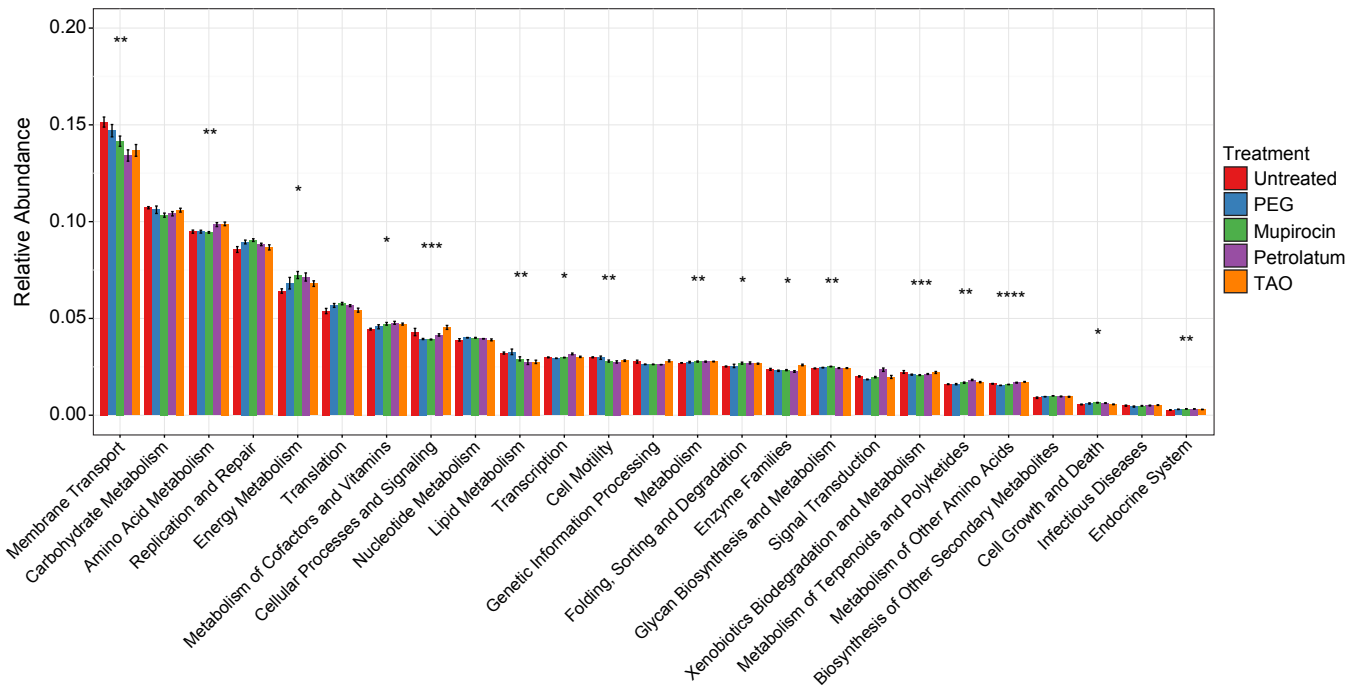


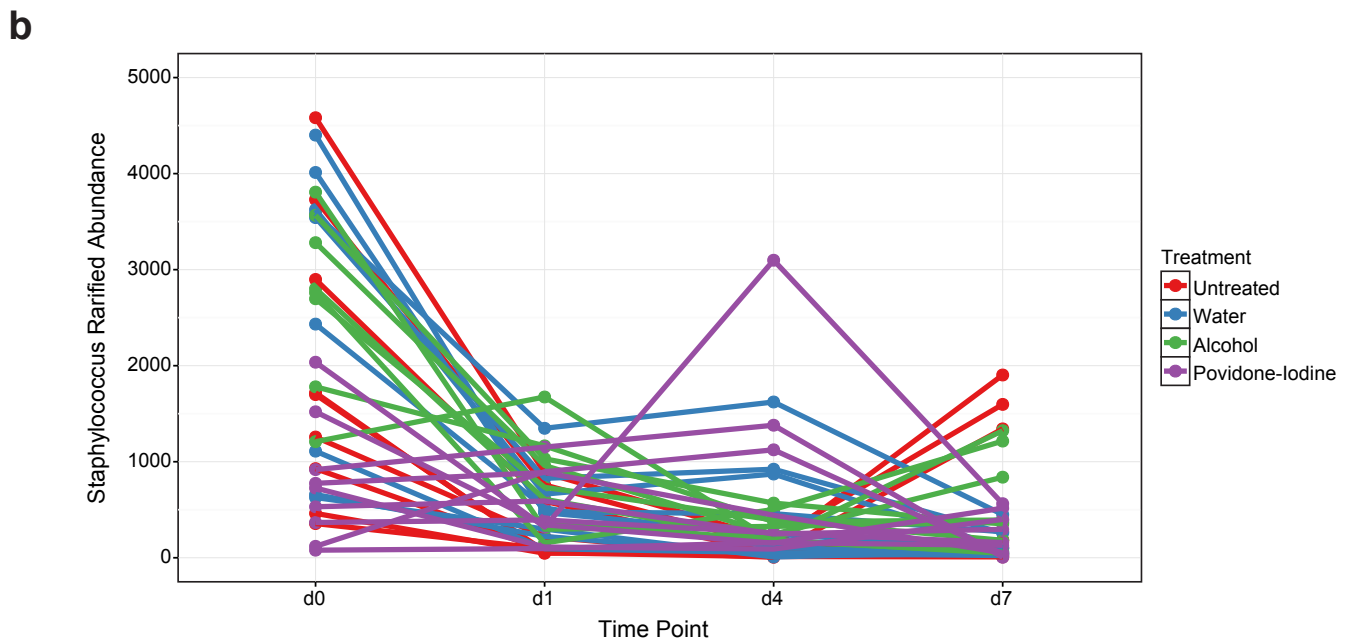
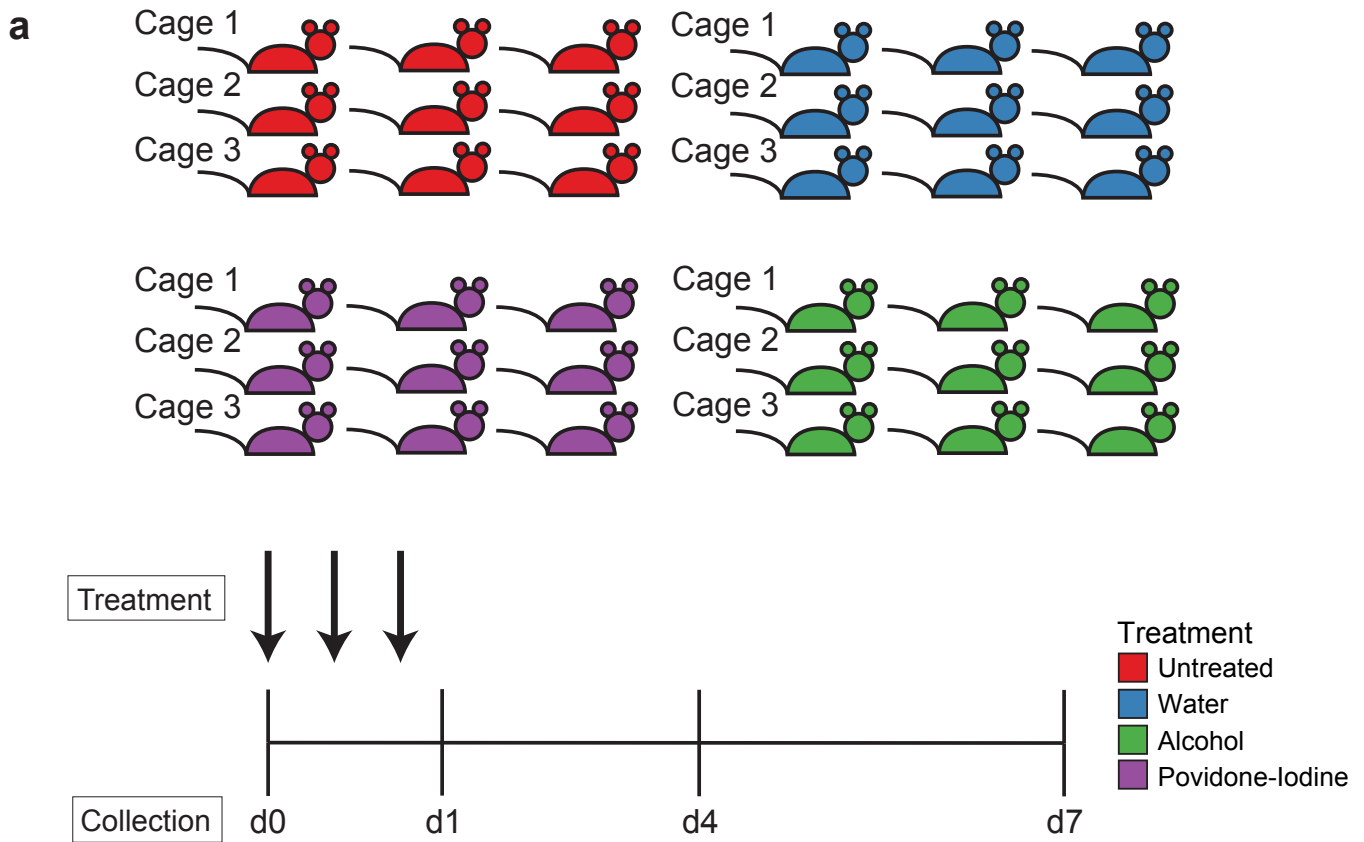
Supplementary Figure 1 | Long-term alterations of select bacterial taxa in response to topical antibiotic treatment.

