bdellovibrionota;c__Bdellovibrionia;o__Bacteriovoracales;f__Bacteriovoracaceae;g__Peredibacter;s__metagenome
     {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Peptostreptococcales-Tissierellales;f\_Family\_XI;g\_W5053;s\_uncultured\_bacterium}
 \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Erysipelotrichales; f\_Erysipelotrichaceae; g\_uncultured; s\_Clostridiales\_bacterium \\ \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Erysipelotrichales; f\_Erysipelotrichaceae; g\_uncultured; s\_Clostridiales\_bacterium \\ \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Erysipelotrichales; f\_Erysipelotrichaceae; g\_uncultured; s\_Clostridiales\_bacterium \\ \begin{tabular}{ll} $d$\_Bacteria; p\_Clostridiales \\ \begin{tabular}{ll} $d$\_Bacteria; p\_Clostridi
  \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Bacilli$;$o$\_Erysipelotrichales$;$f$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Holdemania$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Erysipelotrichaceae$;$g$\_Ery
 \begin{tabular}{ll} $d\_Bacteria; p\_Firmicutes; c\_Limnochordia; o\_Limnochordia; f\_Limnochordia; g\_Hydrogenispora; \_Imnochordia; f\_Limnochordia; f\_Limnochord
\label{lem:d_Bacteria} $$ d\_Bacteroidota; c\_Bacteroidota; c\_Bacteroidota; c\_Sphingobacteriales; f\_Sphingobacteriaceae; g\_Sphingobacterium; s\_Sphingobacterium\_spiritivorum $$ d\_Bacteroidota; c\_Bacteroidota; c\_Bacteroidota
  d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_TRA3-20;g_TRA3-20;
\label{eq:d_bacteria} $$ $$ $ $ d_Bacteria; $p_Chloroflexi; $c_Chloroflexia; $o_Thermonic robiales; $f_JG30-KF-CM45; $g_JG30-KF-CM45; $s_uncultured_Chloroflexia; $o_Thermonic robiales; $f_JG30-KF-CM45; $g_JG30-KF-CM45; $g_JG3
  d Bacteria;p Bdellovibrionota;c Oligoflexia;o Oligoflexales;f Oligoflexaceae;g uncultured;
  d_Bacteria;p_Firmicutes;c_Bacilli;o_Erysipelotrichales;f_Erysipelotrichaceae;g_Faecalibaculum;s_uncultured_bacterium
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Diplorickettsiales;f_Diplorickettsiaceae;g_Aquicella;
     d__Bacteria;p__Firmicutes;c__Clostridia;o__Oscillospirales;f__UCG-010;g__UCG-010;_
   \begin{tabular}{ll} $d\_Bacteria; p\_Actinobacteriota; c\_Thermoleophilia; o\_Solirubrobacterales; f\_Solirubrobacteraceae; g\_Patulibacter; \_Solirubrobacteraceae; g\_Patulibacteraceae; g
   \begin{tabular}{ll} $d$\_Bacteria; p\_Spirochaetota; c\_Spirochaetaes; f\_Spirochaetaee; g\_Spirochaetae2; --Spirochaetaee; g\_Spirochaetaee; g\_S
d_Bacteria;p_Spirochaetota;c_Spirochaetia;o_Spirochaetales;f_Spirochaetaceae;g_Treponema;s_Treponema_maltophilum
 \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_Pseudomonadales; f\_Moraxellaceae; g\_Moraxella; \_Moraxellaceae; g\_Moraxellaceae; g\_Moraxellaceae
{\tt d\_Bacteria;p\_Latescibacterota;c\_Latescibacterota;o\_Latescibacterota;f\_Latescibacterota;g\_Latescibacterota;s\_saltmarsh\_clone
d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Sphingobacteriales;f_env.OPS_17;g_env.OPS_17;_
  d_Bacteria;p_Firmicutes;c_Clostridia;o_Lachnospirales;f_Lachnospiraceae;g_[Eubacterium]_ventriosum_group;_
d Bacteria;p Firmicutes;c Bacilli;o Thermoactinomycetales;f Thermoactinomycetaceae;g Melghirimyces;s
  d_Bacteria;p_Gemmatimonadota;c_Gemmatimonadetes;o_Gemmatimonadales;f_Gemmatimonadaceae;g_Gemmatimonas
                              \underline{\hspace{0.1cm}} \textbf{Bacteria;} \underline{\hspace{0.1cm}} \textbf{Desulfobacterota;} \underline{\hspace{0.1cm}} \textbf{C}\underline{\hspace{0.1cm}} \textbf{Desulfovibrionia;} \underline{\hspace{0.1cm}} \textbf{Desulfovibrionales;} \underline{\hspace{0.1cm}} \textbf{Desulfovibrionaceae;} \underline{\hspace{0.1cm}} \underline{\hspace{0.1cm}} \textbf{Bilophila;} \underline{\hspace{0.1cm}} \textbf{Desulfovibrionaceae;} \underline{\hspace{0.1cm}} \textbf{Desulfovibrion
\label{lem:d_Bacteria} $$ d\_Bacteria; p\_Spirochaetota; c\_Spirochaetia; o\_Spirochaetales; f\_Spirochaetaceae; g\_Spirochaetales; f\_Spirochaetaceae; g\_Spirochaetalea; f\_Spirochaetaceae; g\_Spirochaetaceae; g\_Spirochaeta
     \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Enterobacterales; f\_Aeromonadaceae; g\_Oceanisphaera; \_Proteobacteria; o\_Enterobacteria; o\_E
d_Bacteria;p_Chloroflexi;c_Anaerolineae;o_Anaerolineales;f_Anaerolineaceae;g_Pelolinea;
   \  \  \, d\_Bacteria; p\_Spirochaetota; c\_Spirochaetia; o\_Spirochaetales; f\_Spirochaetaceae; \\ \  \  \, d\_Bacteria; p\_Spirochaetota; c\_Spirochaetia; o\_Spirochaetales; f\_Spirochaetaceae; \\ \  \  \, d\_Spirochaetales; f\_Spirochaetaceae; \\ \  \  \, d\_Spirochaetaceae; \\ \  \  \, d\_S
\label{lem:d_Bacteria} $$ d\_Bacteria; p\_SAR324\_clade(Marine\_group\_B); c\_SAR324\_clade(Marine\_group\_B); p\_SAR324\_clade(Marine\_group\_B); p\_SAR324\_clade(Marine\_
{\tt d\_Bacteria}; {\tt p\_Proteobacteria}; {\tt c\_Gammaproteobacteria}; {\tt o\_Burkholderiales}; {\tt f\_Chitinimonadaceae}; {\tt g\_Chitinivorax}; {\tt s\_metagenome}
  \label{lem:d_Bacteria}  d\_Bacteria; \\ p\_Cyanobacteria; \\ c\_Cyanobacteriia; \\ o\_Synechococcales; \\ f\_Cyanobiaceae; \\ \\ \\ D
{\tt d\_Bacteria;p\_Desulfobacterota;c\_Desulfobacteria;o\_Desulfobacterales;f\_Desulfobacteraceae;\_;}
  d_Bacteria;p_Myxococcota;c_Polyangia;o_MidBa8;f_MidBa8;g_MidBa8
  {\tt d\_Bacteria;} {\tt p\_Bacteroidota;} {\tt c\_Bacteroidia;} {\tt o\_Bacteroidales;} {\tt f\_Rikenellaceae;} {\tt g\_Rikenellaceae\_RC9\_gut\_group;} {\tt d\_Bacteroidota;} {\tt c\_Bacteroidia;} {\tt o\_Bacteroidales;} {\tt f\_Rikenellaceae;} {\tt g\_Rikenellaceae\_RC9\_gut\_group;} {\tt d\_Bacteroidota;} {\tt o\_Bacteroidia;} {\tt o\_Bact
