



## Integrated Metagenomic and Metabolomic Analyses of the Effect of *Astragalus* Polysaccharides on Alleviating High-Fat Diet–Induced Metabolic Disorders

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Hong Y, Li B, Zheng N, Wu G, Ma J, Tao X, Chen L, Zhong J, Sheng L and Li H (2020) Integrated Metagenomic and Metabolomic Analyses of the Effect of Astragalus Polysaccharides on Alleviating High-Fat Diet–Induced Metabolic Disorders. Front. Pharmacol. 11:833. doi: 10.3389/fphar.2020.00833 <sup>1</sup> Functional Metabolomic and Gut Microbiome Laboratory, Institute of Interdisciplinary Integrative Medicine Research, Shanghai University of Traditional Chinese Medicine, Shanghai, China, <sup>2</sup> Huzhou Key Laboratory of Molecular Medicine, Huzhou Central Hospital, Affiliated Cent Hospital Huzhou University, Huzhou, China

Most herbal polysaccharides possess multiple benefits against metabolic disorders, such as non-alcoholic fatty liver disease (NAFLD) and obesity. However, the underlying mechanisms are largely unknown. Here, male C57BL/6J mice were fed with chow or high-fat diet (HFD) with or without Astragalus polysaccharides (APS) supplementation, and gut microbial profile and metabolite profile were studied by metagenomic sequencing and untargeted metabolomics, respectively. APS was effective in alleviating HFD-induced metabolic disorders, with the alteration of gut microbiota composition and function. A total of 188 species, which mainly from Bacteroidetes, Actinobacteria, Firmicutes, and Proteobacteria phyla, and 36 metabolites were markedly changed by HFD and revered by APS. Additionally, the altered glutathione metabolism and purine metabolism pathways were identified by both metagenomic function analysis and metabolite pathway enrichment analysis. Furthermore, the gut microbial alteration was associated with the changes of key intestinal metabolites. We found 31 and 20 species were correlated with purine metabolism and glutathione metabolism, respectively. Together, our results showed significant metagenomic and metabolomic changes after HFD feeding and APS intervention, revealed the potential correlation between gut microbial species and metabolites, and highlighted mechanisms of herb-derived polysaccharides by modulating gut microbiome and host metabolism underlying their benefits on metabolic disorders.

Keywords: Astragalus polysaccharides, metagenomic, metabolomics, metabolic disorders, hepatic steatosis

## INTRODUCTION

Metabolic disorders, such as non-alcoholic fatty liver disease (NAFLD) and obesity, represent hugely problems concerning the health worldwide (Jung and Choi, 2014). Significant interest has recently focused on the effect of gut microbiota in metabolic disorders (Cani, 2019). Gut microbiota is a complex microbial community with highly interactive microorganisms that maintain a close interplay with its

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host. Emerging evidence has revealed that gut microbiota plays an essential role in prevention and treatment of human diseases, such as obesity and NAFLD (Boulange et al., 2016). Changes in the diversity and composition of gut microbiota directly affect host physiology (Bennett et al., 2013; Yoshimoto et al., 2013; Khan et al., 2016). In addition, the metabolic potential of gut microbiota has been identified as a contributing factor to health (Dahiya et al., 2017). Gut dysbiosis and subsequently altered metabolite profile can lead to many health issues. Although the underlying mechanisms require further investigation, there is an increasing body of evidence that the bacterial metabolites, like short chain fatty acids (SCFAs), bile acids, and tryptophan metabolites, are important modulators of host physiology (Cani, 2019). Therefore, gut microbiota and its metabolites have a pivotal role in the maintenance of physiologic and metabolic homeostasis of the host. Targeting gut microbiota and its metabolites might be a potential therapy for the treatment and prevention of metabolic disorders.

Plant polysaccharides are natural macromolecules that are widely present in various herbs with medicinal properties such as anti-inflammation, anti-virus, and immune modulation (Mao et al., 2007; Gu et al., 2015), as well as metabolic benefits (Chang et al., 2015). Astragalus polysaccharides (APS) are extracted from Astragalus mongholicus Bunge, a frequently used herbal medicine with established efficacy in lowering plasma lipids, improving insulin sensitivity (Zou et al., 2009; Ke et al., 2017), and ameliorating metabolic risk in metabolically stressed transgenic mice (Huang et al., 2017). Given the non-absorptive properties of polysaccharides in the gastrointestinal tract, the metabolic benefits of polysaccharides are usually associated with modulation or recovery of gut dysbiosis such as the anti-obesity effects of the polysaccharides extracted from Ganoderma lucidum and Hirsutella sinensis (Chang et al., 2015; Wu et al., 2018). However, the effect of plant polysaccharides on host metabolism is still largely unknown.

In the present study, we proved the effect of APS in attenuating metabolic disorders in high-fat diet (HFD)-fed mice. Cecum metabolomics and bacteria composition was analyzed by liquid chromatography/mass spectrometry (LC/MS)-based untargeted metabolomics and metagenomic sequencing, respectively. Our results showed APS was effective in reversing HFD-induced changes of gut microbial structure and function as well as gut metabolites. Additionally, through both metagenomic function analysis and metabolises pathway enrichment analysis, we filtrated out two metabolism pathways, purine metabolism pathway and glutathione metabolism pathway, which might be important for hepatic steatosis lowering effects of APS. Together, the present study provided new evidences for the beneficial effect of APS on regulating metabolic disorders at both metagenomic and metabolomic levels.

#### MATERIALS AND METHODS

#### **Preparation of APS Extracts**

APS was provided by Ci Yuan Biotechnology Co., Ltd. (Lot# 20140504, Shanxi, China) with 90% purity of polysaccharides

from *Astragalus mongholicus* Bunge. Briefly, polysaccharides were extracted from *Astragalus mongholicus* Bunge with distilled boiling water, and the supernatant was condensed and precipitated with 70% ethanol. Crude polysaccharides extract experienced deproteinization by sevage method before dialysis, which was then lyophilized for subsequent monosaccharide analysis and experiment (Li et al., 2003).

#### Characterization of Monosaccharide Composition of APS

The extracted APS was hydrolyzed into monosaccharides with trifluoroacetic acid, and the hydrolyzed monosaccharides from APS and monosaccharide standards were acetylated according to a previous method (Lin et al., 2016). The acetylated samples were then analyzed by Agilent Technologies 7890B gas chromatograph (GC, USA) equipped with 3% OV-225/AW-DMCS-Chromosorb W column (3 mm  $\times$  2.5 m). The heating program for the GC analysis was as follows: the initial temperature was 140°C, and increased to 198°C at a rate of 2° C/min and maintained for 4 min, then the temperature was increased to 214°C with a temperature gradient of 4°C/min, and then increased to 217°C at the speed of 1°C/min and kept 4 min. Finally, the temperature increased to 250°C at the rate of 3°C/ min and held constant for 5 min. The APS used in our current study was composed of five monosaccharides including rhamnose (1.6%), arabinose (23.39%), xylose (0.84%), glucose (70.55%), and galactose (3.61%).

#### **Animal Study**

After 1-week accommodation, 15 mice were treated with chow diet (Con, 16.5% calories from fat, SHOOBREE), HFD (60% calories from fat, Research Diet, D12492) with or without APS for 14 weeks, respectively. Since our preliminary data showed 8% APS supplemented in diet had the most significantly metabolic protective effect than 2% and 4% APS, the finial concentration of 8% APS was used in this study. The experiments were conducted under the Guidelines for Animal Experiment of Shanghai University of Traditional Chinese Medicine and the protocol was approved by the institutional Animal Ethics Committee. At the end of the experiment, mice were sacrificed after anesthesia with 1% pentobarbital sodium solution intraperitoneally. Serum, cecum contents, and tissue samples were collected, weighted, and immediately frozen in liquid nitrogen and stored at  $-80^{\circ}$ C for further analysis.

## Histological Evaluation on the Degree of Hepatic Steatosis

Liver tissues were fixed with 10% neutral formalin for 24 h, embedded in paraffin and stained with hematoxylin-eosin staining (H&E) using a standard protocol. The degree of hepatic steatosis was evaluated according to previous publication in a blinded way (Peng et al., 2009). The criteria for scoring: grade 0, no hepatocytes involved; grade 1, 1–25% of the hepatocytes involved; grade 2, 26–50% of hepatocytes involved; grade 3, 51–75% of hepatocytes involved; and grade 4, 76–100% of hepatocytes involved.

#### **Metagenomics**

About 100 mg of cecum content were used for bacteria DNA extraction using a fecal DNA extraction kit. Bacterial DNA samples were fragmented to an average size of about 300 bp using Covaris M220 (Gene Company Limited, China) for pairedend library construction using TruSeqTM DNA Sample Prep Kit (Illumina, San Diego, CA, USA). Adapters containing the full complement of sequencing primer hybridization sites were ligated to the blunt-end of fragments. Paired-end sequencing was performed on Illumina HiSeq4000 platform (Illumina Inc., San Diego, CA, USA) at Majorbio Bio-Pharm Technology Co., Ltd. (Shanghai, China) using HiSeq 3000/4000 PE Cluster Kit and HiSeq 3000/4000 SBS Kit according to the manufacturer's instructions (www.illumina.com). Sequence data associated with this project have been deposited in the NCBI Short Read Archive database (Accession Number: PRJNA615253). Adapter sequence were stripped from the 3' and 5' end of paired end Illumina reads using SeqPrep (https://github.com/jstjohn/SeqPrep). Lowquality reads (length < 50 bp or with a quality value < 20 or having N bases) were removed by Sickle (https://github.com/ najoshi/sickle). Reads were aligned to the Mus musculus genome by BWA (http://bio-bwa.sourceforge.net) and any hit associated with the reads and their mated reads were removed. Data were assembled using MEGAHIT (https://github.com/voutcn/ megahit) (Li et al., 2015), which makes use of succinct de Bruijn graphs. Contigs with the length being or over 300 bp were selected as the final assembling result, and then the contigs were used for further gene prediction and annotation. Open reading frames from each assembled contig were predicted using MetaGene (http://metagene.cb.k.u-tokyo.ac.jp/) (Noguchi et al., 2006). The predicted open reading frames with length being or over 100 bp were retrieved and translated into amino acid sequences using the NCBI translation table (http://www.ncbi. nlm.nih.gov/Taxonomy/taxonomyhome.html/index.cgi? chapter=tgencodes#SG1). All predicted genes with a 95% sequence identity (90% coverage) were clustered using CD-HIT (http://www.bioinformatics.org/cd-hit/) (Fu et al., 2012), the longest sequences from each cluster were selected as representative sequences to construct non-redundant gene catalog. Reads after quality control were mapped to the representative sequences with 95% identity using SOAPaligner (http://soap.genomics.org.cn/) (Li et al., 2008), and gene abundance in each sample were evaluated. Representative sequences of non-redundant gene catalog were aligned to NCBI NR database with e-value cutoff of 1e-5 using BLASTP (Version 2.2.28+, http://blast.ncbi.nlm.nih.gov/Blast.cgi) for taxonomic annotations.

## Sample Preparation for Metabolomics Study

For the metabolomics analysis, 10-mg cecum content was added to 200- $\mu$ l water and homogenized. The homogenate was added to 800  $\mu$ l of ACN: MeOH (1:1, v/v), vortexed for 30 s, and sonicated for 10 min. After overnight incubation at  $-20^{\circ}$ C, samples were centrifuged at 12,000 g for 15 min at 4°C. The supernatant was

transferred into a clean dry tube and dried with nitrogen at 30°C, the residue was reconstituted with 100  $\mu l$  of ACN: H<sub>2</sub>O (1:1, v/v), vortexed for 30 s, sonicated for 5 min in an ice bath, then centrifuged at 12,000 g for 15 min at 4°C.

#### **HPLC-QTOF/MS** Analysis

Chromatographic analysis was performed using a Shimadzu HPLC system (Nexera XR LC-20AD, Japan) equipped with an ACQUITY UPLC BEH C18 column (2.1 × 100 mm, 1.8  $\mu$ m). The mobile phase A consists of 0.1% formic acid in H<sub>2</sub>O, mobile phase B was ACN. The gradient was used as follows: 1% B, 0–1.5 min; 1%~99% B, 1.5–13 min; 99% B, 13–16.5 min; 99%~1% B, 16.5–16.6 min; 1% B, 16.6–20 min. The column temperature was 30°C, flow rate was 0.3 ml/min, and the volume of injection was 2  $\mu$ l for each run.

The metabolomics profiling analysis was performed on an SCIEX Triple TOF 5,600+ with information dependent acquisition (IDA). For the positive mode, the collision energy (CE) spread were set as 40 and 10 eV, declustering potential (DP) set at 60 V, the ion spray voltage floating (ISVF) set at 5,500 V, and the temperature set to 550°C. For the negative mode, the CE spread were set as -40 and -10 eV, DP set at -60 V, the ion ISVF set at 4,500 V, and the temperature set at 450°C. The other source same parameters settings in the two modes were as follows: the ion source gas1 and gas2 were set at 60 psi with curtain gas was set at 35 psi, the TOF/MS full scan was operated with the mass range was 60-1,000 Da and the TOF-MS/MS full scan was operated with the mass range was 25-1,000 Da, and the accumulation time was 0.15 s. The mass spectrometer was automatically calibrated by the calibration delivery system (CDS) once every six injections.

#### Metabolomics Data Processing and Metabolites Identification

The wiff data were imported to the Progenesis QI (Waters, Milford, MA, USA) for data processing. The converted files were calculated for generation of alignment, peak picking, deconvolution, filter data and identifying compounds. For the identification of potential biomarkers, several online databases, such as the HMDB (http://www.hmdb.ca/) and LIPIDMAPS (http://www.lipidmaps.org/) were selected for metabolite identification based on exact mass measurement (mass error < 10 ppm) obtained from HPLC-QTOF/MS. Other parameter settings were designed as default for data processing automatically. A data matrix containing retention times, accurate masses, and peak intensities was exported into SIMCA-P 13.0 software (Umetrics, Umeå, Sweden) for principal component analysis (PCA).

#### **Statistical Analysis**

Data are shown as means  $\pm$  sem unless otherwise noted. Multiple comparisons were performed by using one-way ANOVA followed by Tukey's honest significant difference *post hoc* test with SPSS software (21.0). p < 0.05 was considered statistically significant.

### RESULTS

## APS Attenuates HFD-Induced Metabolic Disorders

To explore the effect of APS on improving metabolic disorders, 4week-old mice were fed with chow diet, or HFD with or without APS supplementation for 14 weeks. Administration of HFD resulted in significant increases of body weight, liver weight, and hepatic steatosis as revealed by H&E, while APS supplementation reversed these changes (**Figures 1A–D**). In addition, APS significantly reduced serum total cholesterol (TC), alanine aminotransferase (ALT), aspartate aminotransferase (AST), fasting blood glucose, and insulin levels, which were increased by HFD (**Figure 1E-I**). These results indicated that APS was effective in attenuating HFD-induced metabolic disorders in mice.

# APS Reverses Gut Dysbiosis in HFD-Fed Mice

Since most plant-derived polysaccharides are non-absorbable, we hypothesized that the effect of APS was probably associated with the modulation of gut microbiota. Cecum contents were collected and used for metagenomics sequencing. An average of 92.8  $\pm$  1.5 (SEM) million reads per sample were generated. Shannon index was reduced significantly in the HFD group and increased by APS supplementation, indicating APS was effective in increasing microflora diversity (**Figure 2A**). Bray-Curtis

PCoA showed clear separation among groups, which was consistent with the heatmap of Hierarchical clustering (**Figures 2B, C**). In addition, taxonomic profiling of top 9 most abundance phylum indicated that HFD obviously increased the relative abundance of Firmicutes, Deferribacteres, and Synergistetes phyla, and reduced the relative abundance of Bacteroidetes phylum, whereas APS reversed above changes (**Figure 2D**).