(a) Schematic diagram of antibiotic treatments and sample collection regimen in mice administered polyethylene glycol (PEG), mupirocin, petrolatum, or triple antibiotic ointment (TAO). Treatment cohorts consisted of nine mice total, three cages of three mice each. Treatment occurred every 12 hours for one week, and mice were followed for 4 weeks post-treatment. (b,c) Longitudinal rarified abundances of (b) *Staphylococcus* and (c) *Alistipes* and *Oscillibacter*. (d) Variations in bacterial burden over time in response to treatment. Data are presented as mean \pm s.e.m. Statistical significance was determined at each time point by Wilcoxon rank sum test (Mann Whitney U test). * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, **** $P < 0.0001$.



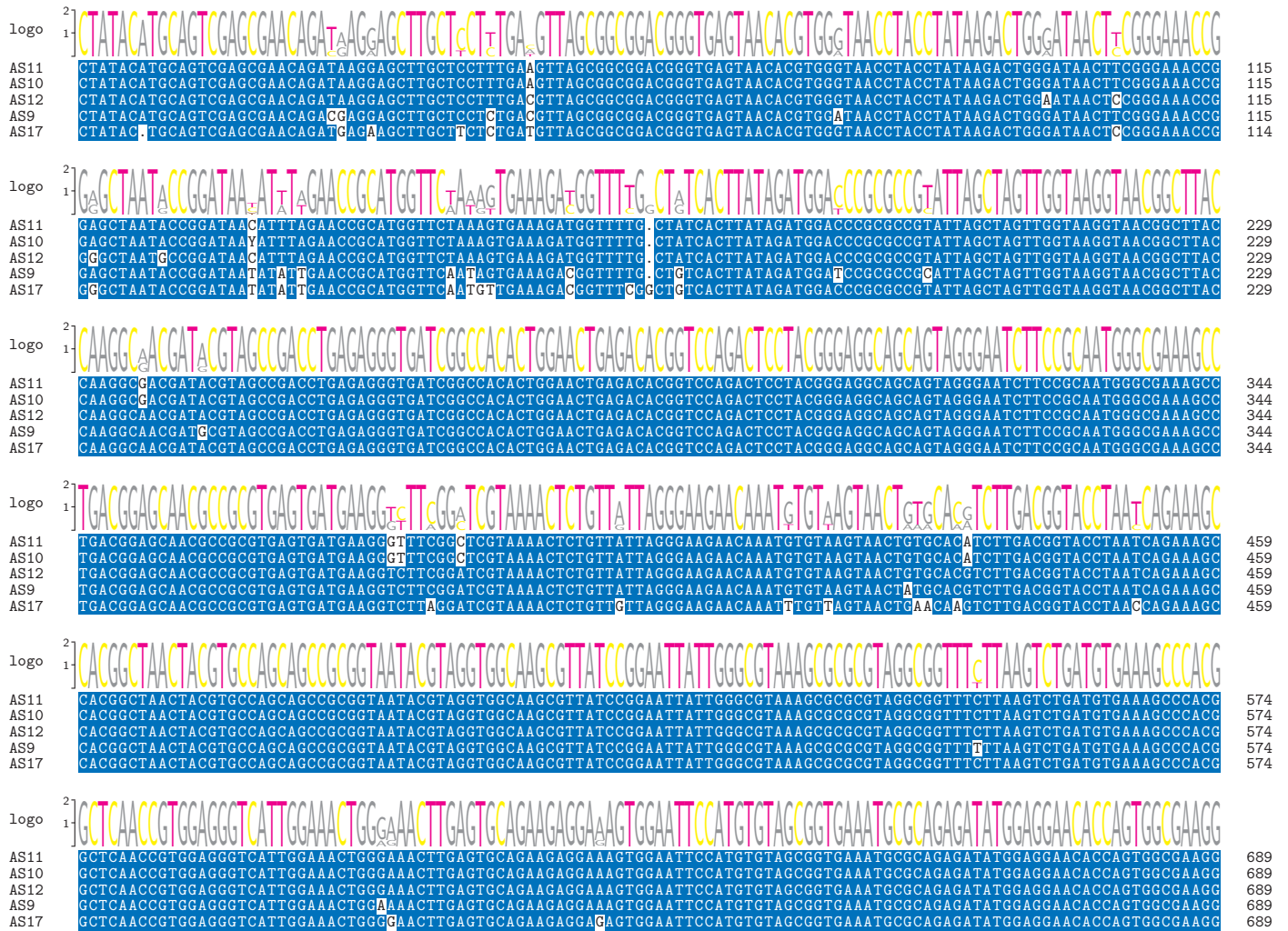
Supplementary Figure 2 | Changes to functional potential of bacterial communities in response to topical antibiotic treatment.