d_Bacteria;p_Patescibacteria;c_Gracilibacteria;o_Candidatus_Peribacteria;f_Candidatus_Peribacteria;g_Candidatus_Peribacteria;s_metagenome
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Flavobacteriales;f_Weeksellaceae;g_Cloacibacterium;_
d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Muribaculaceae;__;_
  {\tt d\_Bacteria;p\_Bdellovibrionota;c\_Bdellovibrionia;o\_Bacteriovoracales;f\_Bacteriovoracaceae;g\_Bacteriovorax;\_Bacteriovoracaceae;g\_Bacteriovorax;\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriovoracaceae;g\_Bacteriov
  \label{eq:d_Bacillaceae} $$ d\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Bacillales; f\_Bacillaceae; g\_Bacillus; s\_Bacillus\_mannanilyticus and the second 
{\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Peptostreptococcales-Tissierellales;f\_Peptostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporacetigenium;\_Clostreptococcaceae;g\_Sporaceae;g\_Sporaceae;g\_Sporaceae;g\_Sporaceae;g\_Sporaceae;g\_Sporacea
 \begin{tabular}{ll} $d$\_Bacteria; $p$\_Acidobacteriota; $c$\_Blastocatellia; $o$\_11-24; $f$\_11-24; $g$\_11-24; $\_$
d_Bacteria;p_Patescibacteria;c_Gracilibacteria;o_Candidatus_Peregrinibacteria;f_Candidatus_Peregrinibacteria;g_Candidatus_Peregrinibacteria;
\label{eq:d_Bacteria}  \displays the description of the description 
  d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Kordiimonadales;f_uncultured;g_uncultured;
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d Bacteria;p Proteobacteria;c Gammaproteobacteria;o Gammaproteobacteria Incertae Sedis;f Unknown Family;g uncultured;
 d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Flavobacteriales;f_Flavobacteriaceae;g_Eudoraea;
   d_Bacteria;p_Patescibacteria;c_Dojkabacteria;o_Dojkabacteria;f_Dojkabacteria;g_Dojkabacteria;s_uncultured_bacterium
d_Bacteria;p_Firmicutes;c_Clostridia;o_Lachnospirales;f_Lachnospiraceae;g_Blautia;s_unidentified
     d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Rikenellaceae;g_Rikenellaceae_RC9_gut_group;s_Bacteroides_sp.
 d_Bacteria;p_Patescibacteria;c_ABY1;o_Candidatus_Komeilibacteria;f_Candidatus_Komeilibacteria;g_Candidatus_Komeilibacteria;
d_Bacteria;p_Firmicutes;c_Bacilli;o_Thermoactinomycetales;f_Thermoactinomycetaceae;g_Laceyella;_
 \  \  \, d\_Bacteria; p\_Acidobacteriota; c\_Acidobacteriae; o\_Acidobacteriales; \_
\label{thm:condition} $$ d_Bacteria; p_Firmicutes; c_Clostridia; o_Peptostreptococcales-Tissierellales; f_Peptostreptococcales-Tissierellales; g_Gottschalkia; f_Peptostreptococcales-Tissierellales; f_Peptostreptococcales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Tissierellales-Ti
 d_Bacteria;p_Patescibacteria;c_ABY1;o_Candidatus_Magasanikbacteria;f_Candidatus_Magasanikbacteria;g_Candidatus_Magasanikbacteria;
 d Bacteria;p Chloroflexi;c Anaerolineae;o Anaerolineales;f Anaerolineaceae;
 \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Planctomycetota$;$c$\_Phycisphaerae$;$o$\_Phycisphaerales$;$f$\_Phycisphaeraceae$;$g$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$\_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM1A02$;$_SM
d_Bacteria;p_Bacteroidota;c_Kapabacteria;o_Kapabacteriales;f_Kapabacteriales;g_Kapabacteriales
 d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Micavibrionales;f_uncultured;g_uncultured;
{\tt d\_Bacteria;p\_Proteobacteria;c\_Gammaproteobacteria;o\_Gammaproteobacteria\_Incertae\_Sedis;f\_Unknown\_Family;g\_Candidatus\_Berkiella;s\_uncultured\_organism
 d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Actinomycetales;f_Actinomycetaceae;g_Mobiluncus;_
 d_Bacteria;p_Firmicutes;c_Clostridia;o_Lachnospirales;f_Lachnospiraceae;g_A2;s_uncultured_bacterium
\label{eq:d_Bacteria} $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Cytophagales; f\_Spirosomaceae; g\_Pseudarcicella; \_Cytophagales; f\_Spirosomaceae; g\_Spirosomaceae; g\_Pseudarcicella; \_Cytophagales; f\_Spirosomaceae; g\_Spirosomaceae; g
 {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Peptostreptococcales-Tissierellales;f\_Peptostreptococcaea;g\_Peptostreptococcus;g\_Peptostreptococcaea;g\_Peptostreptococcus;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcaea;g\_Peptostreptococcae;g\_Peptostreptococcae;g\_Peptostreptococcae;g\_Peptostrept
 d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Prolixibacteraceae;_;
\label{eq:d_bacteria} \\ d\_Bacteria; p\_Patescibacteria; c\_ABY1; o\_Candidatus\_Falkowbacteria; f\_Candidatus\_Falkowbacteria; g\_Candidatus\_Falkowbacteria; f\_Candidatus\_Falkowbacteria; f\_Candida
 d_Bacteria;p_Firmicutes;c_Bacilli;o_Erysipelotrichales;f_Erysipelotrichaceae;g_Ileibacterium;s_Ileibacterium_valens
\label{eq:d_Bacteria} $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Cytophagales; f\_Cyclobacteriaceae; g\_uncultured; $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Cytophagales; f\_Cyclobacteriaceae; g\_uncultured; $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Cytophagales; f\_Cyclobacteriaceae; g\_uncultured; $$ d\_Bacteroidia; o\_Cytophagales; f\_Cyclobacteriaceae; g\_uncultured; f\_Bacteroidia; o\_Cytophagales; f\_Cyclobacteriaceae; g\_Uncultured; f\_Cyclobacteriaceae; f\_Cyclobacteriaceae; g\_Uncultured; f\_Cycloba
 \label{eq:d_AT-s3-28}  d\_Bacteria; p\_Acidobacteriota; c\_AT-s3-28; o\_AT-s3-28; f\_AT-s3-28; g\_AT-s3-28; g\_AT-s3-28
   d_Bacteria;p_Desulfobacterota;c_Desulfovibrionia;o_Desulfovibrionales;f_Desulfovibrionaceae;g_Desulfovibrio;
{\tt d\_Bacteria;p\_Firmicutes;c\_Bacilli;o\_Thermoactinomycetales;f\_Thermoactinomycetaceae;g\_Novibacillus;\_Institute of the control of the contr
   d_Bacteria;p_Firmicutes;c_Bacilli;o_Exiguobacterales;f_Exiguobacteraceae;g_Exiguobacterium;