In order to find the specific bacterial species which might mediate the metabolic benefits of APS, we analyzed metagenomics data at species level. Total 8,323 species were annotated in Con group, while only 7,572 species were annotated in HFD-fed mice. Different with the reduced species number found in HFD group, APS supplement increased the species number to 7,972 (Figure 2E). In addition, a total of 188 species which differentially changed by HFD and reversed by APS supplement were determined with the double criteria of both fold change  $\ge 2$  (or  $\le 0.5$ ) and p < 0.01. The differential species were mainly from Actinobacteria, Firmicutes, Proteobacteria, and Bacteroidetes phyla. Among them, 74 species were reduced in HFD group and reversed by APS supplement which mostly from Bacteroidetes phylum, while the other 114 species showed opposite changes which mostly from Actinobacteria, Firmicutes, and Proteobacteria phyla (Figure 2F). These data suggested APS played an essential role in regulating gut microbiota composition. APS supplementation was effective in reversing HFD induced dysbiosis, which might be associated with the improved metabolic disorders.







**FIGURE 2** | APS reverses gut dysbiosis in HFD-fed mice. Cecum samples of Con, HFD, and APS groups were analyzed with metagenomics. (A) Shannon index. (B) Bray\_curtis based PCoA analysis followed by Permutational Multivariate Analysis Of Variance (PERMANOVA,  $R^2$ : 0.695, *p*-value: 0.005, *p*.adjust: 0.005). (C) Bray\_curtis based distance matrix. (D) Multigroup difference analysis of the top 9 abundant phyla. (E) Venn diagram illustrating the overlap of species in intestinal microbiota among the samples and number of species in three groups. (F) Co-occurrence network deduced from 188 differential species significant changed in HFD group compared to Con group and restored in APS group. Red edges, Spearman's rank correlation coefficient > 0.8, *p* < 0.01; blue edges, Spearman's rank correlation coefficient < -0.8, *p* < 0.01. *n* = 3 per group. \*\**p* < 0.01.

#### APS Improves Metabolic Function of Microbiome in HFD-Fed Mice

The changes of gut microbiota structure are always accompanied with the alternation of gut microbial function. Hence, we further investigated the functional consequences after APS supplementation. Bray-Curtis PCoA based on Kyoto Encyclopedia of Genes and Genomes (KEGG) orthologs level (KOs) showed clear separation among groups, with APS group clustered between Con and HFD groups (**Figure 3A**). At KEGG level 1 level, the top differential altered pathways were metabolism, environmental information processing, cellular processes, and human diseases. Among them, the metabolic pathway had the highest proportion (**Figure 3B**). Then, we further studied the KEGG level 3 pathway under metabolism. By LDA Effect Size (LEfSe) Analysis, 27 metabolic pathways were screened with the criteria of LDA > 2 (**Figure 3C**). Among them, six metabolic pathways were increased by HFD and reversed by APS supplement significantly, including tryptophan metabolism, methane metabolism, sulfur metabolism, insect hormone biosynthesis, limonene and pinene degradation, and nitrotoluene degradation. Meanwhile, eight metabolic pathways were reduced by HFD and increased by APS supplement, including taurine and hypotaurine metabolism, acarbose and validamycin biosynthesis, isoquinoline alkaloid biosynthesis,



Multivariate Analysis Of Variance (PERMANOVA,  $R^2$ : 0.745, *p-value*: 0.002, *p.adjust*: 0.002). (B) Multigroup difference analysis in KEGG pathway at level 1. \**p* < 0.05, \*\**p* < 0.01. (C) LDA Effect Size (LEfSe) Analysis of gut microbial function at level 3 of metabolism was profiled among three groups. Heatmap of the relative abundances of the metabolic pathways with the criteria of LDA > 2. The black dots mean significant difference (*p* < 0.05) between HFD and Con groups or between HFD and APS groups.

streptomycin biosynthesis, tropane, piperidine and pyridine alkaloid biosynthesis, nicotinate and nicotinamide metabolism, polyketide sugar unit biosynthesis, and zeatin biosynthesis (**Figure 3C**). In addition, glutathione metabolism was increased by HFD and tended to be reduced by APS (p = 0.07), while purine metabolism was significant reduced by HFD and tended to be increased by APS (p = 0.07). Altogether, the metabolic function of bacteria that changed by HFD could be partially reversed by APS supplementation.

# APS Reverses Metabolomic Changes in HFD-Fed Mice

To elucidate the metabolic character of APS, the LC/MS-based untargeted metabolic profiling in positive and negative mode was performed on fecal samples. The unsupervised PCA, which was performed to visualize the general differences among samples, showed clear separation among groups in both positive and negative modes (**Figures 4A, B**). With the criteria of either VIP> 1 (multivariate statistical analysis) and p < 0.05 (univariate statistics), 36 metabolites were significantly altered by HFD and reversed by APS supplementation (**Figure 4C**). We next carried

out the metabolic pathway analysis on the 36 differential metabolites. The top 5 significant altered pathways, which covered nine differential metabolites including deoxyguanosine, guanosine, uracil, inosine, pyroglutamic acid, glutamic acid, maltose, glucose, and pantetheine, were starch and sucrose metabolism, neomycin, kanamycin, and gentamicin biosynthesis, pantothenate and CoA biosynthesis, glutathione metabolism, and purine metabolism (**Figure 4D**). It is interesting to note that the glutathione metabolism and purine metabolism and purine metabolism pathways were also identified based on altered bacterial function. These findings suggested that APS was effective in reversing HFD-induced dysregulated metabolism, which is associated with its effect on regulating gut microbiota composition.

### Correlation Between Gut Microbial Species and Differential Metabolites

Since two important metabolic pathways, glutathione metabolism and purine metabolism, were found both in metagenomic function analysis and metabolites pathway enrichment analysis, we investigated the correlation of 188 differential bacterial species with five differential metabolites enriched in these two pathways





by spearman's correlation analysis. The heatmap revealed 49 species were correlated with four metabolites (**Figure 5**). The correlation analysis showed that the differential metabolites from glutathione metabolism, including pyroglutamic acid and glutamic acid, showed negative correlation with 14 and 8 differential bacterial species, respectively, with *Streptococcus\_equi* and *Bizionia\_argentinensis* negatively correlated with both metabolites. In addition, guanosine and inosine, which are from purine metabolism pathway, were positively correlated with 17 and 5 differential bacterial species respectively, and showed negative correlation with seven and two species respectively. Interestingly, deoxyguanosine from purine pathway was not correlated with any species. These results suggested certain

bacteria that were shifted by APS were correlated with metabolites in glutathione metabolism and purine metabolism, indicating the important roles of these bacteria in APS-associated beneficial effects.

### DISCUSSION

The beneficial effects of herbal polysaccharides on metabolic disorders have been shown to closely related to the alternation of gut microbiota composition and function as well as metabolites. In our current study, we performed metagenomic sequencing