Relative abundances of major KEGG Pathways calculated by PICRUSt analysis of bacterial populations following one week of treatment with polyethylene glycol (PEG), mupirocin, petrolatum, or triple antibiotic ointment (TAO). Data are presented as mean \pm s.e.m. Statistical significance was determined for major pathway designations by comparing across all treatments with the Kruskal-Wallis rank sum test and FDR correction. *P < 0.05, ** P < 0.01, *** P < 0.001, **** P < 0.0001.



Supplementary Figure 3 | Effects of antiseptics on skin bacterial inhabitants.

(a) Model of antiseptic treatments and sample collection in mice treated with water, alcohol, or povidone-iodine. Treatment cohorts consisted of nine mice total, three cages of three mice each. Mice received three treatments total, one every 8 hours, and were followed for one-week post treatment. (b) Rarified *Staphylococcus* abundance in response to treatment over time. Data are presented as individual mice and colored by treatment.



Supplementary Figure 4 | Resident *Staphylococcus* isolate 16S rRNA gene sequences. Comparison of Sanger sequenced murine resident *Staphylococcus* 16S rRNA genes. Consensus sequence logo is noted above isolate sequences. Nucleotides with greater than 50% conserved identity are depicted in blue. Non-conserved nucleotides are unhighlighted.

Supplementary Table 1 | Taxonomic comparisons of treatment groups at d1 post-treatment