 d Bacteria;p Actinobacteriota;c Actinobacteria;o Frankiales;f Geodermatophilaceae;
\label{lem:d_Bacteria}  \display= 
 \label{lem:d_bacteria}  \mbox{$d$\_Bacteria$;$p$\_Verrucomicrobiota$;$c$\_Verrucomicrobiae$;$o$\_Opitutales$;$f$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$\_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_Opitutaceae$;$_
d_Bacteria;p_Cyanobacteria;c_Cyanobacteriia;o_Cyanobacteriales;f_Phormidiaceae;g_Trichodesmium_IMS101;_
d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Frankiales;f_Sporichthyaceae;_
  \\ d\_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Enterobacterales; f\_Aeromonadaceae; \\ \\ d\_Bacteria; p\_Bacteria; p\_Bact
d Bacteria;p Campylobacterota;c Campylobacteria;o Campylobacterales;f Sulfurimonadaceae;g Sulfurimonas;
 d_Bacteria;p_Actinobacteriota;c_WCHB1-81;o_WCHB1-81;f_WCHB1-81;g_WCHB1-81;
 {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Peptococcales;f\_Peptococcaceae;g\_uncultured}
 \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Lachnospirales; f\_Lachnospiraceae; g\_Anaerostipes and the context of the c
 \label{eq:d_bacteria} \\ \mbox{$d$\_Bacteria$;$p$\_Chloroflexi$;$c$\_Anaerolineae$;$o$\_SBR1031$;$f$\_A4b$;$g$\_A4b$;$s$\_uncultured\_organism and the control of t
 \\ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Micrococcales; f\_Micrococcaceae; g\_Garicola; \\ d\_Bacteria; p\_Actinobacteriota; c\_Actinobacteria; o\_Micrococcales; f\_Micrococcaceae; g\_Actinobacteriota; c\_Actinobacteria; o\_Micrococcaceae; g\_Actinobacteriota; o\_Actinobacteriota; o\_Act
 d Bacteria;p Bacteroidota;c Bacteroidia;o Bacteroidales;f Marinifilaceae;q Odoribacter;s uncultured bacterium
 \label{eq:d_Bacteria} $$ d\_Bacteria; p\_Sva0485; c\_Sva0485; o\_Sva0485; f\_Sva0485; g\_Sva0485; a_Sva0485; a_Sva
\label{eq:d_Bacteria} \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Bacillales; f\_Bacillaceae; g\_uncultured; s\_uncultured\_bacterium \\ \end{tabular}
d_Bacteria;p_Firmicutes;c_Bacilli;o_Lactobacillales;f_Carnobacteriaceae;_
 \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Spirochaetota; c\_Spirochaetia; o\_Spirochaetales; f\_Spirochaetaceae; g\_Salinispira; \_Spirochaetaceae; g\_Salinispira; g\_Sa
d_Bacteria;p_Firmicutes;c_Clostridia;o_Oscillospirales;f_Oscillospiraceae;g_Flavonifractor;
d Bacteria;p Patescibacteria;c Gracilibacteria;o Gracilibacteria; Gracilibacteria;g Gracilibacteria;s
d Bacteria;p Abditibacteriota;c Abditibacteria;o Abditibacteriales;f Abditibacteriaceae;g
                      _Archaea;p__Crenarchaeota;c__Nitrososphaeria;o__Nitrosotaleales;f__Nitrosotaleaceae;g__Candidatus_Nitrosotalea;
   d_Bacteria;p_Firmicutes;c_Clostridia;o_Oscillospirales;f_Hungateiclostridiaceae;g_Ruminiclostridium;
d_Bacteria;p_Chloroflexi;c_Ktedonobacteria;o_Ktedonobacterales;f_JG30-KF-AS9;g_JG30-KF-AS9;s_uncultured_bacterium
   d_Bacteria;p_Gemmatimonadota;c_BD2-11_terrestrial_group;o_BD2-11_terrestrial_group;f_BD2-11_terrestrial_group;g_BD2-11_terrestrial_group;
 {\tt d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhizobiales;f\_Rhizobiaceae;g\_Allorhizobium-Peorhizobium-Pararhizobium-Rhizobium;\_Rhizobium;\_Rhizobiaceae;g\_Allorhizobium-Rhizobium-Rhizobium-Rhizobium,\_Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobium-Rhizobi
\label{eq:d_Bacteria}  \mbox{$d$\_Bacteria;p$\_Firmicutes;c$\_Bacilli;o$\_Staphylococcales;f$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcaceae;g$\_Macrococcus;$\_Staphylococcus;$\_Staphylococcaceae;g$\_Staphylococcus;$\_Staphyloc
d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Rhizobiales;f_A0839;g_A0839;_
d Bacteria;p Bacteroidota;c Bacteroidia;o Bacteroidales;f Marinifilaceae;g Odoribacter;
 {\tt d\_Bacteria;p\_Verrucomicrobiota;c\_Lentisphaeria;o\_Oligosphaerales;f\_Oligosphaeraceae;g\_SBZC-1223;s\_uncultured\_bacterium}
d Archaea;p Nanoarchaeota;c__Nanoarchaeia;o__Woesearchaeales;
 d Bacteria;p Desulfobacterota;c Desulfuromonadia;o Desulfuromonadales;f Geopsychrobacteraceae
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Pseudomonadales;f_Marinomonadaceae;g_Marinomonas;
d_Bacteria;p__Firmicutes;c__Clostridia;o__Peptostreptococcales-Tissierellales;f__Peptostreptococcales-Tissierellales;__;
   d_Bacteria;p_Latescibacterota;c_Latescibacterota;o_Latescibacterota;f_Latescibacterota;g_Latescibacterota;s_uncultured_bacterium
 {\tt d\_Bacteria;p\_Patescibacteria;c\_Parcubacteria;o\_Candidatus\_Campbellbacteria;f\_Candidatus\_Campbellbacteria;g\_Candidatus\_Campbellbacteria;s\_uncultured\_bacterium
 d_Bacteria;p_Patescibacteria;c_ABY1;__;__;_
 {\tt d\_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Propionibacteriales;f\_Propionibacteriaceae;g\_uncultured;\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f\_Propionibacteriales;f
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d__Bacteria;p__Chiorotlexi;c__Anaerolineae;o__SBR1031;t__A4b;g__A4b;__
              d_Bacteria;p_Chloroflexi;c_JG30-KF-CM66;o_JG30-KF-CM66;f_JG30-KF-CM66;g_JG30-KF-CM66;_
              \label{lem:d_Bacteria} \\ \mbox{$d$\_Bacteria;$p$\_Cyanobacteria;$c$\_Cyanobacteriales;$f$\_Chroococcidiopsaceae;} \\ \mbox{$d$\_Bacteria;$p$\_Cyanobacteriales;$f$\_Chroococcidiopsaceae;} \\ \mbox{$d$\_Bacteria;$p$\_Cyanobacteriales;$p$\_Cyanobacteriales;} \\ \mbox{$d$\_Bacteria;$p$\_Cyanobacteriales;$p$\_Cyanobacteriales;} \\ \mbox{$d$\_Bacteria;$p$\_Cyanobacteriales;$p$\_Cyanobacteriales;} \\ \mbox{$d$\_Bacteria;$p$\_Cyanobacteriales;} \\ \mbox{$d$\_Bacteria;$p$\_Cyanobacteriales;} \\ \mbox{$d$\_Bacteria;$p$\_Cyanobacteriales;} \\ \mbox{$d$\_Bacteriales;} \\ \mbox{$d$\_Bacteriales;