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Patiata, 201601Geobacillus, and ProteobacteriaGardiatus, Azambacteria, bacterium, GW2011, GWA1, 43, 9unclassifiedCandidatus, AzambacteriaAlteromonas, sp., oral, taxon, 278AlteromonasProteobacteria <t< td=""><td>Prevozella, s.g., CAG 732       Prevozella, s.g., CAG 732       Prevozella, s.g., CAG 732       0.5         Nonchabdus, g.g., NBAU, VenSA04       Vibrio and Proteobacteria       Proteobacteria       0.5         Brevundimonas, s.g., Root 1279       Brevundimonas       Proteobacteria       0         Acidovorax, s.g., Leaf 78       Acidovorax       Proteobacteria       0         Acidovorax, s.g., Leaf 78       Acidovorax       Proteobacteria       0         Plancococcus, s.g., CAU 13       Plancococcus       Firmicutes       0         Microbacterium, Invidocarbonoxydans       Microbacterium       Actinobacteria       0         Microbacterium, Invidocarbonoxydans       Firmicutes       Entricicia       0         Strenomoves, S.g., MUSC164       Strenomoves Actinobacteria       0         Strenomoves, MUSC164       Strenomoves Actinobacteria       0         Strenomoves, MUSC164       Strenomoves, Actinobacteria       0         Strenomoves, S.g., 674/-1       Helicobacteri       Proteobacteria         Mesorhizobium, ac, URPC0008       Mesorhizobium       Proteobacteria         Helicobacter, canis       Helicobacteri       Proteobacteria         Helicobacter, and the acterium, SG8,15       unclassified       Candidatus, Azambacteria         Helicobacter, and the actenium</td><td>Prevozella       Bacteroidetes       0.5         Prevozella       Senorhabdus, sp. RC341       Vibrio       Proteobacteria       0.5         Brevundimonas, sp. RC341       Vibrio       Proteobacteria       0         Acidovorax, sp. LeaF78       Acidovorax       Proteobacteria       0         Actornobacter, unbiandi       Acidovorax       Actinobacteria       0       0         Microbacterian, hydrocarbonoxydans       Microbacterian       Actinobacteria       0       0       0         Streatomyces, sp. MUSCI64       Streatomyces       Actinobacteria       0</td><td></td><td>SAR324_cluster_bacterium_SCGC_AAA240-J09</td><td>unclassified</td><td>Proteobacteria</td><td></td></t<>	Prevozella, s.g., CAG 732       Prevozella, s.g., CAG 732       Prevozella, s.g., CAG 732       0.5         Nonchabdus, g.g., NBAU, VenSA04       Vibrio and Proteobacteria       Proteobacteria       0.5         Brevundimonas, s.g., Root 1279       Brevundimonas       Proteobacteria       0         Acidovorax, s.g., Leaf 78       Acidovorax       Proteobacteria       0         Acidovorax, s.g., Leaf 78       Acidovorax       Proteobacteria       0         Plancococcus, s.g., CAU 13       Plancococcus       Firmicutes       0         Microbacterium, Invidocarbonoxydans       Microbacterium       Actinobacteria       0         Microbacterium, Invidocarbonoxydans       Firmicutes       Entricicia       0         Strenomoves, S.g., MUSC164       Strenomoves Actinobacteria       0         Strenomoves, MUSC164       Strenomoves Actinobacteria       0         Strenomoves, MUSC164       Strenomoves, Actinobacteria       0         Strenomoves, S.g., 674/-1       Helicobacteri       Proteobacteria         Mesorhizobium, ac, URPC0008       Mesorhizobium       Proteobacteria         Helicobacter, canis       Helicobacteri       Proteobacteria         Helicobacter, and the acterium, SG8,15       unclassified       Candidatus, Azambacteria         Helicobacter, and the actenium	Prevozella       Bacteroidetes       0.5         Prevozella       Senorhabdus, sp. RC341       Vibrio       Proteobacteria       0.5         Brevundimonas, sp. RC341       Vibrio       Proteobacteria       0         Acidovorax, sp. LeaF78       Acidovorax       Proteobacteria       0         Actornobacter, unbiandi       Acidovorax       Actinobacteria       0       0         Microbacterian, hydrocarbonoxydans       Microbacterian       Actinobacteria       0       0       0         Streatomyces, sp. MUSCI64       Streatomyces       Actinobacteria       0		SAR324_cluster_bacterium_SCGC_AAA240-J09	unclassified	Proteobacteria	
Xenonhabdus sz., NBAIL/XenSaO4         Xenonhabdus sz., NBAIL/XenSaO4         Xenonhabdus         Proteobacteria         0.5           Brevundimonas, sz., Root1279         Brevundimonas         Proteobacteria         0           Acidovoras, sz., CAU13         Brevundimonas, sz., Root1279         Brevundimonas, Proteobacteria         0           Achoromobacter, unhandii         Achoromobacter, unhandii         Achoromobacter, unhandii         0           Achoromobacter, unhandii         Achoromobacter, unhandii         Achoromobacter, unhandii         0           Hierobacteria         Proteobacteria         0           Hierobacter, unhandii         Achoromobacter, unhandii         0           Hierobacter, unhandii         Achoromobacter, unhandii         0           Hierobacter, unhandii         Achoromobacter, unhandii         0           Hierobacter, solisilwa         Flainhumbacter         Bacteroidetes         -0.5           Bacillus, sol.         Unhandi         Strentomoves         Actinobacteria         -0.5           Olizella, uneolvica         Olizella         Proteobacteria         -0.5           Olizella, uneolvica         Olizella         Proteobacteria         -0.5           Heilcobacter, canit         Heilcobacter         Proteobacteria         -0.5           Heilco	Xenorhabdus, so., N84/LenSa04       Xenorhabdus       Proteobacteria       0.5         Wibrio       Proteobacteria       Proteobacteria       0.5         Brewundimonas, so., Root1279       Brewundimonas       Proteobacteria       0         Acidovorax, so., Lea778       Acidovorax       Proteobacteria       0         Achomobacter, Juliandii       Achomobacter, Proteobacteria       0         Microbacterium, Dividocatonoxydans       Microbacteria       Pancocccus       Firmicutes       0         Microbacterium, Solisivae       Flavihumibacter, Solisivae       Bacillus       Firmicutes       -0.5         Streatomyces, solisivae       Firmicutes       Streatomyces, actinobacteria       -0.5         Streatomyces, solisivae       Olisella, so, UNCSOL64       Streatomyces, actinobacteria       -0.5         Olisella, ureolytica       Olisella       Proteobacteria       -0.5         Olisella, so, UNCC008       Mesorhizobium       Proteobacteria       -0.5         Mesorhizobium, Lardaugens       Novosphinaobium       Proteobacteria       -0.5         Meicobacteri, canis       Helicobacteriovarx, marinus       Halobacteriovarx       -0.5         Gobaclius, S, Alexanbacteria, bacterium, SCR, 15       unclassified       Candidatus, Barabacteria         Helicobacteri,	Xenorhabdus ga, NBAU, XenSa04       Xenorhabdus       Proteobacteria       0.5         Vibrio       Serverudimonas ga, Root1279       Brevundimonas       Proteobacteria       0         Brevundimonas ga, Root1279       Brevundimonas       Proteobacteria       0         Achromobacter, ruhlandii       Achromobacter, ruhlandii       Achromobacter       Proteobacteria       0         Achromobacter, ruhlandii       Achromobacter       Bravinumiscare       Bacteroidetes       0         Harococcus, Ga, CAUI3       Planococcus, Grimicutes       Bacteroidetes       0         Breillus, so, UNC3701720/20129       Bactillus       Firmicutes       0         Breindinabium, tardaueens       Oligella       Firmicutes       0         Streatomoves, so, MUSCI64       Streatomoves       Firmicutes       0         Streatomoves, SGAV1       Halomata       Olarskowia       Actinobacteria       0         Novosphinaphium, tardaueens       Novosphinaphium       Proteobacteria       0       0         Novosphinaphium, tardaueens       Novosphinaphium       Proteobacteria       0       0         Machinaphium, tardaueens       Novosphinaphium       Proteobacteria       0       0         Machinaphium, tardaueens       Novosphinaphium       Proteobacteria </td <td></td> <td>Prevotella_spCAG:732</td> <td>Prevotella</td> <td>Bacteroidetes</td> <td></td>		Prevotella_spCAG:732	Prevotella	Bacteroidetes	
Vibrio.s., RC341VibrioProteobacteriaOtoAcidovara.s., Leaf78AcidovaraProteobacteria0Acidovara.s., Leaf78AcidovaraProteobacteria0Acidovara.s., Leaf78AcidovaraProteobacteria0Acidovara.s., Leaf78AcidovaraProteobacteria0Acidovara.s., Leaf78AcidovaraProteobacteria0Plancoccus.s., CAU13PlancoccusFirmicutes0Microbacterium.hydrocathonovydansMicrobacteriumActinobacteriaFlavihumibacter.solisilvaeEmiticiaBactroidetes-0.5Bacillus.s., UNC437CL 72CviS29Bacillus.s.FirmicutesBacillus.s., UNC437CL 72CviS29Bacillus.s.FirmicutesStreatocorcus.s., 343, SSPCStreatocorcus.s.FirmicutesOlizella, ureolyticaOlizellaProteobacteriaNovosahinaobium, tardaugensNovosahinaobiumProteobacteriaMesonincobium, tardaugensNovosahinaobiumProteobacteriaHalobacteriovorax.marinusHalobacteriovoraxProteobacteriaGeobacillus.s., DattrouGeobacillusFirmicutesGeobacillus.s., Dattrinu, GW201L GWA1,44,9unclassifiedCandidatus, AzambacteriaAteromonas.s., Nac.26AlteromonasProteobacteriaAteromonas.s., Nac.26AlteromonasProteobacteriaAteromonas.s., Nac.278ProteobacteriaBacteroidetesPhaeodacvilhacter, vinennasProteobacteriaAteromonas.s., Nac.278ProteobacteriaBacteroidetesProteobacter	Whin s.r., RC3-11       Whin is a.r., RC3-1279       Proteobacteria       Proteobacteria         Acidovorax, s.g., Leaf78       Acidovorax       Proteobacteria       0         Acidovorax, s.g., CAU13       Plancocccus       Proteobacteria       0         Microbacteru, Invitanti       Achromobacter       Proteobacteria       0         Microbacteru, Invitanti       Achromobacter       Proteobacteria       0         Microbacteru, Invitanti       Bacteroidetes       -0.5         Flavihumibacter, solisilvae       Flavihumibacter       Bacteroidetes       -0.5         Strentomyces, J.MUSCIG4       Strentomyces       Actinobacteria         Strentomyces, J.MUSCIG4       Strentomyces       Actinobacteria         Oligella, urabita       Orscholadeteria       Proteobacteria         Novashinazbitum, Lardauens       Mesonhizazbitum       Proteobacteria         Mesonhizazbitum       Proteobacteria       Proteobacteria         Halobacteriovorax, marinus       Halobacteriovorax       Proteobacteria         Halobacteriovorax, marinus       Halobacteriovorax       Proteobacteria         Actinobacteria       Dacteria       Candidatus, Azambacteria         Actinobacteria       Dacteria       Proteobacteria         Mesonhizazbitum       Proteobacter	Wibrios., RCG241       Vibrio       Proteobacteria       O         Acidovorar, sp., Leal73       Acidovorar       Proteobacteria       O         Acidovorar, sp., CAU13       Acidovorar       Proteobacteria       O         Acidovorar, sp., CAU13       Planococcus       Firmicutes       O         Rencoaccus, sp., CAU13       Planococcus       Firmicutes       O         Rencoaccus, sp., CAU13       Planococcus       Firmicutes       O         Flavhumbacter, solis/ivae       Acidovorar, Actinobacteria       Actinobacteria       O         Flavhumbacter, solis/ivae       Emitoicia       Bacillus, sp., UVC437CL720/S29       Bacillus       Actinobacteria       Firmicutes         Streatoroccus, sp., 343_SSPC       Streatoroccus       Firmicutes       Firmicutes       Firmicutes         Streatoroccus, sp., 343_SSPC       Streatoroccus       Colskiva, Lutes       Actinobacteria       Proteobacteria         Novaschinacobium, Lardaugens       Novaschinacobium       Proteobacteria       Proteobacteria       Proteobacteria         Helcobacter, canis       Helcobacter, canis       Proteobacteria       Proteobacteria         Halobacteriovorax, marinus       Halobacteriovorax, marinus       Halobacteriovorax       Proteobacteria         Geobacillus, S., Naz.26       Al		Xenorhabdus_spNBAII_XenSa04	Xenorhabdus	Proteobacteria	0.5
Brewindimonas, so., Root1279       Brewindimonas, so., Poteobacteria       0         Achomobacter, unhandii       Achomobacter, unhandii       Achomobacter, unhandii       0         Achomobacter, unhandii       Achomobacter, unhandii       Achomobacter, unhandii       0         Alanococcus, S. (AUL3       Planococcus, S.       Firmicutes       0         Hainbacter, solitota       Bacteroidetes       10.5         Kicrobacterium, hydrocarbonoxydans       Microbacterium       Actinobacteria       0         Hainbacter, solitota       Bacteroidetes       10.5         Bacillus, so, UNC437CL72CxiS29       Bacillus       Bacteroidetes       10.6         Streatomyces, So, JMSC164       Streatomyces       Actinobacteria         Olizella, ureolytica       Olizella       Proteobacteria         Overschinadobium, tardauens       Novoschinadobium       Proteobacteria         Mesorhizobium, so, URHC0008       Mesorhizobium       Proteobacteria         Halobacteriovorax, marinus       Halobacteriovorax       Proteobacteria         Geobacillus, so, B4113, 201601       Geobacillus       Proteobacteria         Garmanoretobacteria, bacterium, SG8,15       Huonbacter       Proteobacteria         Alteromonas, so., Nap.26       Actaria       Actinobacteria         Acido	Brewundimonas, sp., 26021279       Brewundimonas, sp., Proteobacteria       0         Achromobacter, unhandii       Achromobacter, unhandii       Proteobacteria       0         Achromobacter, unhandii       Achromobacter, unhandii       Achromobacter, unhandii       0         Microbacter, unhandii       Achromobacter, unhandii       Achromobacter, unhandii       0         Microbacter, unhandii       Achromobacter, unhandii       0         Microbacter, unhandii       Achromobacter, unhandii       0         Flainhumibacter       Bacteroidetes       0         Flainhumibacter       Bacteroidetes       0         Streatomyces, sp., MUSC124       Streatococcus, sp., 243, SSPC       Streatococcus, sp., 243, SSPC       Streatococcus, sp., 243, SSPC         Oligela, uneohytica       Oligela, acohytica       Oligela, Proteobacteria       Actinobacteria         Novosahinaobium, sp. URHC0008       Mesonhizobium       Proteobacteria         Halobacteriovorax, marinus       Halobacteriovorax       Proteobacteria         Geobacillus, sp., 24113, 201601       Geobacillus, sp., 24113, 201601       Geobacillus, sp., 24113, 201601         Geobacillus, sp., 24113, 201602       Unclassified       Proteobacteria         Ateromonas, sp., Rotabateria, Bacterium, GW2011, GWA2, 32, 9       Unclassified       Candidatus, Azambacteria	Brevundimonas, sc., Root1279       Brevundimonas, proteobacteria       0         Achromobacter, ruhlandii       Achromobacter, ruhlandii       Achromobacter, ruhlandii       0         Achromobacter, ruhlandii       Achromobacter, ruhlandii       0         Microbacterium, hydrocarbonoxydans       Microbacterium       Actinobacteria       0         Microbacterium, hydrocarbonoxydans       Microbacterium       Actinobacteria       0         Microbacterium, hydrocarbonoxydans       Microbacterium       Actinobacteria       0         Bacillus, ac, UNCASTCI 27CV/529       Bacillus       Bacteroidetes       0         Strentomyces, ap, MUSCI64       Strentomyces       Actinobacteria         Oligella, uneolynica       Oligella       Proteobacteria         Novosphinapobum, tardauaens       Novosphinapobum, tardauaens       Novosphinapobum, tardauaens         Novosphinapobum, tardauaens       Novosphinapobum, tardauaens       Novosphinapobum, tardauaens         Helicobacter       Canis       CHICobacteria       Proteobacteria         Helicobacter       Proteobacteria       Proteobacteria         Helicobacter       Proteobacteria       Proteobacteria         Halomans & C.GAL-1       Halobacteriovorax       Proteobacteria         Helicobacteria       Proteobacteria       Pro		Vibrio_spRC341	Vibrio	Proteobacteria	0.0