Lineage	FDR-corrected p-value
Actinobacteria; Actinobacteria; Actinomycetales; Microbacteriaceae	0.9263883
Actinobacteria; Actinobacteria; Actinomycetales; Micrococcaceae; Kocuria	0.6638857
Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae	0.6638857
Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae; Parabacteroides	0.4254647
Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Chryseobacterium	0.6638857
Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Elizabethkingia	0.6638857
Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Flavobacterium	0.6486878
Bacteroidetes; Sphingobacteria; Sphingobacteriales; Sphingobacteriaceae; Sphingobacterium	0.1687431
Deferribacteres; Deferribacteres; Deferribacterales; Deferribacteraceae; Mucispirillum	0.395196
Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Jeotgalicoccus	0.6638857
Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Staphylococcus	0.3879636
Firmicutes; Bacilli; Lactobacillales; Enterococcaceae; Enterococcus	0.3879636
Firmicutes; Bacilli; Lactobacillales; Lactobacillaceae; Lactobacillus	0.6638857
Firmicutes; Bacilli; Lactobacillales; Leuconostocaceae; Weissella	0.6486878
Firmicutes; Clostridia; Clostridiales	0.6638857
Firmicutes; Clostridia; Clostridiales; Lachnospiraceae	0.6486878
Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Dorea	0.3827328
Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Johnsonella	0.649452
Firmicutes; Clostridia; Clostridiales; Ruminococcaceae	0.4254647
Firmicutes; Clostridia; Clostridiales; Ruminococcaceae; Oscillibacter	0.4254647
Firmicutes; Clostridia; Clostridiales; Veillonellaceae; Veillonella	0.6486878
Proteobacteria; Alphaproteobacteria; Sphingomonadales; Sphingomonadaceae; Novosphingobium	0.1687431
Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae	0.6486878
Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae; Comamonas	0.6486878
Proteobacteria; Betaproteobacteria; Burkholderiales; Oxalobacteraceae; Massilia	0.8707155
Proteobacteria; Gammaproteobacteria; Enterobacteriales; Enterobacteriaceae	0.7751558
Proteobacteria; Gammaproteobacteria; Pseudomonadales; Moraxellaceae; Acinetobacter	0.6638857
Proteobacteria; Gammaproteobacteria; Pseudomonadales; Pseudomonadaceae; Pseudomonas	0.1687431
Proteobacteria; Gammaproteobacteria; Xanthomonadales; Xanthomonadaceae; Stenotrophomonas	0.6486878
Tenericutes; Mollicutes; Anaeroplasmatales; Anaeroplasmataceae; Anaeroplasma	0.6486878

Significances calculated with FDR-corrected Kruskal-Wallis rank sum tests

Supplementary Table 2 | Taxonomic comparisons of lineages at d0 and d1 post-treatment