d Bacteria;p Proteobacteria;c Gammaproteobacteria;o Burkholderiales;f Chitinibacteraceae;g Iodobacter;
              d__Bacteria;p__Synergistota;c__Synergistia;o__Synergistales;f__Synergistaceae
           d__Bacteria;p__Firmicutes;c__Clostridia;o__Clostridiales;
              \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Bacilli$;o$\_Erysipelotrichales$;$f$\_Erysipelotrichaceae$;$g$\_Erysipelothrix$;}
                         I__Bacteria;p__Firmicutes;c__Bacilli;o__Bacillales;f__Planococcaceae;g__Chryseomicrobium;__
           \label{lem:d_Bacteria}  \mbox{$d$\_Bacteroidota$;$c$\_Bacteroidia$;$o$\_Cytophagales$;$f$\_Hymenobacteraceae$;} 
              \label{lem:d_Bacteria} \\ \text{d} \underline{\hspace{0.5cm}} \text{Bacteria}; \\ p\underline{\hspace{0.5cm}} \text{Zixibacteria}; \\ c\underline{\hspace{0.5cm}} \text{Zixibacteria}; \\ o\underline{\hspace{0.5cm}} \text{Zixibacteria}; \\ \underline{\hspace{0.5cm}} \text{Zixibacteria}; \\ 
              d__Bacteria;p__Proteobacteria;c__Alphaproteobacteria;o__Rickettsiales;__;
           {\tt d\_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Corynebacteriales;f\_Corynebacteriaceae;g\_Corynebacterium;s\_Corynebacterium\_matruchotii}
              {\tt d\_Bacteroidota;c\_Bacteroidota;c\_Bacteroidia;o\_Flavobacteriales;f\_Flavobacteriaceae;g\_Robiginitalea;s\_uncultured\_bacterium and the state of the 
           {\tt d\_Bacteria;p\_Desulfobacterota;c\_Desulfobulbia;o\_Desulfobulbales;f\_Desulfobulbaceae;\_;\_Desulfobulbaceae;\_;\_Desulfobulbaceae;\_;\_Desulfobulbaceae;\_;\_Desulfobulbaceae;\_;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Desulfobulbaceae;\_Des
           d_Archaea;p_Nanoarchaeota;c_Nanoarchaeia;o_Woesearchaeales;f_GW2011_GWC1_47_15;g_GW2011_GWC1_47_15;s_uncultured_archaeon
              d Bacteria;p__Latescibacterota;__;
           d_Bacteria;p_Patescibacteria;c_Parcubacteria;o_Candidatus_Yanofskybacteria;f_Candidatus_Yanofskybacteria;g_Candidatus_Yanofskybacteria;
                \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Clostridia$;$o$\_Oscillospirales$;$f$\_Ruminococcaceae$;$g$\_Anaerotruncus$;$
              d_Bacteria;p_Actinobacteriota;c_Coriobacteriia;o_Coriobacteriales;f_Eggerthellaceae;g_Eggerthella;
              {\tt d\_Bacteria}; {\tt p\_Acidobacteriota}; {\tt c\_Acidobacteriae}; {\tt o\_Solibacteralee}; {\tt f\_Solibacteraceae}; {\tt g\_Candidatus\_Solibacter}; {\tt o\_Solibacteralee}; {\tt f\_Solibacteraceae}; {
              \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Pseudomonadales; f\_Halomonadaceae; g\_Kushneria; \_Pseudomonadales; f\_Halomonadaceae; g\_Halomonadaceae; g\_Halomonaceae; g\_Halomonaceaea; g\_Halomonaceae; g\_Halomonaceae; g\_Ha
           d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Xanthomonadales;f_Xanthomonadaceae;g_Stenotrophomonas;
              \label{lem:d_Bacteria} $$ d\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Muribaculaceae; g\_Muribaculum; \_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Muribaculaceae; g\_Muribaculum; \_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Muribaculaceae; g\_Muribaculum; \_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Muribaculaceae; g\_Muribaculum; \_Bacteroidia; o\_Bacteroidales; f\_Muribaculaceae; g\_Muribaculum; \_Bacteroidia; o\_Bacteroidia; o\_Bacteroidales; f\_Muribaculaceae; g\_Muribaculum; \_Bacteroidia; o\_Bacteroidia; o\_Bacteroi
              \label{lem:d_Bacteria}  \  \, d\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Izemoplas matales; f\_Izemoplas mataceae; g\_Izimaplas ma; \_Izemoplas mataceae; g\_Izemoplas mataceae; g\_Izemo
           d_Bacteria;p_Zixibacteria;c_Zixibacteria;o_Zixibacteria;f_Zixibacteria;g_Zixibacteria;
              \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Clostridia$;$o$\_Oscillospirales$;$f$\_Ruminococcaceae$;$g$\_Harryflintia$;$\_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Clostridia$;$D$_Cl
              d_Bacteria;p_Myxococcota;c_Myxococcia;o_Myxococcales;f_Myxococcaceae;g_P3OB-42;_
           d_Bacteria;p_Cyanobacteria;c_Cyanobacteriia;o_Leptolyngbyales;f_Leptolyngbyaceae
              d_Bacteria;p_Chloroflexi;c_Anaerolineae;o_ADurb.Bin180;f_ADurb.Bin180;g_ADurb.Bin180;s_uncultured_organism
           d_Bacteria;p_Nitrospirota;c_Nitrospiria;o_Nitrospirales;f_Nitrospiraceae;g_Nitrospira;
                         I_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Actinomycetales;f_Actinomycetaceae;g_F0332;
           d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_WN-HWB-116;f_WN-HWB-116;g_WN-HWB-116;
              d_Bacteria;p_Gemmatimonadota;c_PAUC43f_marine_benthic_group;o_PAUC43f_marine_benthic_group;f_PAUC43f_marine_benthic_group;g_PAUC43f_marine_benthic_group;
              {\tt d\_Bacteria;p\_Bacteroidota;c\_Bacteroidia;o\_Bacteroidales;f\_Muribaculaceae;g\_Muribaculaceae;s\_uncultured\_bacterium}
           \label{eq:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Oscillospirales; f\_Ruminococcaceae; g\_uncultured; \_Clostridia; f\_Ruminococcaceae; g\_Uncultured; g\_Uncultured; g\_Uncultured; g\_Uncultured; g\_Uncultured; g\_Uncultured; g\_Uncultured;
              \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Clostridia$;$o$\_Christensenellales$;$f$\_Christensenellaceae$;$g$\_uncultured$;$c$\_Christensenellales$;$f$\_Christensenellaceae$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured$;$g$\_uncultured