Acidovorax, sp. Leai778       Acidovorax       Proteobacteria       0         Acidovorax, sp. CAU13       Planozoccus       Firmicutes       0         Planozoccus, sp. CAU13       Planozoccus       Firmicutes       0         Planozocus, sp. CAU13       Planozoccus       Firmicutes       0         Planozocus, sp. CAU13       Planozocus       Firmicutes       0         Planozocus, sp. CAU13       Planozocus       Firmicutes       0         Flavihumibacter, solisivae       Firmicutes       Bacteroidetes       0         Bacillus, sp. UNC437C12CviS29       Bacillus       Bacteroidetes       Firmicutes         Streptopocus, sp. JALSSPC       Streptopocus       Firmicutes       Colobacteria         Olgelal, ureolvica       Olgela       Proteobacteria       Proteobacteria         Novosphinoobium, Lardauens       Novosphinoobium       Proteobacteria       Proteobacteria         Halomans, Sp. URIC0028       Helicobacter       Proteobacteria       Proteobacteria         Halobacteriovar, marinus       Halobacteriovarak       Proteobacteria         Geobacillus, Sp. JALI3, 201601       Geobacillus       Proteobacteria         Geobacillus, Sp. JALI3, 201601       Geobacillus       Proteobacteria         Fluonbacte, boctenia, bacterium, GW2011	Acidovars       Sectorabacteria       Poteobacteria       0         Acidovars       Proteobacteria       0         Plancoccus su. CAU13       Plancoccus       Fimicutes       -0.5         Harchorabacter: solisilvae       Fimicutes       Fimicutes       -0.5         Flavihumibacter: solisilvae       Fimicutes       Bacteroidetes       -0.5         Bacillus su. UNASTC12/CVIS29       Bacteroidetes       Bacteroidetes       -0.5         Streatocorus: su. JAUSC184       Streatomyces: a Actinobacteria       Poteobacteria       -0.5         Orskivia: Lurbata       Olizella       Proteobacteria       -0.5         Mesonizobium, tardauens       Novosphinaobium, tardauens       Novosphinaobium, tardauens       Novosphinaobium, tardauens       Novosphinaobium, tardauens       Novosphinaobium       Proteobacteria         Mesonizobium, andures       Cerskovia       Actinobacteria       Proteobacteria         Mesonizobium, tardauens       Novosphinaobium,	Acidovars.sp. Jeaf78       Acidovars       Proteobacteria       0         Acimombacter       Proteobacteria       0         Plancoccus.sp. CAUU3       Plancoccus       Firmicutes       0         Flavihumbacter.solisilvae       Firmicutes       Bacteroidetes       0         Flavihumbacter.solisilvae       Firmicutes       Bacteroidetes       0         Flavihumbacter.solisilvae       Firmicutes       Bacteroidetes       0         Streatomorphica       Streatomorphica       Firmicutes       0         Streatomorphica       Streatomorphica       Firmicutes       0         Olizella, uneolytica       Olizella, uneolytica       Olizella, uneolytica       0         Olizella, uneolytica       Olizella, uneolytica       Olizella, uneolytica       0         Novosahinaobium, tardaugens       Novosahinaobium       Proteobacteria       0         Helicobacter, canis       Helicobacter       Proteobacteria       0         Habomans, Sp. GFA-1       Halobacteriovarx       Proteobacteria       0         Halobacteriovarx, anditus, Stambacteria, bacterium, SG8,15       unclassified       Candidatus, Azambacteria         Geobacillus, Sp. UNH2001       Gammanoteobacteria, bacterium, GW201, GWA1,44,9       unclassified       Candidatus, Azambacteria		Brevundimonas_sp_Root1279	Brevundimonas	Proteobacteria	
Achramobacter:       Proteobacteria       Proteobacteria         Planococcus       Firmicutes         Alicrobacterium, hydroarbonoxydans       Microbacterium       Actinobacteria         Planococcus       Firmicutes         Alicrobacterium, hydroarbonoxydans       Microbacteria       Bacteroidetes         Planococcus       Bacteroidetes       Bacteroidetes         Flavihumibacter:       Streptonococus       Firmicutes         Bacillus sp. UNC437C1720v329       Bacillus       Firmicutes         Streptonococus.sp. 343.258C       Streptococcus       Firmicutes         Olcaella       Porteobacteria       Proteobacteria         Vovashinaobium, tardaueens       Novashinaobium       Proteobacteria         Mesorhizobium, sp. URHC0008       Mesorhizobium       Proteobacteria         Helicobacter:       Proteobacteria       Helicobacter         Geobacillus sp. B4113, 201601       Geobacillus Sp. Firmicutes         Goideuter, bazemanae       Halomonas       Proteobacteria         Fluonbacter, bazemanae       Huorbacter, bazemanae       Firmicutes         Goideuter, bazemanae       Halomonas Sp. Cal.15       unclassified       Candidatus_Azambacteria         Goideuter, bazemanae       Helcobacter: ovorax       Proteobacteria	Achromobacter:       Proteobacteria       Proteobacteria         Planococcuss       Firmicutes       Attinobacteria       Attinobacteria         Flankomitacter:       Streptonovdans       Microbacteria       Attinobacteria         Flankomitacter:       Streptonovcash       Firmicutes       Bacteroidetes       -0.5         Bacteroidetes       Streptonovcash       Streptonovcash       Firmicutes       -0.5         Streptonovcash       Streptonovcash       Actinobacteria       -0.5         Olarela, uredvintca       Olarela       Proteobacteria       -0.5         Ovcashinaobium_tardauens       Novcashinaobium       Proteobacteria       -0.5         Halomonas.so., GFA-1       Halomonas.so., GFA-1       Halomonas.so., GFA-1       Halomonas.so., GFA-1         Halobacteri.vovark.marinus       Halobacteria       Proteobacteria         Geobacillus.so., BAU13.201601       Geobacillus.so., Servestoria       Candidatus, Azambacteria         Garmaporteobacteria, bacterium, SGR_15       unclassified       Candidatus, Azambacteria         Fluoribacter. bozemanae       Novashincabium       Proteobacteria         Geobacillus.so., Sonot58       Actinomas       Proteobacteria         Gardidatus_Azambacteria       Actromonas       Proteobacteria         Fluoribacter	<ul> <li>Achromobäcter, uhlandii</li> <li>Achromobäcter</li> <li>Proteobacteria</li> <li>Planococuss, CAUJ</li> <li>Planococuss, CAUJ</li> <li>Microbacterium, hvdrozarbonoxydans</li> <li>Microbacterium, hvdrozarbonoxydans</li> <li>Microbacterium, hvdrozarbonoxydans</li> <li>Planococuss, CAUJ</li> <li>Bacillus, Sp. UNC437C172Cv529</li> <li>Bacillus, Sp. Jel 13, 201601</li> <li>Geobacillus, Sp. Jel 14, 29</li> <li>Unclassified</li> <li>Proteobacteria</li> <li>Proteobacteria</li> <li>Proteobacteria</li> <li>Proteobacteria</li> <li>Proteobacteria</li> <li>Proteobacteria</li> <li>Proteobacteria</li> <li>Proteobacteria</li> <li>Proteobacteria</li>     &lt;</ul>		Acidovorax sp. Leaf78	Acidovorax	Proteobacteria	0
Plancaccusi siz       CAU33       Plancaccusi siz       Firmicutes         Microbacterium, hydrocarbonoxydans       Microbacterium       Actinobacteria       Bacteroidetes         Hawhumibacter, solisilvae       Emnicicia       Bacteroidetes       Bacteroidetes       Bacteroidetes         Bacteroidetes       Emnicicia       Bacteroidetes       Bacteroidetes       Bacteroidetes       -0.5         Bacteroidetes       Streatcomyces, so, MUSC184       Streatcomyces       Actinobacteria       -0.5         Bacteroidetes       Streatcomyces, so, MUSC184       Streatconyces, and Microbacteria       -0.5         Olaella, ureolytica       Olaella, ureolytica       Olaella, ureolytica       Olaella       Proteobacteria         Microbacter, canis       Holobacter, canis       Helicobacter, proteobacteria       Proteobacteria         Halobacter, bozemanae       Halobacteriovarax       Proteobacteria       Proteobacteria         Halobacter, bozemanae       Geobacillus, so, BH113, 201601       Geobacillus, So, CFAI-1       Halobacteriovarax       Proteobacteria         Halobacter, bozemanae       Geobacillus, so, Molacteri, Bacterium, GW2011, GWA1,41,9       unclassified       Candidatus, Azambacteria         Geobacillus, so, JMALSS       Acadovarax, so, JMALSS       Acadovarax       Proteobacteria         Halobacterin	Plancococcus sc. CAU13       Plancococcus sc. Cauta Actinobacteria       Firmicutes         Microbacterium, Ividiocatonoxydans       Microbacterium       Actinobacteria       Bacteroidetes       -0.5         Haivihumibacter, Solisivae       Emticicia       Bacteroidetes       Bacteroidetes       -0.5         Bacteroidetes       Emticicia       Bacteroidetes       Actinobacteria       Bacteroidetes       -0.5         Bacteroidetes       Streptomyces, sp. MUSC164       Streptomyces, Sp. MUSC164       Streptomyces, Actinobacteria       -0.5         Olicella, ureolytica       Olicella, ureolytica       Olicella, Proteobacteria       Proteobacteria       -0.5         Microbacter, canis       Helicobacter, canis       Helicobacter, canis       Helicobacter, canis       Firmicutes       -0.5         Halomonas, Sp. GRUCO08       Mesoritizobium       Proteobacteria       Proteobacteria         Halomonas, Sp. Bul13, 201601       Geobacillus, sp. Bul13, 201601       Geobacillus, sp. Bul13, 201601       Geobacillus, sp. Macteria         Gammatorobacteria, bacterium, GW2011, GWA1, 44, 9       unclassified       Candidatus, Azambacteria         Alteromonas, Sp. Orat, Basteroidetes       Acadiovara, Sp. Cobacteria       Acadiovara, Sp. Cobacteria         Alteromonas, Sp. Orat, Basteroidetes       Acadiovara, Sp. Cobacteria       Acadiovara, Sp. Cobacteria	Planococcus sc. CAU13       Planococcus sc. CAU13       Planococcus sc. Cautobacteria       Planococcus sc. Plinicutes       Planococcus Planotics       Planococcus Planotics       Planococcus Planotics       Planotics<		Achromobacter ruhlandii	Achromobacter	Proteobacteria	0
Microbacterium, hydrocarbonoxydans       Microbacterium       Actinobacteria         Nicrobacterium, hydrocarbonoxydans       Nicrobacterium       Actinobacteria         Nicrobacter, solisivae       Plavihumibacter       Bacteroidetes       Bacteroidetes         Bacillus, so, UNC437C172CV/S29       Bacillus       Firmicutes       Bacteroidetes         Bacillus, so, UNC437C172CV/S29       Bacillus       Firmicutes         Streetomyces, so, JAJSC164       Streetomyces       Actinobacteria         Orlealla, ureohytica       Orlealla, ureohacteria       Proteobacteria         Orlealla, ureohytica       Orlealla       Proteobacteria         Mesorhizobium, tardaueans       Novasohinaobium       Proteobacteria         Mesorhizobium, so, URHC0008       Mesorhizobium       Proteobacteria         Mesorhizobium, so, JCH-10       Halobacterizovorax       Proteobacteria         Mesorhizobium, so, JCH, SCA, SCA, SCA, SCA, SCA, SCA, SCA, SCA	Microbacterium, Judicastonoxydans       Microbacterium       Actinobacteria       -0.5         Havihumibacite; solisilvae       Havihumibacite;       Bacteroidetes       -0.5         Emitoica, olicorabhica       Bacteroidetes       Filmicutes       Bacteroidetes       -0.5         Emitoica, olicorabhica       Bacteroidetes       Filmicutes       Bacteroidetes       -0.5         Streptomyces, sp. 343,259C       Streptomyces       Actinobacteria       Filmicutes         Olicella, ureolynica       Olicella, ureolynica       Olicella       Proteobacteria         Vovasphinaobhum, Tardauens       Novasphinaobhum       Proteobacteria         Mesorhizobhum, Sp. URHCOOB       Mesorhizobhum       Proteobacteria         Mesorhizobhum, Sp. URHCOOB       Mesorhizobum       Proteobacteria         Helicobacter, canis       Helicobacter       Proteobacteria         Halomanas, Sp. GRA-1       Halomanas       Proteobacteria         Halomanas, Sp. JABL 201601       Geobacillus       Filmicutes         Gammaproteobacteria, bacterium, SGB,15       unclassified       Candidatus, Azambacteria         Halomanas, Sp. JABL 201601       Unclassified       Candidatus, Azambacteria         Gammaproteobacteria, bacterium, GW2011, GWA1,44,9       unclassified       Candidatus, Azambacteria	Interobacterium, Indicarbonoxydans       Microbacterium       Actinobacteria       −0.5         Interobacterium, Indicarbonoxydans       Microbacterium       Actinobacteria       −0.5         Interobacterium, Indicarbonoxydans       Microbacteria       Bacteroidetes       Bacteroidetes       Bacteroidetes       0.05         Interobacterium, Indicarbonoxydans       Microbacteria       Bacteroidetes       Bacteroidetes       0.05         Interobacterium, Indicarbonoxydans       Microbacteria       Bacteroidetes       0.05         Interobacterium, Indicarbonoxydans       Microbacteria       Bacteroidetes       0.05         Interobacterium, Indicarbonoxydans       Microbacteria       Proteobacteria         Interobacteria       Microbacteria       Actinobacteria         Interobacteria       Microbacteria       Microbacteria         Interobacteria       Microbacteria		Planococcus sp. CAU13	Planococcus	Firmicutes	
Havitumibacter, solisivae       Havitumibacter       Bacteroidetes       -0.5         Havitumibacter, solisivae       Emticia       Bacteroidetes       -0.5         Emticia, olipotrophica       Emticia       Bacteroidetes       -0.5         Streptomyces, sp., M3.254       Streptomyces       Actinobacteria       -0.5         Oligella, ureolytica       Oligella       Proteobacteria       -0.6         Oligella, ureolytica       Oligella       Proteobacteria       -0.6         Nevosphinaobium, sp. URHC0008       Mesorhizobium       Proteobacteria       -0.6         Halomonas, S., GFAI-1       Halomonas       Proteobacteria       -0.6         Halomonas, S., GFAI-1       Halomonas       Proteobacteria       -0.6         Halobacter.canis       Halobacteriovorax, marinus       -0.6       -0.6       -0.6         Geobacillus, sp., SAI13, 201601       Geobacillus, Filmicutes       -0.6       -0.6       -0.6         Geobacillus, sp., Saumbacteria, bacterium, GW2011, GWA1, 41, 9       unclassified       Proteobacteria       -0.6         Geobacillus, sp., Nap, 26       Alteromonas       Proteobacteria       -0.6       -0.6       -0.6       -0.6       -0.6       -0.6       -0.6       -0.6       -0.6       -0.6       -0.6       -0.	Havhumbacter, solsivae       Havhumbacter       Bacteroidetes       -0.5         Bacteroidetes       Emticia       Bacteroidetes       Bacteroidetes       -0.5         Bacteroidetes       Bacteroidetes       Bacteroidetes       Bacteroidetes       -0.5         Bacteroidetes       Bacteroidetes       Bacteroidetes       Bacteroidetes       -0.5         Streptococcus       Streptococcus       Firmicutes       Actinobacteria       -0.5         Olicella       Porteobacteria       -0.6       -0.6       -0.6         Olicella, ureolytica       Olicella       Proteobacteria       -0.6       -0.6         Olicella, ureolytica       Olicella       Proteobacteria       -0.6       -0.6       -0.6         Mesorhizobium, p. URHC0008       Mesorhizobium       Proteobacteria       -0.6       -0.6       -0.6         Helicobacter, canis       Helicobacter       Proteobacteria       -0.6<	Hawburbacter, Solsivae       Hawburbacter       Bacteroidetes       0.5         Hawburbacter       Bacteroidetes       Bacteroidetes       0.5         Streutomyces.soMUSC184       Streutomyces       Actinobacteria       Bacteroidetes         Streutomyces.soMUSC184       Streutococcus       Firmicutes       Actinobacteria         Olaella.ureolytica       Olaella       Proteobacteria         Olaella.ureolytica       Olaella       Proteobacteria         Movoshingobium.tardauens       Novoshingobium       Proteobacteria         Halobacter.canis       Helicobacter       Proteobacteria         Halomas.soGRAI-1       Halobacterizobacteria         Halomas.soGRAI-1       Halobacteriovarx         Halobacter.canis       Halobacteriovarx         Geobacillus.soGAI-1       Halobacteriovarx         Halobacteria       Proteobacteria         Gammaproteobacteria.bacterium.SGB.15       unclassified       Proteobacteria         Gandiatus.so.Nap.26       Actarobacteria       Actarobacteria         Gardidus.so.so.Nap.26       Actarobacteria       Actarobacteria         Gardidus.so.so.Nap.26       Actarobacteria       Proteobacteria         Gardidus.so.so.Nap.26       Actarobacteria       Actarobacteria         Gardidus.so.s		Microhacterium bydrocarhonoxydans	Microbacterium	Actinobacteria	