Treatment	Lineage	FDR-corrected p-value
Betadine	Proteobacteria; Gammaproteobacteria; Pseudomonadales; Pseudomonadaceae; Pseudomonas	1
Betadine	Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae	1
Betadine	Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Staphylococcus	1
Betadine	Firmicutes; Clostridia; Clostridiales	1
Betadine	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae	1
Betadine	Proteobacteria; Gammaproteobacteria; Xanthomonadales; Xanthomonadaceae; Stenotrophomonas	1
Betadine	Firmicutes; Bacilli; Lactobacillales; Enterococcaceae; Enterococcus	1
Betadine	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Elizabethkingia	1
Betadine	Proteobacteria; Gammaproteobacteria; Enterobacteriales; Enterobacteriaceae	1
Betadine	Firmicutes; Clostridia; Clostridiales; Ruminococcaceae	1
Betadine	Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae; Parabacteroides	1
Betadine	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Flavobacterium	1
Betadine	Deferribacteres; Deferribacteres; Deferribacterales; Deferribacteraceae; Mucispirillum	1
Betadine	Bacteroidetes; Sphingobacteria; Sphingobacteriales; Sphingobacteriaceae; Sphingobacterium	1
Betadine	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Chryseobacterium	1
Betadine	Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae; Comamonas	1
Betadine	Firmicutes; Clostridia; Clostridiales; Ruminococcaceae; Oscillibacter	1
Betadine	Firmicutes; Bacilli; Lactobacillales; Leuconostocaceae; Weissella	1
Betadine	Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae	1
Betadine	Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Jeotgalicoccus	NA
Betadine	Proteobacteria; Alphaproteobacteria; Sphingomonadales; Sphingomonadaceae; Novosphingobium	1
Betadine	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Dorea	1
Betadine	Firmicutes; Bacilli; Lactobacillales; Lactobacillaceae; Lactobacillus	1
Betadine	Proteobacteria; Gammaproteobacteria; Pseudomonadales; Moraxellaceae; Acinetobacter	1
Betadine	Tenericutes; Mollicutes; Anaeroplasmatales; Anaeroplasmataceae; Anaeroplasmata	1
Betadine	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Johnsonella	1
Betadine	Actinobacteria; Actinobacteria; Actinomycetales; Micrococcaceae; Kocuria	1
Betadine	Actinobacteria; Actinobacteria; Actinomycetales; Microbacteriaceae	1
Betadine	Firmicutes; Clostridia; Clostridiales; Veillonellaceae; Veillonella	1
Betadine	Proteobacteria; Betaproteobacteria; Burkholderiales; Oxalobacteraceae; Massilia	1
Ethanol	Proteobacteria; Gammaproteobacteria; Pseudomonadales; Pseudomonadaceae; Pseudomonas	1
Ethanol	Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae	1
Ethanol	Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Staphylococcus	0.019744961
Ethanol	Firmicutes; Clostridia; Clostridiales	1
Ethanol	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae	1
Ethanol	Proteobacteria; Gammaproteobacteria; Xanthomonadales; Xanthomonadaceae; Stenotrophomonas	1
Ethanol	Firmicutes; Bacilli; Lactobacillales; Enterococcaceae; Enterococcus	1
Ethanol	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Elizabethkingia	1
Ethanol	Proteobacteria; Gammaproteobacteria; Enterobacteriales; Enterobacteriaceae	1
Ethanol	Firmicutes; Clostridia; Clostridiales; Ruminococcaceae	1
Ethanol	Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae; Parabacteroides	1
Ethanol	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Flavobacterium	1
Ethanol	Deferribacteres; Deferribacteres; Deferribacterales; Deferribacteraceae; Mucispirillum	1
Ethanol	Bacteroidetes; Sphingobacteria; Sphingobacteriales; Sphingobacteriaceae; Sphingobacterium	1
Ethanol	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Chryseobacterium	1
Ethanol	Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae; Comamonas	1
Ethanol	Firmicutes; Clostridia; Clostridiales; Ruminococcaceae; Oscillibacter	1
Ethanol	Firmicutes; Bacilli; Lactobacillales; Leuconostocaceae; Weissella	1
Ethanol	Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae	1
Ethanol	Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Jeotgalicoccus	1
Ethanol	Proteobacteria; Alphaproteobacteria; Sphingomonadales; Sphingomonadaceae; Novosphingobium	1
Ethanol	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Dorea	1
Ethanol	Firmicutes; Bacilli; Lactobacillales; Lactobacillaceae; Lactobacillus	1
Ethanol	Proteobacteria; Gammaproteobacteria; Pseudomonadales; Moraxellaceae; Acinetobacter	1
Ethanol	Tenericutes; Mollicutes; Anaeroplasmatales; Anaeroplasmataceae; Anaeroplasmata	1
Ethanol	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Johnsonella	1
Ethanol	Actinobacteria; Actinobacteria; Actinomycetales; Micrococcaceae; Kocuria	1
Ethanol	Actinobacteria; Actinobacteria; Actinomycetales; Microbacteriaceae	1
Ethanol	Firmicutes; Clostridia; Clostridiales; Veillonellaceae; Veillonella	1
Ethanol	Proteobacteria; Betaproteobacteria; Burkholderiales; Oxalobacteraceae; Massilia	1
No Treat	Proteobacteria; Gammaproteobacteria; Pseudomonadales; Pseudomonadaceae; Pseudomonas	0.932949404
No Treat	Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae	1
No Treat	Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Staphylococcus	0.148087207
No Treat	Firmicutes; Clostridia; Clostridiales	1
No Treat	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae	1
No Treat	Proteobacteria; Gammaproteobacteria; Xanthomonadales; Xanthomonadaceae; Stenotrophomonas	1
No Treat	Firmicutes; Bacilli; Lactobacillales; Enterococcaceae; Enterococcus	1
No Treat	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Elizabethkingia	1
No Treat	Proteobacteria; Gammaproteobacteria; Enterobacteriales; Enterobacteriaceae	1
No Treat	Firmicutes; Clostridia; Clostridiales; Ruminococcaceae	1
No Treat	Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae; Parabacteroides	1
No Treat	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Flavobacterium	1
No Treat	Deferribacteres; Deferribacteres; Deferribacterales; Deferribacteraceae; Mucispirillum	1
No Treat	Bacteroidetes; Sphingobacteria; Sphingobacteriales; Sphingobacteriaceae; Sphingobacterium	0.388151273
No Treat	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Chryseobacterium	1
No Treat	Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae; Comamonas	0.289846607
No Treat	Firmicutes; Clostridia; Clostridiales; Ruminococcaceae; Oscillibacter	1
No Treat	Firmicutes; Bacilli; Lactobacillales; Leuconostocaceae; Weissella	1
No Treat	Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae	1
No Treat	Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Jeotgalicoccus	1
No Treat	Proteobacteria; Alphaproteobacteria; Sphingomonadales; Sphingomonadaceae; Novosphingobium	0.070091195