           \label{eq:d_bacteria} \\ \texttt{d} \underline{\hspace{0.5cm}} \mathsf{Bacteria}; \\ \texttt{p} \underline{\hspace{0.5cm}} \mathsf{Myxococcota}; \\ \texttt{c} \underline{\hspace{0.5cm}} \mathsf{Polyangia}; \\ \texttt{o} \underline{\hspace{0.5cm}} \mathsf{Polyangiales}; \\ \texttt{f} \underline{\hspace{0.5cm}} \mathsf{Sandaracinaceae}; \\ \texttt{g} \underline{\hspace{0.5cm}} \mathsf{uncultured}; \underline{\hspace{0.5cm}} \mathsf{uncultured}; \underline{\hspace{0.5cm}} \mathsf{polyangia}; \\ \texttt{o} \underline{\hspace{
              d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Rhizobiales;f_Beijerinckiaceae;g_Roseiarcus;_
              d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Actinomycetales;f_Actinomycetaceae;g_Actinomyces;s_Actinomyces_massiliensis
           d__Bacteria;p__Verrucomicrobiota;c__Chlamydiae;o__Chlamydiales;
              \label{lem:d_bacteria} \mbox{$d$\_Bacteria$;$p$\_Acidobacteriota$;$c$\_Aminicenantia$;$o$\_Aminicenantales$;$f$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Aminicenantales$;$g$\_Amin
              {\tt d\_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Streptosporangiales;f\_Streptosporangiales\_Incertae\_Sedis;g\_Motilibacter;s\_uncultured\_bacterium and {\tt description} and {\tt descriptio
           d_Bacteria;p_Firmicutes;c_Clostridia;o_Peptococcales;f_Peptococcaceae;g_uncultured;s_uncultured_bacterium
              d Bacteria;p Actinobacteriota;c Actinobacteria;o Actinomycetales;f Actinomycetaceae;g Actinomyces;s Actinomyces graevenitzii
           \label{lacea} \begin{tabular}{lll} $d$\_Bacteroidota; &c&Bacteroidota; &c
           \label{lem:d_bacteria}  \mbox{$d$\_Bacteria$;p$\_Bacteroidota$;c$\_Ignavibacteria$;e$\_Ignavibacteriales$;f$\_PHOS-HE36$;g$\_PHOS-HE36$;s$\_uncultured$\_bacterium$. The substitution of the sub
              \label{eq:d_bacteria} \\ \texttt{d}\_\texttt{Bacteria}; \texttt{p}\_\texttt{TA06}; \texttt{c}\_\texttt{TA06}; \texttt{o}\_\texttt{TA06}; \texttt{g}\_\texttt{TA06}; \texttt{g}\_\texttt{TA06}; \texttt{s}\_\texttt{uncultured}\_\texttt{bacterium} \\
            \begin{tabular}{ll} $d$\_Bacteria; p\_Patescibacteria; c\_Dojkabacteria; o\_Dojkabacteria; f\_Dojkabacteria; g\_Dojkabacteria; d\_Dojkabacteria; d
              {\tt d\_Bacteria;p\_Verrucomicrobiota;c\_Verrucomicrobiae;} \\
              \label{eq:d_Bacteria} $$ d\_Bacteria; p\_Planctomycetota; c\_Phycisphaerae; o\_Phycisphaerales; f\_AKAU3564\_sediment\_group; g\_AKAU3564\_sediment\_group; g\_AKAU35
           d Bacteria;p Firmicutes;c Negativicutes;o Acidaminococcales;f Acidaminococcaceae;g Acidaminococcus;
              \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_Salinis phaerales; f\_Solimonada ceasing a superior of the proteobacteria; but the proteobacteria o\_Salinis phaerales; f\_Solimonada ceasing a superior of the proteobacteria; but the prote
              {\tt d\_Bacteria;p\_Proteobacteria;c\_Gamma proteobacteria;o\_Enterobacterales;f\_Pasteurellaceae;g\_Haemophilus}
               \underline{\text{d\_Bacteria}}; \underline{\text{p\_Bdellovibrionota}}; \underline{\text{C\_Bdellovibrionia}}; \underline{\text{o\_Bdellovibrionales}}; \underline{\text{f\_Bdellovibrionaceae}}; \underline{\text{g\_Bdellovibrio}}; \underline{\text{Bdellovibrio}}; \underline{\text{s\_uncultured\_bacterium}}; \underline{\text{bacteria}}; \underline{\text{bac
                     d__Bacteria;p__Bacteroidota;c__Ignavibacteria;o__SJA-28;f__SJA-28;g__SJA-28;s__uncultured_bacterium
           {\tt d\_Bacteria}; {\tt p\_Proteobacteria}; {\tt c\_Gammaproteobacteria}; {\tt o\_Enterobacterales}; {\tt f\_Shewanellaceae}; {\tt g\_Shewanella}; {\tt s\_Shewanella}_{\tt glacialipiscicolalacteria}; {\tt o\_Enterobacterales}; {\tt f\_Shewanellaceae}; {\tt f\_Shewanellace
              d_Bacteria;p_Patescibacteria;c_Parcubacteria;o_Candidatus_Moranbacteria;f_Candidatus_Moranbacteria;g_Candidatus_Moranbacteria;s_uncultured_bacterium
              {\tt d\_Bacteria;p\_Firmicutes;c\_Bacilli;o\_Lactobacillales;f\_Lactobacillaceae;g\_Leuconostoc;s\_Leuconostoc\_carnosum}
           \label{local_d_bacteria} $$ d_Bacteria; p_Patescibacteria; c_Gracilibacteria; o_Absconditabacteriales_(SR1); f_Absconditabacteriales_(SR1); g_Absconditabacteriales_(SR1); f_Absconditabacteriales_(SR1); f_Absconditab
              \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Rhodospirillales; f\_uncultured; g\_uncultured; g\_uncultured;
           {\tt d\_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Frankiales;f\_Acidothermaceae;g\_Acidothermus;\_Bacteria;p\_Actinobacteriota;c\_Actinobacteria;o\_Frankiales;f\_Acidothermaceae;g\_Acidothermus;\_Bacteria;p\_Acidothermus;Bacteria;p\_Acidothermus;Bacteria;p\_Acidothermus;Bacteria;p\_Acidothermus;Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p\_Bacteria;p
              d Bacteria;p Firmicutes;c Clostridia;o Lachnospirales;
              d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Flavobacteriales;f_Crocinitomicaceae;
           d_Bacteria;p_Bdellovibrionota;c_Bdellovibrionia;o_Bacteriovoracales;f_Bacteriovoracaceae
                                       _Bacteria;p__Chloroflexi;c__P2-11E;o__P2-11E;f__P2-11E;g__P2-11E;s__uncultured_bacterium
                d_Bacteria;p_Firmicutes;c_Clostridia;o_Lachnospirales;f_Lachnospiraceae;g_A2;_
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d__Bacteria;p__Bacteroidota;c__Ignavibacteria;o__Ignavibacteriales;__;__;
\label{lem:d_Bacteria} \\ \mbox{d\_Bacteria;p\_Campylobacterota;c\_Campylobacteria;o\_Campylobacterales;f\_Sulfurimonadaceae;g\_Sulfuricurvum;\_Sulfurimonadaceae;g\_Sulfuricurvum;\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonadaceae;g\_Sulfurimonada
d_Bacteria;p_Planctomycetota;c_OM190;o_OM190;f_OM190;g_OM190;_
  {\tt d\_Bacteria;p\_Chloroflexi;c\_Dehalococcoidia;o\_MSBL5;f\_MSBL5;g\_MSBL5;}