Immunicational activities       Immunication         Immunication       Immunication         Immunication       Immunication         Bacillus sp. UNCL37CL72CViS29       Bacillus         Bacillus sp. UNCL37CL72CViS29       Bacillus         Streptomorces       Firmicutes         Streptomorces       Firmicutes         Streptomorces       Firmicutes         Olicella urophytica       Olicella urophytica         Oerskovia, Turbata       Olicella urophytica         Oerskovia, Turbata       Oerskovia         Mesonhizobium, tardaueens       Novesphinaobium         Proteobacteria       Proteobacteria         Mesonhizobium, sp. URHC0008       Mesonhizobium         Mesonhizobium, sp. URHC0008       Mesonhizobium         Helicobacter, canis       Halobacteriovorax, Proteobacteria         Halobacteriovorax, mainus       Halobacteriovorax, Proteobacteria         Gammaroteobacteria, bacterium, GW2011_GWA144.9       unclassified       Candidatus, Azambacteria         Gammaroteobacteria, bacterium, GW2011_GWA238.9       Alteromonas       Proteobacteria         Activorans, alvas, sp. Nap.26       Alteromonas       Proteobacteria         Activorans, alvas, sp. CAG68       Activorax       Proteobacteria         Activorans, alvas, sp. CAG68	Imminute and activation of the second sec	Image: Product and the sector of the sec		Flavihumihacter solisilvae	Flavihumihacter	Bacteroidetes	-0.5
Bacillus sp. UNC437C12CViS29       Bacillus sp. UNC437C12CViS29       Bacillus sp. Chilobacteria         Streptococcus       Firmicutes       Actinobacteria         Streptococcus       Firmicutes       Actinobacteria         Oligella ureohrica       Oligella       Proteobacteria         Novosphinaobium, tardauaens       Novosphinaobium       Proteobacteria         Mesorhizobium, Sp. URHC0008       Mesorhizobium       Proteobacteria         Mesorhizobium, Sp. URHC0008       Mesorhizobium       Proteobacteria         Helicobacter, Canis       Helicobacter       Proteobacteria         Halomonas, Sp. GRA/1       Halomonas       Proteobacteria         Geobacillus, Sp. Jacobacteria, Exertium, SG8,15       unclassified       Proteobacteria         Fluoribacter, bozemanae       Fluoribacter       Proteobacteria         Geobacillus, Sp. Nag. 26       Alteromonas       Proteobacteria         Alteromonas, Sp. Nag. 26       Alteromonas       Proteobacteria         Alteromonas, Sp. Nag. 26       Alteromonas       Batteroidetes         Actiovorax, Sp. Nag. 26       Actiovorax       Proteobacteria         Actiovorax, Sp. Nag. 26       Actiovorax       Proteobacteria         Actiovorax, Sp. Nag. 26       Actiovorax       Proteobacteria         Actiovorax, Sp. Nat	Bacillus, sp. UNC437C1 72CvIS29       Bacillus sp. UNC437C1 72CvIS29         Bacillus, sp. UNC437C1 72CvIS29       Bacillus sp. Attraction         Streptococcus       Firmicutes         Streptococcus       Firmicutes         Olicalla       Proteobacteria         Olicalla       Proteobacteria         Olicalla       Proteobacteria         Novosphinaobium, tardauzens       Novosphinaobium         Novosphinaobium, sp. URHC0008       Mesorhizobium         Helicobacter, canis       Helicobacter         Proteobacteria       Halomonas         Halobacteriovorax, mainus       Halobacteriovorax, mainus         Geobacillus, sp. JA13_201601       Geobacillus         Geobacillus, sp. JNa2_26       Alteromonas         Fluonbacter, bozemanae       Fluonbacter         Proteobacteria       Acarivorans, proteobacteria         Acarivorans, sp. Na2_26       Alteromonas         Alteromonas, sp. Na2_26       Alteromonas         Anteromonas, sp. Vac568       Acaldovarax         Proteobacteria	Bacillus sp. UNC437C1/2CV/529       Bacillus sp. UNC437C1/2CV/529       Bacillus sp. UNC437C1/2CV/529         Streatcocccus       Firmicutes         Streatcoccus       Firmicutes         Oliaella ureolvica       Oliaella         Porteobacteria       Oliaella         Nevosphinaobium, tardauaens       Novosphinaobium         Nevosphinaobium, sp. URHC0008       Mesonitaobium         Mesonitaobium, sp. URHC0008       Mesonitaobium         Helicobacter, canis       Helicobacteria         Halomonas       Proteobacteria         Geobacillus, sp. GA11, 2       Halomonas         File       Halomonas, sp. GA11, 2         Halomonas, sp. GA11, 2       Halomonas         Proteobacteria       File         Geobacillus, sp. Jatil, 201601       Geobacillus         Geobacillus, sp. Jatil, 201601       Unclassified         Candidatus, Jatambacteria       Candidatus, Jatambacteria         Geobacillus, sp. Jatil, 20201       GWA1,41,9		Emticicia oligotrophica	Emticicia	Bacteroidetes	
Balinds       Data (Data)       Actinobacteria         Streptomyces, sp., MUSC164       Streptococcus       Firmicutes         Streptococcus, sp., 34, 359C       Streptococcus       Firmicutes         Collaella, uropolitica       Ocisialla, uropolitica       Actinobacteria         Ocisialla, uropolitica       Ocisialla, uropolitica       Actinobacteria         Operskovia, turbata       Oerskovia       Actinobacteria         Mesonhizobium, sp., URHC0003       Mesonhizobium       Proteobacteria         Mesonhizobium, sp., URHC0003       Mesonhizobium       Proteobacteria         Helicobacter, canis       Helicobacter       Proteobacteria         Halobacteniovorax, mainus       Halobacteniovorax       Proteobacteria         Halobacteniovorax, mainus       Halobacteriovorax       Proteobacteria         Gammaroteobacteria, bacterium, GW2011, GW41, 44, 9       unclassified       Candidatus, Azambacteria         Gaminas, an, Nao, 26       Alteromonas       Proteobacteria         Actiovarax, sp., CRA2       Alteromonas       Proteobacteria         Actinobacter, bacterium, GW2011, GW41, 44, 9       unclassified       Candidatus, Azambacteria         Actiovarax, sp., Nao, 26       Alteromonas       Proteobacteria         Actiovarax, sp., Nao, 26       Alteromonas       Bacteriodetet	Datamas       Datamas       Actinobacteria         Streptomyces.sp./MUSCIG4       Streptococcus       Firmicutes         Streptococcus.sp34.3.SSPC       Streptococcus       Firmicutes         Olidella_ureophitica       Olidella_ureophitica       Actinobacteria         Overskivia_turbata       Olidella       Actinobacteria         Mesonhizobium, staduatens       Novesphinaobium       Proteobacteria         Mesonhizobium, sp. URHCO008       Mesonhizobium       Proteobacteria         Helicobacter, canis       Helicobacteri       Proteobacteria         Halobacteriovorax, marinus       Halobacteriovorax       Proteobacteria         Geobacillus, Sp.4113.201601       Geobacillus       Firmicutes         Geobacillus, Azambacteria, bacterium, GW2011_GWA1.44.9       unclassified       Candidatus, Azambacteria         Berkelbacteria, Sp. Nap.26       Alteromonas       Proteobacteria         Alteromonas, Sp. Nap.26       Alteromonas       Proteobacteria         Adarivorans, glivus       Acatinovarx, Sp.       Proteobacteria         Adarivorans, Sp. Nap.26       Alteromonas       Proteobacteria         Alteromonas, Sp. Nap.26       Alteromonas       Proteobacteria         Adarivorans, Sp. Nap.26       Alteromonas       Proteobacteria         Adarivorans, Sp.	Jackman       Jackman       Jackman       Jackman         Jackman       Streptomyces, sp., JMUSC164       Streptococcus       Firmicutes         Streptomyces, sp., JALSC164       Streptococcus       Firmicutes         Streptomyces, sp., JALSC164       Streptococcus       Firmicutes         Streptomyces, sp., JALSC164       Streptococcus       Firmicutes         Olisalla, urophycin       Actinobacteria       Proteobacteria         Operskovia, turbata       Oerskovia       Actinobacteria         Operskovia, turbata       Operskovia       Actinobacteria         Mesorhizobium, sp., URHC0008       Mesorhizobium       Proteobacteria         Mesorhizobium, sp., URHC0008       Helicobacter       Proteobacteria         Halomonas, sp., GRAI-1       Halomonas       Proteobacteria         Halomonas, sp., GRAI-1       Halobacteriovorax       Proteobacteria         Halomonas, sp., JRA, ZBA       Geobacillus, sp. 24113, 201601       Geobacillus, Sp. 24113, 201601       Geobacillus, Sp. 24113, 201601         Geobacillus, sp. 24113, 201601       Geobacillus, Sp. 24113, 201601       Geobacillus, Sp. 24113, 201601       Geobacillus, Sp. 24113, 201601         Geobacillus, sp. 24113, 201601       Geobacillus, Sp. 24113, 201601       Geobacillus, Sp. 24113, 201601       Geobacillus, Sp. 24113, 201601         G		Bacillus en LINCA37CL72QuiS20	Bacillus	Firmicutes	
Streptococcus sp. 3/3, SSPC       Streptococcus sp. initial streptosporandium streptococcus sp. initial streptosporandium streptosp. i	Strentrococcus sp. 343,35PC       Strentrococcus SP, 443,35PC         Strentrococcus sp. 343,35PC       Strentrococcus SP, 443,35PC         Oliaella Ureolvita       Oliaella Proteobacteria         Oliaella Ureolvita       Oliaella Proteobacteria         Oliaella Ureolvita       Oliaella Proteobacteria         Novasphinaobium, tardauzens       Novasphinaobium         Novasphinaobium, sp. URHC0008       Mesorhizobium         Helicobacter, canis       Helicobacter         Proteobacteria       Proteobacteria         Halomonas, GFAI-1       Halobacteriovorax         Halobacteriovorax, marinus       Halobacteriovorax         Geobacillus, sp. 34113, 201601       Geobacillus         Gammaproteobacteria, bacterium, GW2011, GWA1,44,9       unclassified         Fluoribacter, bozemanae       Fluoribacter, bozemanae         Gandiatus, Azambacteria, bacterium, GW2011, GWA2,38,9       Alteromonas         Alteromonas, sp. Nap, 26       Alteromonas         Proteobacteria       Acarivorans         Adarivorans, alivus       Aparivorans         Adarivorans, Sp. URHB0020       Variovorax         Variovorax, sp. CRNB022       Variovorax         Proteobacteria       Batteroidetes         Porphyromonas       Bacteroidetes         Porphyromonas	Streptococcus s, 243, 25PC       Streptococcus Firmicutes         Streptococcus s, 1743, 25PC       Streptococcus Firmicutes         Oliaella ureolvita       Oliaella       Proteobacteria         Oliaella ureolvita       Oliaella       Proteobacteria         Mexorizobium, s, URHCOOB       Mesorizobium       Proteobacteria         Helicobacter, canis       Helicobacter       Proteobacteria         Helicobacter, canis       Halobacteriovorax, marinus       Halobacteriovorax       Proteobacteria         Helicobacter, canis       Halobacteriovorax, marinus       Halobacteriovorax       Proteobacteria         Geobacillus sp., JA13, 201601       Geobacillus Firmicutes       Finoribacter, bozemanae       Filoribacter, bozemanae         Fluoribacter, bozemanae       Filoribacter, bozemanae       Filoribacter, bozemanae       Candidatus, Azambacteria         Ateromonas, sp., Nap., 26       Alteromonas, Proteobacteria       Acarivorans       Proteobacteria         Adarivorans, alivus       Aqarivorans       Proteobacteria       Candidatus, Azambacteria         Acidovorax, sp., Nap., 26       Alteromonas, proteobacteria       Candidatus, Parkelbacteria         Acidovorax, sp., Nap., 26       Alteromonas       Proteobacteria         Acidovorax, sp., Nap., 26       Alteromonas       Poteobacteria		Strentomyces sn MUSC164	Strentomyces	Actinobacteria	
Olgalla, unocuruo, Superformative       Olgalla, and the second sec	Oligalla, urgolski je protecibacteria       Oligalla, urgolski je protecibacteria         Oligalla, urgolski zurbata       Oligalla, urgolski zurbata         Overskivia, zurbata       Oerskovia, zurbata         Overskivia, zurbata       Oerskovia, zurbata         Okovsphinaobium, straduaens       Novesphinaobium         Mesorhizobium, sp. URHC0008       Mesorhizobium       Proteobacteria         Mesorhizobium, sp. URHC0008       Mesorhizobium       Proteobacteria         Helicobacter, canis       Helicobacter       Proteobacteria         Halomonas, sp. GRAI-1       Halomonas       Proteobacteria         Halobacteriovorax, marinus       Halobacteriovorax       Proteobacteria         Gammaroteobacteria, bacterium, GK2011, GWA1,44,9       unclassified       Candidatus, Azambacteria         Gammaroteobacteria, bacterium, GW2011, GWA1,44,9       unclassified       Candidatus, Azambacteria         Alteromonas, sp. Nap.,26       Alteromonas       Proteobacteria         Alteromonas, sp. Nap.,276       Alteromonas       Proteobacteria         Activorax, sp. URHE0020       Variovorax       Proteobacteria         Activorax, sp. URHE0020       Variovorax       Proteobacteria         Macovorax, Sp. Urgels       Activorax, sp.       Proteobacteria         Materomonas, sp. oral, taxon, 278       P	Digella_ureolytica       Digella_ureolytica       Digella_ureolytica         Oligella_ureolytica       Oligella_ureolytica       Actinobacteria         Derskovia_turbata       Derskovia       Proteobacteria         Derskovia_turbata       Proteobacteria       Proteobacteria         Derskovia_turbata       Proteobacteria       Proteobacteria         Derskovia_turbata       Betschinta       Proteobacteria         Derskovia_turbata       Betschinta       Proteobacteria         Derskovia_turbata       Betschintata       Proteobacteria         Derskovia_turbata       Betschintata       Proteobacteria         Derskovia_turbata       Betschintata       Proteobacteria         Derskovia_turbata       Betschintata       Proteobacteria         Derskovia_turbata       Betsc		Streptonoccus on 3/3 SSDC	Streptococcus	Firmicutes	