No Treat	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Dorea	1
No Treat	Firmicutes; Bacilli; Lactobacillales; Lactobacillaceae; Lactobacillus	1
No Treat	Proteobacteria; Gammaproteobacteria; Pseudomonadales; Moraxellaceae; Acinetobacter	1
No Treat	Tenericutes; Mollicutes; Anaeroplasmatales; Anaeroplasmataceae; Anaeroplasmata	1
No Treat	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Johnsonella	1
No Treat	Actinobacteria; Actinobacteria; Actinomycetales; Micrococcaceae; Kocuria	1
No Treat	Actinobacteria; Actinobacteria; Actinomycetales; Microbacteriaceae	1
No Treat	Firmicutes; Clostridia; Clostridiales; Veillonellaceae; Veillonella	1
No Treat	Proteobacteria; Betaproteobacteria; Burkholderiales; Oxalobacteraceae; Massilia	1
Water	Proteobacteria; Gammaproteobacteria; Pseudomonadales; Pseudomonadaceae; Pseudomonas	1
Water	Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae	1
Water	Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Staphylococcus	0.22213081
Water	Firmicutes; Clostridia; Clostridiales	1
Water	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae	1
Water	Proteobacteria; Gammaproteobacteria; Xanthomonadales; Xanthomonadaceae; Stenotrophomonas	1
Water	Firmicutes; Bacilli; Lactobacillales; Enterococcaceae; Enterococcus	1
Water	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Elizabethkingia	1
Water	Proteobacteria; Gammaproteobacteria; Enterobacteriales; Enterobacteriaceae	1
Water	Firmicutes; Clostridia; Clostridiales; Ruminococcaceae	1
Water	Bacteroidetes; Bacteroidia; Bacteroidales; Porphyromonadaceae; Parabacteroides	1
Water	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Flavobacterium	1
Water	Deferribacteres; Deferribacteres; Deferribacterales; Deferribacteraceae; Mucispirillum	1
Water	Bacteroidetes; Sphingobacteria; Sphingobacteriales; Sphingobacteriaceae; Sphingobacterium	1
Water	Bacteroidetes; Flavobacteria; Flavobacteriales; Flavobacteriaceae; Chryseobacterium	1
Water	Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae; Comamonas	1
Water	Firmicutes; Clostridia; Clostridiales; Ruminococcaceae; Oscillibacter	1
Water	Firmicutes; Bacilli; Lactobacillales; Leuconostocaceae; Weissella	1
Water	Proteobacteria; Betaproteobacteria; Burkholderiales; Comamonadaceae	1
Water	Firmicutes; Bacilli; Bacillales; Staphylococcaceae; Jeotgaliococcus	NA
Water	Proteobacteria; Alphaproteobacteria; Sphingomonadales; Sphingomonadaceae; Novosphingobium	1
Water	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Dorea	1
Water	Firmicutes; Bacilli; Lactobacillales; Lactobacillaceae; Lactobacillus	1
Water	Proteobacteria; Gammaproteobacteria; Pseudomonadales; Moraxellaceae; Acinetobacter	1
Water	Tenericutes; Mollicutes; Anaeroplasmatales; Anaeroplasmataceae; Anaeroplasmata	1
Water	Firmicutes; Clostridia; Clostridiales; Lachnospiraceae; Johnsonella	1
Water	Actinobacteria; Actinobacteria; Actinomycetales; Micrococcaceae; Kocuria	1
Water	Actinobacteria; Actinobacteria; Actinomycetales; Microbacteriaceae	1
Water	Firmicutes; Clostridia; Clostridiales; Veillonellaceae; Veillonella	1
Water	Proteobacteria; Betaproteobacteria; Burkholderiales; Oxalobacteraceae; Massilia	1

Significances calculated with FDR-corrected Wilcoxon rank sum tests