 \begin{tabular}{ll} $d$\_Bacteria; p$\_Actinobacteriota; c$\_Acidimicrobiia; o$\_Microtrichales; f$\_lamiaceae; g$\_lamia; \_lamia; -lamiaceae; g$\_lamia; -lamiaceae; g$\_lamiaceae; g$\_lamiaceae
  d_Bacteria;p_Firmicutes;c_Negativicutes;o_Acidaminococcales;f_Acidaminococcaceae;g_Succiniclasticum;
d Bacteria;p Proteobacteria;c Gammaproteobacteria;o Pseudomonadales;f Halomonadaceae;g Marinospirillum;
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Diplorickettsiales;f_Diplorickettsiaceae;g_uncultured
    d__Bacteria;p__Proteobacteria;c__Alphaproteobacteria;o__Rhizobiales;f__Kaistiaceae;g__Kaistia;
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Pseudomonadales;f_Cellvibrionaceae;g_Cellvibrio;
    \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Bacteroidota; c\_Chlorobia; o\_Chlorobiales; f\_Chlorobiaceae; g\_Prosthecochloris; \_Chlorobiaceae; g\_Prosthecochloris; g\_Prosthecoc
    d_Bacteria;p_Patescibacteria;c_WWE3;o_WWE3;f_WWE3;g_WWE3;_
d_Bacteria;p_Patescibacteria;c_Saccharimonadia;o_Saccharimonadales;f_Saccharimonadaceae;g_Candidatus_Saccharimonas;
  \label{eq:d_bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Bacilli$;$o$\_Lactobacillales$;$f$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissella$;$\_Lactobacillaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae$;$g$\_Weissellaceae
   \begin{tabular}{ll} $d$\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Chitinophagales; f\_37-13; g\_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-13; \_37-1
d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Sphingobacteriales;f_LiUU-11-161;g_LiUU-11-161;_
  \label{eq:d_Bacteroidota} $$ d\_Bacteroidota; c\_Bacteroideta; VC2.1\_Bac22; f\_Bacteroidetes\_VC2.1\_Bac22; g\_Bacteroidetes\_VC2.1\_Bac22; g\_Bacteroidetes\_VC2.1\_Bacteroidetes\_VC2.1\_Bacteroidetes\_VC2.1\_Bacteroidetes\_VC2.1\_Bacteroidetes\_VC2.1\_Bacteroidete
d Bacteria;p Chloroflexi;c Anaerolineae;
  d Archaea;p Nanoarchaeota;c Nanoarchaeia;o Woesearchaeales;f SCGC AAA011-D5;g SCGC AAA011-D5;
  d Bacteria;p Firmicutes;c Clostridia;o Oscillospirales;f Ruminococcaceae;g CAG-352;s uncultured bacterium
  {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Oscillospirales;f\_Ethanoligenenaceae;g\_Ethanoligenens;s\_uncultured\_bacterium}
    d_Bacteria;p_Cyanobacteria;c_Cyanobacteriia;o_Cyanobacteriales;f_Oscillatoriaceae;g_uncultured;s_uncultured_cyanobacterium
    d_Bacteria;p_Deferrisomatota;c_Defferrisomatia;o_Defferrisomatales;f_Defferrisomataceae;g_Deferrisoma;s_uncultured_bacterium
  d__Bacteria;p__Thermotogota;c__Thermotogae;o__Kosmotogales;f__Kosmotogaceae;__;_
  d_Bacteria;p_Patescibacteria;c_Gracilibacteria;o_Candidatus_Abawacabacteria;f_Candidatus_Abawacabacteria;g_Candidatus_Abawacabacteria;
d_Bacteria;p_Actinobacteriota;c_RBG-16-55-12;o_RBG-16-55-12;f_RBG-16-55-12;g_RBG-16-55-12;
  \label{lagrangian} $$ d\_Bacteria; p\_Acidobacteriota; c\_Blastocatellia; o\_Blastocatellales; f\_Blastocatellaceae; g\_Blastocatella; and the substitution of the substit
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Cyanobacteria; c\_Vampirivibrionia; o\_Caenarcaniphilales; f\_Caenarcaniphilales; g\_Caenarcaniphilales; d\_Caenarcaniphilales; d\_Caenarcan
  \label{lem:d_bacteria}  \mbox{$d$\_Bacteria$;$p$\_Chloroflexi$;$c$\_Anaerolineae$;$o$\_Anaerolineales$;$f$\_Anaerolineaceae$;$g$\_UTCFX1$;$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_Anaerolineae$;$o$\_An
   \begin{tabular}{ll} $d$\_Bacteria; p\_Spirochaetota; c\_Spirochaeta; o\_Spirochaetales; f\_Spirochaetaceae; g\_Spirochaeta; spirochaetaleta; p_Spirochaetaleta; p_Spiroc
  d Bacteria;p Firmicutes;c Desulfitobacteria;o Desulfitobacteriales;f Heliobacteriaceae
_Bacteria;p__Proteobacteria;c__Alphaproteobacteria;o__Reyranellales;f__Reyranellaceae;g_
  {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Oscillospirales;f\_Hungateiclostridiaceae;g\_uncultured;s\_uncultured\_organismatical and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} and {\tt definition} are also as a support of {\tt definition} are also as a s
  {\tt d\_Bacteria;p\_Firmicutes;c\_Clostridia;o\_Peptostreptococcales-Tissierellales;f\_Anaerovoracaceae;g\_[Eubacterium]\_nodatum\_group;\_leading to the control of 
     \begin{tabular}{ll} $d$\_Bacteria; p$\_Actinobacteriota; c$\_Actinobacteria; o$\_Nitriliruptorales; f$\_Nitriliruptoraceae; \_Actinobacteriota; c$\_Actinobacteria; o$\_Nitriliruptorales; f$\_Nitriliruptoraceae; \_Actinobacteria; o$\_Nitriliruptoraceae; D$\_Nitriliruptoraceae; D$\_Nitriliruptorace
\label{lem:d_Bacteria} $$ d\_Bacteria; p\_Acidobacteriota; c\_Subgroup\_22; o\_Subgroup\_22; f\_Subgroup\_22; g\_Subgroup\_22; s\_uncultured\_organism $$ d\_Bacteria; p\_Acidobacteriota; c\_Subgroup\_22; f\_Subgroup\_22; f\_Subgro
  \label{eq:d_Bacteria} $$ d\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_Tannerellaceae; \_; \_
  \label{local-problem} \\ \textbf{d} \underline{\mbox{\tt Bacteroidota;c\_Bacteroidia;o\_Bacteroidales;f\_Prevotellaceae;g\_Prevotella;s\_Prevotella\_nanceiensis} \\
d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Bacteroidales;f_Dysgonomonadaceae;
  {\tt d\_Bacteria;} {\tt p\_Firmicutes;} {\tt c\_Bacilli;} {\tt o\_Thermoactinomycetales;} {\tt f\_Thermoactinomycetaceae;} {\tt g\_Planifilum;} {\tt interpolation} {\tt o\_Thermoactinomycetales;} {\tt f\_Thermoactinomycetaceae;} {\tt g\_Planifilum;} {\tt o\_Thermoactinomycetales;} {\tt o\_Thermoactinomycetale
  d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Micavibrionales;f_Micavibrionaceae;
  d_Bacteria;p_Planctomycetota;c_Phycisphaerae;o_mle1-8;f_mle1-8;g_mle1-8;s_uncultured_bacterium