Olderikovia_jurbata     Olderikovia_iurbata     Actinobacteria       Olderikovia_jurbata     Olderikovia_iurbata     Actinobacteria       Novosphinaobium_tardauaens     Novosphinaobium     Proteobacteria       Novosphinaobium_so_URHC0008     Mesorhizobium     Proteobacteria       Helicobacter, canis     Helicobacter     Proteobacteria       Helicobacteriovorax_marinus     Halomonas     Proteobacteria       Geobacillus_so_GAL-1     Halobacteriovorax     Proteobacteria       Halobacteriovorax_marinus     Halobacteriovorax     Proteobacteria       Geobacillus_so_GAL-1     Halobacteriovorax     Proteobacteria       Geobacillus_so_GAL-1     Halobacteriovorax     Proteobacteria       Geobacillus_so_CALLS_201601     Geobacillus     Filvinbacter       Geobacillus_so_CALLS_2011_GWA2_38_9     unclassified     Candidatus_Azambacteria       Geobacillus_so_Nao_26     Alteromonas     Proteobacteria       Adarivorans_olivus     Aladivorans     Proteobacteria       Adarivorans_olivus     Aladivorans     Proteobacteria       Adarivorans_olivus     Aladivorans     Proteobacteria       Adarivorans_olivus     Aladivorans     Proteobacteria       Adarivorans_so_OraLtavon_278     Butyricimonas     Bacteroidetes       Butyricimonas_so_OraLtavon_278     Protevotallus     Bacteroidetes </td <td>Ordenia     Ordenia     Actinobacteria       Ordenikovia, turbata     Ordenikovia, turbata     Actinobacteria       Novosphinoobium, tardaugens     Novosphinoobium     Proteobacteria       Novosphinoobium, sp. URHCOO08     Mesorhizobium     Proteobacteria       Helicobacter, canis     Helicobacter     Proteobacteria       Helicobacter, canis     Helicobacteria     Proteobacteria       Halomonas, G.FAI-1     Halomonas     Proteobacteria       Gabacillus, sp. JH113, 201601     Geobacillus     Filicoribacteria       Gandiatus, Azambacteria, bacterium, GW2011, GWA1, 44, 9     unclassified     Candidatus, Azambacteria       Gandiatus, Azambacteria, bacterium, GW2011, GWA1, 44, 9     unclassified     Candidatus, Azambacteria       Berkelbacteria, bacterium, GW2011, GWA2, 38, 9     unclassified     Candidatus, Azambacteria       Gandiatus, Azambacteria, bacterium, GW2011, GWA2, 38, 9     unclassified     Candidatus, Azambacteria       Gardiatus, Azambacteria, bacterium, GW2011, GWA1, 44, 9     unclassified     Candidatus, Azambacteria       Gardiatus, Azambacteria, bacterium, GW2011, GWA1, 44, 9     unclassified     Candidatus, Azambacteria       Gardiatus, Azambacteria, bacterium, GW2011, GWA2, 38, 9     Artimonas     Proteobacteria       Gardiatus, Backeridacteria     Ateromonas     Proteobacteria     Ateromonas       Gardiatus, Azambacteria, bacterium, GW2011, G</td> <td>Operakovia_turbata     Operakovia_turbata     Operakovia_turbata     Actinobacteria       Novosphinaobium_tardaugans     Novosphinaobium     Proteobacteria       Novosphinaobium_tardaugans     Novosphinaobium     Proteobacteria       Novosphinaobium_tardaugans     Novosphinaobium     Proteobacteria       Novosphinaobium_tardaugans     Novosphinaobium     Proteobacteria       Helicobacter_canis     Helicobacter     Proteobacteria       Halobacteniovorax     Proteobacteria     Erricura       Geobacillus_sp. J84113_201601     Geobacillus     Firmicutes       Gendiatus_Azambacteria_bacterium_GW2011_GWA1_44_9     unclassified     Candidatus_Azambacteria       Hetromonas     Proteobacteria     Candidatus_Azambacteria       Novorax, sp. Nap.26     Aleidovorax     Proteobacteria       Actidovorax, proteobacteria     Proteobacteria     Proteobacteria       Novorax, sp. URPB0020     Variovrax, proteobacteria     Proteobacteria       Novorax, sp. Nap.21 tavon_278     Proteobacteria     Proteobacteria       Proteobacteria     Prote</td> <td></td> <td>Oligella ureolutica</td> <td>Olicella</td> <td>Proteobacteria</td> <td></td>	Ordenia     Ordenia     Actinobacteria       Ordenikovia, turbata     Ordenikovia, turbata     Actinobacteria       Novosphinoobium, tardaugens     Novosphinoobium     Proteobacteria       Novosphinoobium, sp. URHCOO08     Mesorhizobium     Proteobacteria       Helicobacter, canis     Helicobacter     Proteobacteria       Helicobacter, canis     Helicobacteria     Proteobacteria       Halomonas, G.FAI-1     Halomonas     Proteobacteria       Gabacillus, sp. JH113, 201601     Geobacillus     Filicoribacteria       Gandiatus, Azambacteria, bacterium, GW2011, GWA1, 44, 9     unclassified     Candidatus, Azambacteria       Gandiatus, Azambacteria, bacterium, GW2011, GWA1, 44, 9     unclassified     Candidatus, Azambacteria       Berkelbacteria, bacterium, GW2011, GWA2, 38, 9     unclassified     Candidatus, Azambacteria       Gandiatus, Azambacteria, bacterium, GW2011, GWA2, 38, 9     unclassified     Candidatus, Azambacteria       Gardiatus, Azambacteria, bacterium, GW2011, GWA1, 44, 9     unclassified     Candidatus, Azambacteria       Gardiatus, Azambacteria, bacterium, GW2011, GWA1, 44, 9     unclassified     Candidatus, Azambacteria       Gardiatus, Azambacteria, bacterium, GW2011, GWA2, 38, 9     Artimonas     Proteobacteria       Gardiatus, Backeridacteria     Ateromonas     Proteobacteria     Ateromonas       Gardiatus, Azambacteria, bacterium, GW2011, G	Operakovia_turbata     Operakovia_turbata     Operakovia_turbata     Actinobacteria       Novosphinaobium_tardaugans     Novosphinaobium     Proteobacteria       Novosphinaobium_tardaugans     Novosphinaobium     Proteobacteria       Novosphinaobium_tardaugans     Novosphinaobium     Proteobacteria       Novosphinaobium_tardaugans     Novosphinaobium     Proteobacteria       Helicobacter_canis     Helicobacter     Proteobacteria       Halobacteniovorax     Proteobacteria     Erricura       Geobacillus_sp. J84113_201601     Geobacillus     Firmicutes       Gendiatus_Azambacteria_bacterium_GW2011_GWA1_44_9     unclassified     Candidatus_Azambacteria       Hetromonas     Proteobacteria     Candidatus_Azambacteria       Novorax, sp. Nap.26     Aleidovorax     Proteobacteria       Actidovorax, proteobacteria     Proteobacteria     Proteobacteria       Novorax, sp. URPB0020     Variovrax, proteobacteria     Proteobacteria       Novorax, sp. Nap.21 tavon_278     Proteobacteria     Proteobacteria       Proteobacteria     Prote		Oligella ureolutica	Olicella	Proteobacteria	
Censitivitation     Censitivitation     Proteobacteria       Novosphinaobium, tardaugens     Novosphinaobium     Proteobacteria       Mesonitizobium, sp. URHCODOS     Mesonitizobium     Proteobacteria       Mesonitizobium, sp. URHCODOS     Halomonas     Proteobacteria       Gentauticovara, marinus     Halobacteriovorax     Proteobacteria       Geobacillus, sp. Jall 2,01601     Geobacillus     Filmicutes       Genteria bacterium, GW2011,GWA1,44,9     unclassified     Candidatus, Azambacteria       Genteria bacterium, GW2011,GWA2,38,9     unclassified     Candidatus, Azambacteria       Alteromonas, sp., Naz, 26     Alteromonas     Proteobacteria       Adarivorans, D.Roz, 568     Acidovorax     Proteobacteria       Adarivorans, Julus     Proteobacteria     Proteobacteria       Acidovorax, sp. URHB0020     Variovorax     Proteobacteria       Butyricimonas, sp. Jaz, Iaxon, 278     Porbhyromonas     Bacteroidetes       Provtella Jenxeri     Shiaella, Jenxeri     Shiaella, Jenxeri       Shiaella, Jenxeri	Censitivation     Proteobacteria       Novosphinaobium, tardauraens     Novosphinaobium     Proteobacteria       Mesonitzobium, sp. URHCOODS     Mesonitzobium     Proteobacteria       Mesonitzobium, sp. CRA1-1     Helicobacter     Proteobacteria       Helicobacter, canis     Helicobacter     Proteobacteria       Geobacillus, sp. GRA1-1     Halomonas     Proteobacteria       Geobacillus, sp. GRA1-1     Halomonas     Proteobacteria       Geobacillus, sp. GRA1-1     Halobacteriovorax     Proteobacteria       Geobacillus, sp. B4113, 201601     Geobacillus     Firmicutes       Geobacillus, Azambacteria, bacterium, GW2011, GWA1,44,9     unclassified     Candidatus, Azambacteria       Genviewer, Sp. GRA2     Auteromonas     Proteobacteria       Adarivorans, gilvus     Alteromonas     Proteobacteria       Adarivorans, gilvus     Acidovorax     Proteobacteria       Acidovorax, sp. Root568     Acidovorax     Proteobacteria       Variovorax, sp. URHB0220     Variovorax     Proteobacteria       Macriaditum, shorter     Phaeodactri/lacter, Viamenensis     Lactobacillus       Macriaditum, sp. CARR5120     Provetella     Bacteroidetes       Macriaditum, sp. CARR5120     Geobacillus     Firmicutes       Macriaditum, sp. CAGR7     Filmicutes     Bacteroidetes       Macrobact	Novosphinoobium_tardaugens     Delskovia_initizabium     Proteobacteria       Novosphinoobium_tardaugens     Novosphinoobium     Proteobacteria       Mesorhizobium_sp_URHC0008     Mesorhizobium     Proteobacteria       Mesorhizobium_sp_URHC0008     Mesorhizobium     Proteobacteria       Helicobacter, canis     Helicobacter     Proteobacteria       Geobacillus_sp_GRAI-1     Halomonas     Proteobacteria       Geobacillus_sp_GRAI-1     Halomonas     Proteobacteria       Geobacillus_sp_GRAI-1     Halomonas     Proteobacteria       Geobacillus_sp_GRAI     Geobacillus     Firmicutes       Geobacillus_sp_GRAI     Jacteria     Filopibacter       Fluoribacter_bozernanae     Jacterium_SCGL15     unclassified       Candidatus_Azambacteria     Detreinum_GW2011_GWA1_44_9     unclassified     Candidatus_Azambacteria       Candidatus_Azambacteria     Adarivorans     Proteobacteria     Adarivorans       Alteromonas_sp_Nap_26     Adarivorans     Proteobacteria       Acidovorax_sp_NetBol2020     Varivorax x     Proteobacteria       Butyricimonas_virosa     Bacteroidetes     Bacteroidetes       Proteobactilis_shenzhenensis     Lactobacilis     Filmicutes       Proteobacteria     Acidovorax     Proteobacteria       Proteobactilis_shenzhenensis     Lactobacilis     Filmicu		Ongena_ureolytica	Oorrkovia	Actinobacteria	
Novospininduoluini, sp. URHOD08       Mesonizobium       Proteobacteria         Helicobacter, canis       Helicobacter       Proteobacteria         Helicobacter, canis       Helicobacter       Proteobacteria         Helicobacter, canis       Helicobacter       Proteobacteria         Helicobacter, canis       Helicobacter       Proteobacteria         Helicobacteria, bacterium, SGR, 15       Unclassified       Proteobacteria         Gammaroteobacteria, bacterium, GW2011, GWA1,44,9       unclassified       Candidatus, Azambacteria         Candidatus, Azambacteria, bacterium, GW2011, GWA2,38,9       unclassified       Candidatus, Berkelbacteria         Berkelbacteria, bacterium, GW2011, GWA2,38,9       unclassified       Candidatus, Azambacteria         Alteromonas, sp. Nap, 26       Alteromonas       Proteobacteria         Alteromonas, sp. Nap, 26       Alteromonas       Proteobacteria         Adarivorans, oilvus       Adarivorans       Proteobacteria         Adarivorans, sp. URH80020       Variovorax, Proteobacteria       Proteobacteria         Proteobacteria       Proteobacteria       Proteobacteria         Proteobacteria       Proteobacteria       Proteobacteria         Adarivorans, onlus       Rotarivorans       Proteobacteria         Alaciovorax, sp. URH80020       Variovorax <td>Novesprindebular[_adaddens       Novesprindebular]         Novesprindebular[_adaddens       Network         Novesprindebular[_adaddens       Network</td> <td>Novag/mildobilin/jarbauderis       Novag/mildobilin/jarbauderis         Novag/mildobilin/jarbauderis       Novag/mildobilin/jarbauderis         Novag/mildobilin/jarbauderis       Novag/mildobilin/jarbauderis         Novag/mildobilin/jarbauderis       Helicobacter         Proteobacteria       Proteobacteria         Helicobacter/covar       Proteobacteria         Halobacter/iovorax, marinus       Halobacter/iovorax       Proteobacteria         Geobacillus S, B4113, 201601       Geobacillus       Filminutes         Candidatus, Azambacteria, bacterium, GW2011_GWA1_44_9       unclassified       Candidatus, Azambacteria         Candidatus, Azambacteria, bacterium, GW2011_GWA1_44_9       unclassified       Candidatus, Proteobacteria         Candidatus, Bacterium, GW2011_GWA2_38_9       Alteromonas       Proteobacteria         Ateromonas, so_Nap_26       Alteromonas       Proteobacteria         Aderivorans, so_Nap_26       Alteromonas       Proteobacteria         Aderivorans, so_Nap_268       Acidovorax       Proteobacteria         Aderivorans, so_Nap_268       Acidovorax       Proteobacteria         Aderivorans, so_Nap_268       Acidovorax       Proteobacteria         Adrivorans, so_Nap_268       Acidovorax       Proteobacteria         Adrivoronas, so_naltavon_278       Proteobacteria       &lt;</td> <td></td> <td>Nevershingehium tardaugene</td> <td>Novosobingobium</td> <td>Proteobacteria</td> <td></td>	Novesprindebular[_adaddens       Novesprindebular]         Novesprindebular[_adaddens       Network	Novag/mildobilin/jarbauderis       Novag/mildobilin/jarbauderis         Novag/mildobilin/jarbauderis       Novag/mildobilin/jarbauderis         Novag/mildobilin/jarbauderis       Novag/mildobilin/jarbauderis         Novag/mildobilin/jarbauderis       Helicobacter         Proteobacteria       Proteobacteria         Helicobacter/covar       Proteobacteria         Halobacter/iovorax, marinus       Halobacter/iovorax       Proteobacteria         Geobacillus S, B4113, 201601       Geobacillus       Filminutes         Candidatus, Azambacteria, bacterium, GW2011_GWA1_44_9       unclassified       Candidatus, Azambacteria         Candidatus, Azambacteria, bacterium, GW2011_GWA1_44_9       unclassified       Candidatus, Proteobacteria         Candidatus, Bacterium, GW2011_GWA2_38_9       Alteromonas       Proteobacteria         Ateromonas, so_Nap_26       Alteromonas       Proteobacteria         Aderivorans, so_Nap_26       Alteromonas       Proteobacteria         Aderivorans, so_Nap_268       Acidovorax       Proteobacteria         Aderivorans, so_Nap_268       Acidovorax       Proteobacteria         Aderivorans, so_Nap_268       Acidovorax       Proteobacteria         Adrivorans, so_Nap_268       Acidovorax       Proteobacteria         Adrivoronas, so_naltavon_278       Proteobacteria       <		Nevershingehium tardaugene	Novosobingobium	Proteobacteria	
Intervinization     Protecto acteria       Intervinization     Pr	Intestinizabulini SD_DARCOOCS     Intestinizabulini SD_DARCOOCS       Intestinizabulini SD_DARCOOCS     Intestinizabulini SD_DARCOOCS       Intestinizabulini SD_DARCOOCS     Intestinizabulini SD_DARCOOLS       Intestinizabulini SD_DARCOOLS     Intertinizabulini SD_DARCOOLS       Intestinizabulini SD_DARCOOLS     Intertinizabulini SD_DARCOOLS       Intertinizabulini SD_DARCOOLS     Intertinizabulini SD_DARCOOLS       Intertinizabulini SD_DARCOOLS     Variovarx SD_ORACOOLS       Intertonal SD_DARCOOLS     Variovarx SD_ORACOOLS	Intervinization       Protecto acteria         Interio acteria       Protecto acteria		Morosphingobium_ca_UBUC0008	Maaachizahium	Proteobacteria	
Heincübacter, Jahls       Heincübacter       Proteobacteria         Halomonas       Droteobacteria       Proteobacteria         Halobacteriovorax, marinus       Halobacteriovorax, Proteobacteria         Halobacteriovorax, marinus       Halobacteriovorax, Proteobacteria         Geobacillus, Superiation, SCR_15       unclassified       Proteobacteria         Gammaproteobacteria, bacterium, GW2011, GWA1,41,9       unclassified       Candidatus, Parambacteria         Candidatus, Azambacteria, bacterium, GW2011, GWA1,44,9       unclassified       Candidatus, Parambacteria         Alteromonas, sp., Nap_26       Alteromonas       Proteobacteria         Alteromonas, sp., Nap_26       Alteromonas       Proteobacteria         Adarivorans, alvus       Aqarivorans       Proteobacteria         Adarivorans, sp., Nap_26       Alteromonas       Proteobacteria         Adarivorans, sp., Nap_27       Alteromonas       Proteobacteria         Adarivorans, sp., Nap_26       Alteromonas       Proteobacteria         Adarivorans, sp., Nap_27       Proteobacteria       Proteobacteria         Adarivorans, sp., Nap_278       Poteobacteria       Proteobacteria         Adarivorans, sp., Oral, taxon_278       Poteobacteria       Poteobacteria         Proteobactilus, shenzhenensis       Lactobacillus       Firmicutes	Helicubater       Prelicubater       Proteobateria         Halomonas       Proteobateria         Halomonas       Proteobateria         Halomonas       Proteobateria         Geobacillus       Firmicutes         Gammaroiteobacteria, bacterium_SG8_15       unclassified       Proteobateria         Gandidatus, Azambacteria, bacterium_GW2011_GWA1_44_9       unclassified       Candidatus, Azambacteria         Berkelbacteria, bacterium_GW2011_GWA2_38_9       unclassified       Candidatus, Berkelbacteria         Berkelbacteria, bacterium_GW2011_GWA2_38_9       unclassified       Candidatus, Berkelbacteria         Alteromonas       Proteobacteria       Proteobacteria         Alteromonas       Proteobacteria       Proteobacteria         Adarivorans, alvus       Adarivorans       Proteobacteria         Adarivorans, alvus       Adarivorans       Proteobacteria         Variovorax, sp. URH80220       Variovorax       Proteobacteria         Variovorax, sp. JoraLtaxon_278       Porbryromonas       Bacteroidetes         Phaeodactrilbacter       Bacteroidetes       Bacteroidetes         Prevotella_bleuntidis       Prevotella       Bacteroidetes         Prevotella_bleuntidis       Prevotella       Bacteroidetes         Prevotella_bleuntidis       Pro	FreinCobacteri       FreinCobacteri       Proteobacteria         FreinCobacteri       FreinCobacteri       Proteobacteria         FreinCobacteri       Proteobacteria       Proteobacteria         FreinCobacteri       Proteobacteria       Proteobacteria         FreinCobacteri       Dectaria       Proteobacteria         FreinCobacteri       Dectaria       Proteobacteria         FreinCobacteri       Dectaria       Dectaria         FreinCobacteria       Dectaria       Dectaria         Freincob		Wesoniizobiun_sp_okhcoooo	Wesonii200i0iii	Proteobacteria	