                      _Archaea;p__Thermoplasmatota;c__Thermoplasmata;
  \label{lem:d_Bacteria}  d\_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Burkholderiales; f\_Aquaspirillaceae; g\_Rivicola; \_Proteobacteria; o\_Burkholderiales; f\_Aquaspirillaceae; g\_Rivicola; g\_Ri
      d__Bacteria;p__Firmicutes;c__Clostridia;o__Oscillospirales;f__Hungateiclostridiaceae;g__Thermoclostridium;__
  d_Bacteria;p_Myxococcota;c_Polyangia;o_Polyangiales;f_Polyangiaceae;g_Pajaroellobacter;_
d_Bacteria;p_Fusobacteriota;c_Fusobacteriia;o_Fusobacteriales;f_Fusobacteriaceae;g_Fusobacterium;
  {\tt d\_Bacteria;p\_Bacteroidota;c\_Bacteroidia;o\_Flavobacteriales;f\_Weeksellaceae;g\_Cruoricaptor;s\_Cruoricaptor\_ignavus}
d__Bacteria;p__NB1-j;c__NB1-j;o__NB1-j;f__NB1-j;g__NB1-j;_
  d_Bacteria;p_Caldatribacteriota;c_JS1;o_JS1;f_JS1;g_JS1;s_uncultured_organism
  \label{lem:d_bacteria} \\ \mbox{d\_Bacteroidota;} \mbox{c\_Bacteroidia;} \mbox{o\_Cytophagales;} \mbox{f\_Cyclobacteriaceae;} \mbox{g\_Fulvivirga;} \mbox{d\_Bacteroidota;} \mbox{c\_Bacteroidia;} \mbox{o\_Cytophagales;} \mbox{f\_Cyclobacteriaceae;} \mbox{g\_Fulvivirga;} \mbox{d\_Bacteroidota;} \mbox{o\_Cytophagales;} \mbox{f\_Cyclobacteriaceae;} \mbox{g\_Fulvivirga;} \mbox{d\_Bacteroidota;} \mbox{o\_Cytophagales;} \mbox{f\_Cyclobacteriaceae;} \mbox{g\_Cytophagales;} \mbox{f\_Cyclobacteriaceae;} \mbox{g\_Cytophagales;} \mbox{d\_Cytophagales;} \
d_Bacteria;p_Actinobacteriota;c_Actinobacteria;o_Micrococcales;f_Micrococcaceae;g_Micrococcus;
    d_Bacteria;p_Chloroflexi;c_Chloroflexia;o_Thermomicrobiales;f_JG30-KF-CM45;g_JG30-KF-CM45;s_uncultured_Thermomicrobium
  \label{lem:d_bacteria}  \mbox{$d$\_Bacteria$;$p$\_Verrucomicrobiota$;$c$\_Verrucomicrobiae$;$o$\_Opitutales$;$f$\_Puniceicoccaceae
d_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Burkholderiales;f_SC-I-84;g_SC-I-84;
    \underline{\text{d\_Bacteria;} p\_\text{Proteobacteria;} c\_\text{Gammaproteobacteria;} o\_\text{Diplorickettsiales;} f\_\text{Diplorickettsiaceae} and \underline{\text{darkeria;} p\_\text{Proteobacteria;} c\_\text{Cammaproteobacteria;} o\_\text{Diplorickettsiales;} f\_\text{Diplorickettsiaceae} and \underline{\text{darkeria;} p\_\text{Proteobacteria;} o\_\text{Diplorickettsiales;} f\_\text{Diplorickettsiaceae} and \underline{\text{darkeria;} p\_\text{Diplorickettsiales;} f\_\text{Diplorickettsiaceae} and \underline{\text{darkeria;} p\_\text{Diplorickettsiales;} f\_\text{Diplorickettsiaceae} and \underline{\text{darkeria;} p\_\text{Diplorickettsiaceae}} and \underline{\text{dar
  d_Bacteria;p_Actinobacteriota;c_Coriobacteriia;o_Coriobacteriales;f_Atopobiaceae;g_Libanicoccus;_
   \\ d\_Bacteria; p\_Bdellovibrionota; c\_Oligoflexia; o\_0319-6G20; f\_0319-6G20; g\_0319-6G20; s\_uncultured\_gamma \\ d\_Bacteria; p\_Bdellovibrionota; c\_Oligoflexia; o\_0319-6G20; f\_0319-6G20; g\_0319-6G20; s\_uncultured\_gamma \\ d\_Bacteria; p\_Bdellovibrionota; c\_Oligoflexia; o\_0319-6G20; f\_0319-6G20; s\_uncultured\_gamma \\ d\_Bacteria; b\_Bdellovibrionota; c\_Oligoflexia; o\_0319-6G20; f\_0319-6G20; s\_uncultured\_gamma \\ d\_Bacteria; b\_Bdellovibrionota; c\_Oligoflexia; o\_0319-6G20; f\_0319-6G20; s\_uncultured\_gamma \\ d\_Bacteria; b\_Bdellovibrionota; c\_Dlata; b\_Bdellovibrionota; b\_Bdello
    d_Bacteria;p_Fusobacteriota;c_Fusobacteriia;o_Fusobacteriales;f_Fusobacteriaceae;g_Cetobacterium;
d_Bacteria;p_Patescibacteria;c_Saccharimonadia;o_Saccharimonadales;f_Saccharimonadaceae;g_TM7a;_
\label{eq:d_Bacteria}  \mbox{$d$\_Bacteroidota$;$c$\_Bacteroidia$;$o$\_Bacteroidales$;$f$\_Prolixibacteraceae$;$g$\_Sunxiuqinia$;$g$\_Prolixibacteraceae$;$g$\_Sunxiuqinia$;$g$\_Prolixibacteraceae$;$g$\_Sunxiuqinia$;$g$\_Prolixibacteraceae$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqinia$;$g$\_Sunxiuqi
\label{eq:d_bacteria}  \mbox{$d$\_Bacteria$;p$\_Calditrichota$;c$\_Calditrichia$;o$\_Calditrichales$;f$\_Calditrichaceae$;g$\_Calditrichaceae$;
  d_Bacteria;p_Planctomycetota;c_Phycisphaerae;o_DG-20;f_DG-20;g_DG-20;_
\label{lem:d_Bacteria} \begin{tabular}{ll} $d$\_Bacteria; p\_Fermentibacterota; c\_Fermentibacteria; o\_Fermentibacteria; f\_Fermentibacteraceae; g\_Fermentibacteraceae; s\_Candidatus\_Aegiribacteria; f\_Fermentibacteraceae; f\_Fermentibacteraceae; s\_Candidatus\_Aegiribacteria; f\_Fermentibacteraceae; f\_Fermentibacteraceae; s\_Candidatus\_Aegiribacteria; f\_Fermentibacteraceae; s\_Candidatus\_Aegiribacteraceae; s\_Candidatus\_Aegir
d Bacteria:b Firmicutes:c Bacilli:o Bacillales:f Marinococcaceae:a Marinococcus:
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 \begin{tabular}{ll} $d$\_Bacteria; p\_Bacteroidota; c\_Bacteroidia; o\_Bacteroidales; f\_F082; g\_F082; \\ \end{tabular} 
d_Bacteria;p_Chloroflexi;c_Anaerolineae;o_SBR1031;f_SBR1031;g_SBR1031;_
     {\tt d\_Bacteria;p\_Spirochaetota;c\_Spirochaetia;o\_Spirochaetales;f\_Spirochaetaceae;g\_Treponema;s\_Treponema\_porcinum}
  \label{eq:d_bacteria} $$ d\_Bacteria; p\_Actinobacteriota; c\_Thermoleophilia; o\_Solirubrobacterales; f\_67-14; g\_67-14; s\_uncultured\_actinobacterium for the substitution of the substituti
{\tt d\_Bacteria;p\_Patescibacteria;c\_Microgenomatia;o\_Candidatus\_Woesebacteria;f\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacter
{\tt d\_Bacteria;p\_Patescibacteria;c\_Microgenomatia;o\_Candidatus\_Woesebacteria;f\_Candidatus\_Woesebacteria;g\_Candidatus\_Woesebacteria;s\_uncultured\_bacterium
d_Bacteria;p_Chloroflexi;c_Dehalococcoidia;o_GIF9;f_AB-539-J10;g_AB-539-J10;_
 \begin{tabular}{lll} $d$\_Bacteria; p\_Proteobacteria; c\_Gammaproteobacteria; o\_Burkholderiales; f\_Nitrosomonadaceae; g\_mle1-7; \_left for the context of th
   \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_PLTA13; f\_PLTA13; g\_PLTA13; \_PLTA13; g\_PLTA13; -PLTA13; g\_PLTA13; g\_PLTA13; -PLTA13; g\_PLTA13; 
d_Bacteria;p_Fusobacteriota;c_Fusobacteriia;o_Fusobacteriales;f_Fusobacteriaceae;
  d_Bacteria;p_Firmicutes;c_Clostridia;o_uncultured;f_uncultured;g_uncultured;s_uncultured_organism
  {\tt d\_Bacteria}; {\tt p\_Desulfovibrionia}; {\tt o\_Desulfovibrionales}; {\tt f\_Desulfovibrionalea}; {\tt g\_Desulfovibrionalea}; {\tt p\_Desulfovibrionalea}; {\tt
\label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Gamma proteobacteria$;$o$\_Enterobacterales$;$f$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonadaceae$;$g$\_Psychromonaceae$;$g$\_Psychromonaceae$;$g$\_Psychromonaceae$;$g$\_Ps
     d_Bacteria;p_Desulfobacterota;c_Desulfobacteria;o_Desulfatiglandales;f_Desulfatiglandaceae;g_Desulfatiglans;s_uncultured_bacterium
  \label{lem:d_Bacteria} \\ \mbox{d\_Bacteroidota;c\_Bacteroidia;o\_Chitinophagales;f\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphobaculum;\_Chitinophagaceae;g\_Edaphob
  d_Bacteria;p_Bacteroidota;c_Bacteroidia;o_Flavobacteriales;f_Flavobacteriaceae;g_NS3a_marine_group;_
  {\tt d\_Bacteria; p\_Proteobacteria; c\_Gamma proteobacteria; o\_Enterobacterales; f\_Morganellaceae; g\_Moellerella; \_Communication of the communication of the c
\label{eq:d_Bacteria} $$ d\_Bacteria; p\_Planctomycetota; c\_Planctomycetes; o\_Planctomycetales; f\_uncultured; g\_uncultured; \_uncultured; \_uncultured
 \begin{tabular}{ll} $d$\_Bacteria; p\_Firmicutes; c\_Bacilli; o\_Erysipelotrichales; f\_Erysipelatoclostridiaceae; g\_UCG-004; \_ICG-004; \_I
{\tt d\_Bacteria}; {\tt p\_Hydrogenedentes}; {\tt c\_Hydrogenedentia}; {\tt o\_Hydrogenedentiales}; {\tt f\_Hydrogenedensaceae}; {\tt g\_Hydrogenedensaceae}; {\tt d\_Hydrogenedentes}; {\tt o\_Hydrogenedentes}; {\tt o\_Hydrogenedent
 \begin{tabular}{ll} $d$\_Bacteria; p\_Chloroflexi; c\_Anaerolineae; o\_Anaerolineales; f\_Anaerolineaceae; g\_ADurb. Bin 120; \_Anaerolineae; o\_Anaerolineae; o\_An
  d Bacteria;p Bacteroidota;c Bacteroidia;o Sphingobacteriales;f Lentimicrobiaceae;g Lentimicrobiaceae;
d_Bacteria;p_Myxococcota;c_Polyangia;o_PS-B29;f_PS-B29;g_PS-B29;s_uncultured_delta
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Firmicutes; c\_Clostridia; o\_Lachnospirales; f\_Lachnospiraceae; g\_[Eubacterium]\_hallii\_group; all the substitution of the sub
  d__Bacteria;p__Chloroflexi;c__Dehalococcoidia;__;__;__;
  \label{lem:d_Bacteria} $$ d\_Bacteria; p\_Verrucomicrobiota; c\_Verrucomicrobiae; o\_Opitutales; f\_Puniceicoccaceae; g\_Verruc-01; \_\_Opitutales; f\_Puniceicoccaceae; g\_Verruc-01; _\_Opitutales; f\_Puniceicoccaceae; g\_Puniceicoccaceae; g\_Puniceicoccaceae; g\_Puniceicoccaceae; g\_Puniceicoccaceae; g\_Puniceicoccaceae
     d__Bacteria;p__Proteobacteria;c__Gammaproteobacteria;o__Burkholderiales;f__Nitrosomonadaceae;__;_
  \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Proteobacteria$;$c$\_Gammaproteobacteria$;$o$\_Burkholderiales$;$f$\_Neisseriaceae$;$g$\_Vitreoscilla$;$\_$in the context of t
d_Bacteria;p_Actinobacteriota;c_Coriobacteriia;o_Coriobacteriales;__;__;
\label{local_decomposition} $$ d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Caulobacterales; f\_Caulobacteraceae; g\_uncultured; and the substitution of the
\label{lem:d_Bacteria}  d\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Reyranellales; f\_Reyranellaceae; \_Alphaproteobacteria; o\_Reyranellaceae; Alphaproteobacteria; o\_Reyranellaceae; o\_Reyranellaceae; o\_Reyranellaceae; o\_Reyranellaceae; o
 \begin{tabular}{ll} $d$\_Bacteria; p\_Proteobacteria; c\_Alphaproteobacteria; o\_Dongiales; f\_Dongiaceae; g\_Dongia; \_Proteobacteria; o\_Dongiales; f\_Dongiaceae; g\_Dongia; \_Proteobacteria; o\_Dongiales; f\_Dongiaceae; g\_Dongia; \_Proteobacteria; o\_Dongiales; f\_Dongiaceae; g\_Dongiaceae; g
  {\tt d\_Bacteria;p\_Proteobacteria;c\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;\_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;_Alphaproteobacteria;o\_Rhizobiales;f\_Devosiaceae;_Alphaproteobacteria;o\_Rhizobiales;_Alphaproteobacteria;o\_Rhizobiales;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Alphaproteobacteria;_Al
d Bacteria;p Proteobacteria;c Gammaproteobacteria;o Xanthomonadales;f Rhodanobacteraceae;
  d_Bacteria;p_Firmicutes;c_Clostridia;o_Peptostreptococcales-Tissierellales;f_Family_XI;g_W5053;
  {\tt d\_Bacteria;p\_Patescibacteria;c\_Saccharimonadia;o\_Saccharimonadales;f\_Saccharimonadales;g\_Saccharimonadales;s\_metagenome}
\label{lem:d_bacteria} $$ d\_Bacteria; p\_Chloroflexi; c\_Anaerolineae; o\_Caldilineales; f\_Caldilineaceae; g\_uncultured; \__Caldilineaceae; g\_uncultured; __Caldilineaceae; g\_uncultured; g\_uncult
  {\tt d\_Bacteria;p\_Cloacimonadota;c\_Cloacimonadia;o\_Cloacimonadales;\_;}
\label{lem:d_Bacteria}  \mbox{$d$\_Bacteria$;$p$\_Firmicutes$;$c$\_Bacilli$;$o$\_Thermicanales$;$f$\_Thermicanaceae$;$g$\_Thermicanus$;$\_$
  \label{lem:d_Bacteria}  \mbox{$d$\_Bacteria;$p$\_Firmicutes;$c$\_Bacilli;$o$\_Lactobacillales;$f$\_Lactobacillaceae;$g$\_Leuconostoc;$\_Sacillaceae$$\mbox{$d$\_Bacteria}$$
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 $\label{lem:d_Archaea} $$d_Archaea; p_Halobacterota; c_Halobacteria; o_Halobacterales; f_Haloferacaceae; g_Halorubrum; __Archaea; p_Halobacterota; c_Halobacteria; o_Halobacterota; c_Halobacterota; c_Halobact$

d_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Rhodospirillales;f_AEGEAN-169_marine_group;g_AEGEAN-169_marine_group;d_Archaea;p_Nanoarchaeota;c_Nanoarchaeia;o_Woesearchaeales;f_Woesearchaeales;g_Woesearchaeales;s_metagenome