Halomina,SJ., Ord-1.       Halomina,SJ., Ord-1.         Halomina,SJ., Ord-1.       Halomina,SJ., Ord-1.         Halomina,SJ., Ord-1.       Halomina,SJ., Proteobacteria         Geobacillus, S., J. 113, 201601       Geobacillus         Geobacillus, S., Statia, S., Statia, S.S., 15       unclassified         Fluoribacter, bozemanae       Proteobacteria, bacterium, SGR, 15         Condidatus, Azambacteria, bacterium, GW2011, GWA1,44,9       unclassified       Candidatus, Azambacteria         Berkelbacteria, bacterium, GW2011, GWA2,38,9       unclassified       Candidatus, Berkelbacteria         Alteromonas, SD, Nag, 26       Alteromonas       Proteobacteria         Alteromonas, SD, Nag, 26       Alteromonas       Proteobacteria         Adarivorans, D., Wag, 26       Alteromonas       Proteobacteria         Adarivorans, D., Nag, 26       Alteromonas       Proteobacteria         Adarivorans, SD, Nag, 26       Alteromonas       Proteobacteria         Adarivorans, SD, Nag, 27       Butyricimonas       Bacteroideteria         Acidovorax, D., URHB0020       Varivovrax, SD, Proteobacteria       Bacteroidetes         Butyricimonas, SD, oral, Lavon, 278       Purphyromonas       Bacteroidetes         Proteobactilus, SE, Itavin, 278       Proteobacteria       Bacteroidetes         Proteobactilus, SE, CAMR6420	natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics         natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics         natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics         natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics         natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics         natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics         natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics         natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics         natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics       natolinos, S.J., Conversional Strephysics         natolinos, S.J., Conversional Strephysics       natolinos, Strephysics       natolinos, Strephysics       natolinos, Strephysics         natolinos, Strephysics       natolinos, Strephysics       natolinos, Strephysics       n	Pratolinolas, J., GRAP-1       Pratolinolas, J., GRAP-1         Proteobacteria       Proteobacteria         Geobacillus, so., PA113, 201601       Geobacillus         Geobacillus, Carambacteria, bacterium, GW2011, GWA1, 44, 9       unclassified         Candidatus, Azambacteria       Candidatus, Azambacteria         Alterononas, so., Nap. 2/6       Alterononas         Alterononas, So., Nap. 2/6       Alterononas         Alterononas, So., Oral, 2/6       Alterononas         Adarivorans, olivus       Aarivorans         Proteobacteria       Acidovorax, Proteobacteria         Acidovorax, So., Root568       Acidovorax, Proteobacteria         Butyricimonas, so., oral, Laxon, 278       Purphrvomonas         Butyricimonas, So., oral, Laxon, 278       Purevoralla         Proteobacteria       Proteobacteria         Proteobacteria       Proteobacteria         Butyricimonas, uncas       Proteobacteria         Butyricimonas, so., oral, Laxon, 278       Purevotalla         Butyricimonas, so., oral, Laxon, 277       Purevotalla </td <td></td> <td>Heleboacter_calls</td> <td>Helemona</td> <td>Proteobacteria</td> <td></td>		Heleboacter_calls	Helemona	Proteobacteria	
Halobacterinoviax, Jahrinus       Halobacterinoviax, Proteobacteria         Geobacillus, Detria, Jacterium, GR2,15       unclassified       Proteobacteria         Gammaproteobacteria, Jacterium, GR2,15       unclassified       Candidatus, Azambacteria         Gammaproteobacteria, Jacterium, GW2011, GWA1,44,9       unclassified       Candidatus, Azambacteria         Gammaproteobacteria, Jacterium, GW2011, GWA1,44,9       unclassified       Candidatus, Parambacteria         Mathematica       Actarivorans, anivus       Actarivorans       Proteobacteria         Adidovorax, sp. Nao, 26       Alteromonas       Proteobacteria         Acidovorax, sp. Nao, 26       Alteromonas       Proteobacteria         Acidovorax, sp. Nato, 26       Alteromonas       Proteobacteria         Acidovorax, sp. Nato, 278       Porteobacteria       Proteobacteria         Mathematica       Acidovorax, sp. Nato, 278       Porteobacteria         Porphyromonas, sp. oral, taxon, 278       Porphyromonas       Bacteroidetes         Provotella, oflexater, viennensis       Lactobacillus       Firmicutes         Mathematica       Proteobacteria       Bacteroidetes         Provotella, Jeixoneria       Shigella, Texneri       Shigella, Texneria         Mathematica       Proteobacteria       Bacteroidetes         Mathematica	Palobalcienovola, Maninus       Palobalcienovola, Palita, 201601         Geobacillus, Detrain, bacterium, GR2,15       unclassified       Proteobacteria         Gammaroreobacteria, bacterium, GR2,15       unclassified       Candidatus, Azambacteria         Gammaroreobacteria, bacterium, GR2,15       unclassified       Candidatus, Azambacteria         Gammaroreobacteria, bacterium, GR2011, GWA1,41,9       unclassified       Candidatus, Berkelbacteria         Berkelbacteria, bacterium, GR2011, GWA2,38,9       unclassified       Candidatus, Berkelbacteria         Alteromonas, sp., Nap.26       Alteromonas       Proteobacteria         Adarivorans, oilvus       Adarivorans       Proteobacteria         Adarivorans, sp., Nap.26       Alteromonas       Proteobacteria         Adarivorans, sp., Nap.26       Alteromonas       Proteobacteria         Adarivorans, sp., URHB0020       Variovorax, Proteobacteria       Butyricimonas         Bacteroidetes       Porphyromonas, sp., oral_taxon, 278       Porphyromonas       Bacteroidetes         Prevotella, pleuntidis       Prevotella       Bacteroidetes       Bacteroidetes         Prevotella, pleuntidis       Prevotella       Bacteroidetes       Bacteroidetes         Prevotella, pleuntidis       Prevotella       Bacteroidetes       Bacteroidetes         Prevotella, pleuntidis	Halobalterinovolax, Initros       Halobalterinovolax, Proteobacteria         Geobacillus, Detria, bacterium, GS2,15       unclassified         Candidatus, Azambacteria, bacterium, GW2011_GWA1,4,9       unclassified         Candidatus, Azambacteria       Atteromonas, and Na, 26         Alteromonas, sp., Na, 26       Adarivorans, proteobacteria         Adarivorans, univus       Adarivorans, Proteobacteria         Kuthovar, sp., URAD, 26       Adarivorans, Proteobacteria         Acidovorax, sp., CNAD, 26       Acidovorax         Variovorax, sp., CNAD, 28       Acidovorax         Variovorax, sp., CNAD, 28       Acidovorax         Proteobacteria       Butynicimonas         Bacterioidetes       Bacterioidetes         Porphyromonas, sp., and Laxon, 278       Porphyromonas         Porbyrominas       Bacterioidetes         Provetell, altexter, viennensis       Lactobacillus         Calcobacillus, sherzhenensis       Lactobacillus         Calcobacillus, Se, CAMR5420       Geobacillus         Geobacillus, Se, CAMR5420       Geobacillus		Halohonas_sp_GFA0-1	Halohaatariayaray	Proteobacteria	
Geobacinus SD-24113_201201     Geobacinus SD-24113_201201       Geobacinus SD-24113_201201     Unclassified       Fluoribacter, bozemanae     Proteobacteria       Fluoribacter, bozemanae     Fluoribacter       Fluoribacter, bozemanae     Candidatus, Azambacteria       Geobacinus SD-2411     GWA1,44.9     Unclassified     Candidatus, Azambacteria       Alteromonas, D,Nap.26     Alteromonas     Proteobacteria       Adarivorans, alivus     Agarivorans     Proteobacteria       Adarivorans, alivus     Agarivorans     Proteobacteria       Adarivorans, alivus     Agarivorans     Proteobacteria       Adidvorax, sp. Root568     Aridovorax     Proteobacteria       Butyricimonas, sp. Oral, Lavon, 278     Butyricimonas     Bacteroidetes       Prohrvomonas     Bacteroidetes     Bacteroidetes       Prohrvomonas     Bacteroidetes     Firmicutes       Proteobacteria     Shizella, lienneri     Shizella     Proteobacteria       Provotella, Jiennerii     Shizella, lienneri     Shizella, lienneri     Firmicutes       Prevotella, Jiennerii     Shizella, lienneri     Shizella     Proteobacteria       Proteobacteria     Jiangella, muralis     Jiangella     Attinobacteria       Proteobacteria     Firmicutes     Firmicutes       Paeudomonas     Shizella, muralis <td>Geobacinus SD, 2011, 201001     Geobacinus SD, 2011, 201001       Geobacinus SD, 2011, 201001     Unclassified     Proteobacteria       Fluonbacter, bozemanae     Fluonbacter, Proteobacteria       Fluonbacter, bozemanae     Proteobacteria       Geobacinus SD, 2011, GW2011, GW41, 44, 9     Unclassified     Candidatus, Azambacteria       Berkelbacteria, bacterium, GW2011, GW41, 44, 9     Unclassified     Candidatus, Azambacteria       Heromonas     Proteobacteria     Acariovans     Proteobacteria       Adarivorans, alikus     Adarivorans     Proteobacteria       Adarivorans, SD, Na, 206     Variovorax     Proteobacteria       Adarivorans, SD, Variovar, SD, Rhot 208     Butyricimonas     Bacteroidetes       Butyricimonas, sD, varia, Laxon, 278     Purphyromonas     Bacteroidetes       Praeodactrilibacter, viamenensis     Phaeodactrilibacter     Bacteroidetes       Prevotella, pleunitois     Prevotella     Bacteroidetes       Prevotella, pleunitois     Prevotella     Bacteroidetes       Paeudomonas, marainalis     Jianaella     Actinobacteria       Jianaella, muralis     Jianaella     Actinobacteria       Jianaella, muralis     Jianaella     Actinobacteria       Jianaella, muralis     Bacteroidetes     Bacteroidetes       Butyricimonas, syneratistica     Butyricimonas     Bacteroidetes</td> <td>Geodecinius SU, 24113, 201001     Geodecinius SU     Printiculars       Geodecinius SU, 24113, 201001     unclassified     Proteobacteria       Fluonbacter, Dozemanae     Fluonbacter, Proteobacteria     Candidatus, Azambacteria       GEOGECINUS SU, 24113, 201001     GWA1,44,9     unclassified     Candidatus, Azambacteria       GEOGECINUS SU, 24113, 201001     GWA2,38,9     Alteromonas     Proteobacteria       Alteromonas Su, Nap. 26     Aparivorans, alivus     Aparivorans, Proteobacteria       Acidovorax, Su, Nap. 26     Anarivorans, Proteobacteria     Proteobacteria       Acidovorax, Su, Nap. 26     Aparivorans, Proteobacteria     Proteobacteria       Butyricimonas, Virosa     Butyricimonas     Bacteroidetes       Butyricimonas, Su, Jord, Lawn, 278     Porphyromonas     Bacteroidetes       Phaeodactifibacter, viamenensis     Lactobacillus Firmicutes     Proteobacteria       Prevotella, Ileunitidis     Prevotella     Bacteroidetes       Shiaella, Nevneri     Shiaella, Nevneri     Proteobacteria    <tr< td=""><td></td><td>Cashasillus an B1112 201601</td><td>Cashasillus</td><td>Firmioutos</td><td></td></tr<></td>	Geobacinus SD, 2011, 201001     Geobacinus SD, 2011, 201001       Geobacinus SD, 2011, 201001     Unclassified     Proteobacteria       Fluonbacter, bozemanae     Fluonbacter, Proteobacteria       Fluonbacter, bozemanae     Proteobacteria       Geobacinus SD, 2011, GW2011, GW41, 44, 9     Unclassified     Candidatus, Azambacteria       Berkelbacteria, bacterium, GW2011, GW41, 44, 9     Unclassified     Candidatus, Azambacteria       Heromonas     Proteobacteria     Acariovans     Proteobacteria       Adarivorans, alikus     Adarivorans     Proteobacteria       Adarivorans, SD, Na, 206     Variovorax     Proteobacteria       Adarivorans, SD, Variovar, SD, Rhot 208     Butyricimonas     Bacteroidetes       Butyricimonas, sD, varia, Laxon, 278     Purphyromonas     Bacteroidetes       Praeodactrilibacter, viamenensis     Phaeodactrilibacter     Bacteroidetes       Prevotella, pleunitois     Prevotella     Bacteroidetes       Prevotella, pleunitois     Prevotella     Bacteroidetes       Paeudomonas, marainalis     Jianaella     Actinobacteria       Jianaella, muralis     Jianaella     Actinobacteria       Jianaella, muralis     Jianaella     Actinobacteria       Jianaella, muralis     Bacteroidetes     Bacteroidetes       Butyricimonas, syneratistica     Butyricimonas     Bacteroidetes	Geodecinius SU, 24113, 201001     Geodecinius SU     Printiculars       Geodecinius SU, 24113, 201001     unclassified     Proteobacteria       Fluonbacter, Dozemanae     Fluonbacter, Proteobacteria     Candidatus, Azambacteria       GEOGECINUS SU, 24113, 201001     GWA1,44,9     unclassified     Candidatus, Azambacteria       GEOGECINUS SU, 24113, 201001     GWA2,38,9     Alteromonas     Proteobacteria       Alteromonas Su, Nap. 26     Aparivorans, alivus     Aparivorans, Proteobacteria       Acidovorax, Su, Nap. 26     Anarivorans, Proteobacteria     Proteobacteria       Acidovorax, Su, Nap. 26     Aparivorans, Proteobacteria     Proteobacteria       Butyricimonas, Virosa     Butyricimonas     Bacteroidetes       Butyricimonas, Su, Jord, Lawn, 278     Porphyromonas     Bacteroidetes       Phaeodactifibacter, viamenensis     Lactobacillus Firmicutes     Proteobacteria       Prevotella, Ileunitidis     Prevotella     Bacteroidetes       Shiaella, Nevneri     Shiaella, Nevneri     Proteobacteria <tr< td=""><td></td><td>Cashasillus an B1112 201601</td><td>Cashasillus</td><td>Firmioutos</td><td></td></tr<>		Cashasillus an B1112 201601	Cashasillus	Firmioutos	
Gammaproteobacteria, bacterium, Sub_13       Unclassified       Proteobacteria         Candidatus, Azambacteria, bacterium, GW2011_GWA1_44_9       unclassified       Candidatus, Bacterium, GW2011_GWA1_44_9         Candidatus, Azambacteria, bacterium, GW2011_GWA1_44_9       unclassified       Candidatus, Bacterium, GW2011_GWA1_44_9         Candidatus, Azambacteria, bacterium, GW2011_GWA1_38,9       unclassified       Candidatus, Bacteria         Alteromonas, sp., Nag. 26       Alteromonas       Proteobacteria         Adarivorans, DL, URHB0020       Variovorax       Proteobacteria         Variovorax, sp. URHB0020       Variovorax       Proteobacteria         Porphyromonas, sio:sa       Butyncimonas       Bacteroidetes         Porphyromonas, sico, and Laxon_278       Butyncimonas       Bacteroidetes         Porphyromonas, sp. and Laxon_278       Porphyromonas       Bacteroidetes         Porphyromonas, sp. and Laxon_278       Porphyromonas       Bacteroidetes         Porphyromonas, sp. and Laxon_278       Porphyromonas       Bacteroidetes         Porphyromonas       Sp. and Laxon_278       Porphyromonas       Bacteroidetes         Proteobacteria       Proteobacteria       Bacteroidetes       Bacteroidetes         Proteobacteria       Proteobacteria       Proteobacteria       Bacteroidetes         Proteobacteria	Carinitational Discrete in 2 bacterium,	Galiniau/Diebolacteria_Dacterium_GV2011_GV41_4_9       Unclassified       Proteobacteria         Galiniau/Diebolacteria_bacterium_GV2011_GV41_4_9       unclassified       Candidatus_Azambacteria         Galiniau/Diebolacteria_bacterium_GV2011_GV42_38_9       unclassified       Candidatus_Azambacteria         Galiniau/Diebolacteria       bacterium_GV2011_GV42_38_9       unclassified       Candidatus_Parambacteria         Galiniau/Diebolacteria       bacterium_GV2011_GV42_38_9       unclassified       Candidatus_Parambacteria         Galiniau/Diebolacteria       bacterium_GV2011_GV42_38_9       unclassified       Candidatus_Parambacteria         Galiniau/Diebolacteria       bacterium_GV2011_GV42_38_9       unclassified       Candidatus_Parambacteria         Galiniau/Diebolacteria       bacteria       Parahivorans_anivoras       Proteobacteria         Galiniauu/Diebolacteriauu       conducteria       Bacteroidetes       Bacteroidetes         Butyricimonas_s.poral_taxon_278       Porphyromonas       Bacteroidetes         Provtoella_beitater ximenensis       Lactobacillus       Firmicutes         Beudomonas_marginalis       Prevotella       Bacteroidetes         Gabacillus_s.p.cA67.7       Clastrialum       Firmicutes         Gabacillus_s.p.cA67.7       Clastrialum       Firmicutes         Gabacillus_s.p.cA67.7 <td< td=""><td></td><td>Geobaciilus_sp_B4113_201601</td><td>Geodaciilus</td><td>Protochastoria</td><td></td></td<>		Geobaciilus_sp_B4113_201601	Geodaciilus	Protochastoria	
Filoitbacter       Processing         Filoitbacter       Processing         Filoitbacter       Candidatus, Azambacteria         Berkelbacteria, bacterium, GW2011_GWA1_44_9       unclassified       Candidatus, Azambacteria         Berkelbacteria, bacterium, GW2011_GWA2_38_9       Alteromonas       Proteobacteria         Atteromonas       Proteobacteria       Anarivorans       Proteobacteria         Aparivorans_oilvus       Anarivorans       Proteobacteria         Acariovaras, sp. URL       Acidovorax       Proteobacteria         Variovarx, sp. URHB0020       Variovarax       Proteobacteria         Butyricimonas, sp. cral, taxon_278       Butyricimonas       Bacteroidetes         Prophyromonas       Bacteroidetes       Bacteroidetes         Stactbacturils, shenzhenensis       Lactobacillus       Firmicutes         Prevotella, leunitidis       Prevotella       Bacteroidetes         Shiaella, fienner       Shiaella       Proteobacteria         Geobacillus, p. CAMR5420       Geobacillus       Firmicutes         Flammeoviraa, p. CAG-7       Clostridium, p. CAG-7       Clostridium         Geobacillus, p. CAG-7       Clostridium       Firmicutes         Bacteroidetes       Bacteroidetes       Bacteroidetes         Streptosporanal	Pilotibacter     Pilotibacter     Pilotibacter     Pilotibacter       Candidaus_Azambacteria     Daterium_GW2011_GWA1_44_9     unclassified     Candidaus_Azambacteria       Berkelbacteria     bacterium_GW2011_GWA2_38_9     Alteromonas     Proteobacteria       Berkelbacteria     bacterium_GW2011_GWA2_38_9     Alteromonas     Proteobacteria       Adarivorans_oilvus     Adarivorans     Proteobacteria       Adarivorans_oilvus     Adarivorans     Proteobacteria       Adarivorans_oilvus     Adarivorans     Proteobacteria       Adarivorans_oilvus     Adarivorans     Proteobacteria       Variovorax_sp_URHB0020     Variovorax     Proteobacteria       Butyncimonas     Bacteroidetes     Bacteroidetes       Papothromonas     Darothocites     Bacteroidetes       Proteobacteria     Provotella_pleuritois     Prevotella       Prevotella_pleuritois     Prevotella     Bacteroidetes       Paeudomonas_marginalis     Jiangella     Proteobacteria       Jiangella_muralis     Jiangella     Actinobacteria       Geobacillus_sp_CAM77     Clostridium     Firmicutes       Filammeovirga_bacteria     Bacteroidetes     Bacteroidetes       Bacteroides     Bacteroides     Bacteroidetes       Bacteroides     Bacteroidetes     Firmicutes       Bacte	Pilotibacter     Pilotibacter     Pilotibacter     Pilotibacter       Pilotibacteria     berkelbacteria     berkelbacteria     berkelbacteria     Candidatus, Azambacteria       Berkelbacteria     berkelbacteria     berkelbacteria     Candidatus, Berkelbacteria       Berkelbacteria     berkelbacteria     candidatus, Berkelbacteria       Aterromonas     Proteobacteria       Adarivorans, onvoras, sp. Nap. 26     Aterromonas     Proteobacteria       Adarivorans, sp. Nap. 26     Adarivorans     Proteobacteria       Adarivorans, sp. Nap. 26     Adarivorans     Proteobacteria       Adarivorans, sp. Zond, Laxon, 278     Butyricimonas     Bacteroidetes       Butyricimonas, sp. coal, Laxon, 278     Porphyromonas     Bacteroidetes       Prophyromonas, sp. coal, Laxon, 278     Porphyromonas     Bacteroidetes       Proteobacteria     Butyricimonas, sp. coal, Laxon, 278     Porphyromonas     Bacteroidetes       Proteobacteria     Butyricimonas, sp. coal, Laxon, 278     Porphyromonas     Bacteroidetes       Proteobacteria     Shiaella, Ifexneri     Shiaella     Proteobacteria       Proteobacteria     Shiaella, Ifexneri     Shiaella     Proteobacteria       Proteobacteria     Janzella     Attinobacteria     Proteobacteria       Parotella, pleuntidis     Proteobacteria     Proteobacteria		Gammaproleobacteria_bacterium_5G8_15	Chuaribaatar	Proteobacteria	
Candidatus, Azambaterina, Daterina, Gavena, Tay, Santa Santa, S	Carindiatus, Azambacteria, Dacterium, CW2011, GWA2, 38, 9       Unclassified       Candidatus, Azambacteria         Carindiatus, Pacterium, CW2011, GWA2, 38, 9       unclassified       Candidatus, Pachibacteria         Alteromonas, sp., Naz, 26       Alteromonas       Proteobacteria         Alteromonas, sp., Naz, 26       Alteromonas       Proteobacteria         Alteromonas, sp., Naz, 26       Alteromonas       Proteobacteria         Adarivorans, sp., URHB0020       Variovorax       Proteobacteria         Variovorax, sp., URHB0020       Variovorax       Proteobacteria         Porphyromonas, sirosa       Bacteroidetes       Bacteroidetes         Pacedactrillacter, viamenensis       Lactobacillus       Firmicutes         Prevotella, pleuritidis       Prevotella       Bacteroidetes         Shigella, Ilevneri       Shigella       Proteobacteria         Pseudomonas, marcinalis       Janaella       Proteobacteria         Pseudomonas, partital       Bacteroidetes       Bacteroidetes         Stigella, Ilevneri       Shigella       Firmicutes	Candidatus,Azambeteria Dectenium CVP2012 (GWAL,44.9)     Unclassified     Candidatus,Azambeteria       Bakeliacetna, bacterium, CVP2012 (GWAL,38.9)     unclassified     Candidatus,Patelibacteria       Alteromonas, sp.,Nap.,26     Alteromonas     Proteobacteria       Alteromonas, sp.,Nap.,26     Adarivorans     Proteobacteria       Alteromonas, sp.,Nap.,26     Adarivorans     Proteobacteria       Adarivoran, Sp.,Root568     Acidovorax     Proteobacteria       Acidovorax, Sp., Root568     Acidovorax     Proteobacteria       Butyricimonas, virosa     Butyricimonas     Bacteroidetes       Protobacter, iamenensis     Phaeodactr/libacter     Bacteroidetes       Protobuscer, viamenensis     Lactobacillus     Firmicutes       Prevotella, Deutritis     Prevotella     Bacteroidetes       Shiaella, flexneri     Shiaella     Proteobacteria       Bacteroidetes     Jiangella, Martin     Shiaella       Bacteroidetes     Prevotella, Deutritis     Prevotella, Deutritis       Bacteroidetes     Proteobacteria     Firmicutes       Bacteroidetes     Prevotella, Deutritis     Prevotella, Deutritis       Bacteroidetes     Shiaella, Rexneri     Shiaella     Proteobacteria       Bacteroidetes     Proteobacteria     Proteobacteria     Proteobacteria       Bacteroidetes     Shiaella, Rex		Pluonbacter_bozemanae	Fluoribacter	Condidatus Azembasteria	
Berkellacteria Datemini Datemini Divizio La Constantia       Constantia         Berkellacteria Datemini Divizio La Constantia       Alteromonas       Proteobacteria         Adarivorans, alivus       Adarivorans       Proteobacteria         Adarivorans, alivus       Adarivorans       Proteobacteria         Adarivorans, alivus       Adarivorans       Proteobacteria         Adarivorans, alivus       Adarivorans       Proteobacteria         Adarivorans, sp. Januari Divisiona       Bacteroidetes       Proteobacteria         Butyncimonas, sp. Januari Divisiona       Bacteroidetes       Bacteroidetes         Prohynomonas, sp. Januari Divisiona       Bacteroidetes       Bacteroidetes         Prevotella_pleutitidis       Prevotella       Bacteroidetes         Prevotella_pleutitidis       Shigella       Proteobacteria         Proteobacteria       Shigella       Proteobacteria         Shigella_muralis       Janaella <t< td=""><td>Berkelizateria Datemini Gw2011_Gw22329       Diclassified       Calificators periods deteria         Alteromonas       Proteobacteria         Agarivorans_gilvus       Agarivorans       Proteobacteria         Adartivorans_gilvus       Agarivorans       Proteobacteria         Agarivorans_gilvus       Agarivorans       Proteobacteria         Agarivorans_gilvus       Agarivorans       Proteobacteria         Variovorax       Proteobacteria       Proteobacteria         Variovorax, sp. URH80020       Variovorax       Proteobacteria         Variovorax, sp. JoraLtaxon_278       Porphyromonas       Bacteroidetes         Phaeodactrilibacter, viamenensis       Phaeodactrilibacter       Bacteroidetes         Prevotella_pleuntridis       Prevotella       Bacteroidetes</td><td>Derkellacteria       Datastine/       Calification/         Derkellacteria       Datastine/       Calification/         Alteromonas       Proteobacteria         Adarivorans, gilvus       Adarivorans         Adarivorans, gilvus       Adarivorans         Adarivorans, gilvus       Adarivorans         Adarivorans, proteobacteria       Proteobacteria         Micrownax, sp., Rot568       Adidvorax, Proteobacteria         Butyricimonas, sp., oral, taxon, 278       Porthrymonas         Butyricimonas, sp., oral, taxon, 278       Porthrymonas         Bacteroidetes       Praeodactrilibacter, viamenensis         Phaeodactrilibacter, viamenensis       Lactobacillus         Prevotella, oleunitotis       Prevotella         Bacteroidetes       Prevotella         Prevotella, nuralis       Jiangella         Prevotella, nuralis       Jiangella         Prevotella, nuralis       Jiangella         Butyricimonas, sp. CAR7       Clostrilums, Sp. CAMR5420         Geobacillus, D.CAR67       Clostrilums         Flammeovirga, D.CAR67       Clostrilums         Butyricimonas, spercorisosoris       Bacteroides         Bacteroides, stercorinosoris       Bacteroides         Bacteroideseseteroccccus, equi       Streotosporanium, ros</td><td></td><td>Candidatus_Azambacteria_bacterium_GW2011_GWA1_44_9</td><td>unclassified</td><td>Candidatus_Azambacteria</td><td></td></t<>	Berkelizateria Datemini Gw2011_Gw22329       Diclassified       Calificators periods deteria         Alteromonas       Proteobacteria         Agarivorans_gilvus       Agarivorans       Proteobacteria         Adartivorans_gilvus       Agarivorans       Proteobacteria         Agarivorans_gilvus       Agarivorans       Proteobacteria         Agarivorans_gilvus       Agarivorans       Proteobacteria         Variovorax       Proteobacteria       Proteobacteria         Variovorax, sp. URH80020       Variovorax       Proteobacteria         Variovorax, sp. JoraLtaxon_278       Porphyromonas       Bacteroidetes         Phaeodactrilibacter, viamenensis       Phaeodactrilibacter       Bacteroidetes         Prevotella_pleuntridis       Prevotella       Bacteroidetes	Derkellacteria       Datastine/       Calification/         Derkellacteria       Datastine/       Calification/         Alteromonas       Proteobacteria         Adarivorans, gilvus       Adarivorans         Adarivorans, gilvus       Adarivorans         Adarivorans, gilvus       Adarivorans         Adarivorans, proteobacteria       Proteobacteria         Micrownax, sp., Rot568       Adidvorax, Proteobacteria         Butyricimonas, sp., oral, taxon, 278       Porthrymonas         Butyricimonas, sp., oral, taxon, 278       Porthrymonas         Bacteroidetes       Praeodactrilibacter, viamenensis         Phaeodactrilibacter, viamenensis       Lactobacillus         Prevotella, oleunitotis       Prevotella         Bacteroidetes       Prevotella         Prevotella, nuralis       Jiangella         Prevotella, nuralis       Jiangella         Prevotella, nuralis       Jiangella         Butyricimonas, sp. CAR7       Clostrilums, Sp. CAMR5420         Geobacillus, D.CAR67       Clostrilums         Flammeovirga, D.CAR67       Clostrilums         Butyricimonas, spercorisosoris       Bacteroides         Bacteroides, stercorinosoris       Bacteroides         Bacteroideseseteroccccus, equi       Streotosporanium, ros		Candidatus_Azambacteria_bacterium_GW2011_GWA1_44_9	unclassified	Candidatus_Azambacteria	
Alterionomas, SD, Nal2_2b     Alterionomas     Proteobacteria       Adarivorans, SD, Nal2_2b     Adarivorans     Proteobacteria       Acidovorax, SD, Rott568     Acidovorax     Proteobacteria       Acidovorax, SD, Rott568     Acidovorax     Proteobacteria       Acidovorax, SD, Rott568     Acidovorax     Proteobacteria       Butyricimonas, virosa     Butyricimonas     Bacteroidetes       Porphyromonas, SD_oral, Laxon_278     Porphyromonas     Bacteroidetes       Phaeodactvilibacter_viramenensis     Phaeodactvilibacter     Bacteroidetes       Prevotella, Deuntidis     Prevotella     Bacteroidetes       Prevotella, Dieuntidis     Proteobacteria     Proteobacteria       Pseudomonas, marginalis     Pseudomonas     Proteobacteria       Parameoviraa, pacifica     Flammeoviraa     Bacteroidetes       Fammeoviraa, bacifica     Flammeoviraa     Bacteroidetes       Fammeoviraa, bacifica     Flammeoviraa     Bacteroidetes       Fammeoviraa, bacteria     Butyricimonas     Bacteroidetes       Bacteroidetes     Bacteroidetes     <	Alterioninas, sp., viaz, zo     Alterioninas     Proteobacteria       Adarivorans, sp., Root568     Acidovorax, Proteobacteria       Acidovorax, sp., Root568     Acidovorax, Proteobacteria       Acidovorax, sp., Root568     Acidovorax, Proteobacteria       Butyricimonas, virosa     Butyricimonas       Butyricimonas, sp., oral, Laxon, 278     Porphyromonas       Porphyromonas, sp., oral, Laxon, 278     Phaeodactrilibacter, Xiamenensis       Phaeodactrilibacter, Xiamenensis     Phaeodactrilibacter       Prevotella, Deutitotis     Prevotella, Deutitotis       Shigella, flexneri     Shigella       Proteobacteria     Shigella, flexneri       Shigella, flexneri     Shigella       Proteobacteria     Jiangella, Market 20       Geobacillus, sp., CAMR5420     Geobacillus Firmicutes       Geobacillus, sp., CAMR5420     Geobacillus Firmicutes       Butyricimonas, sp., genergistica     Butyricimonas       Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes       Clostridium, sp., CAG.7     Clostridium       Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes <t< td=""><td>Alterionitals 20, Nal 20       Alterionitals       Proteobacteria         Adarivorans, so, Rott568       Acidovorax, Proteobacteria         Acidovorax, so, Rott568       Acidovorax, Proteobacteria         Acidovorax, So, DertB0200       Variovorax, So, Potteobacteria         Butyricimonas, virosa       Butyricimonas       Bacteroidetes         Butyricimonas, so, cal, Lavon, 278       Phaeodactylibacter       Bacteroidetes         Phaeodactylibacter, xiamenensis       Phaeodactylibacter       Bacteroidetes         Phaeodactylibacter, viamenensis       Lactobacillus       Firmicutes         Provotella, Jenveri       Shiaella, Tervotella       Bacteroidetes         Beudomonas       Provotella, Jenveri       Shiaella, Tervotella       Bacteroidetes         Beudomonas, marginalis       Pseudomonas       Proteobacteria         Beudomonas, D, CAMR5420       Geobacillus, Firmicutes       Firmicutes         Flammeovirga, pacifica       Flammeovirga       Bacteroidetes         Butyricimonas, syneraistica       Butyricimonas       Bacteroidetes         Bacteroidetes       Bacteroidetes       Bacteroidetes         Bacteroidetes       Bacteroidetes       Bacteroidetes         Bacteroidetes       Bacteroidetes       Bacteroidetes         Bacteroidetes       Bacteroidete</td><td></td><td>Berkelbacteria_bacterium_GW2011_GWA2_38_9</td><td>Unclassified</td><td>Candidatus_Berkeibacteria</td><td></td></t<>	Alterionitals 20, Nal 20       Alterionitals       Proteobacteria         Adarivorans, so, Rott568       Acidovorax, Proteobacteria         Acidovorax, so, Rott568       Acidovorax, Proteobacteria         Acidovorax, So, DertB0200       Variovorax, So, Potteobacteria         Butyricimonas, virosa       Butyricimonas       Bacteroidetes         Butyricimonas, so, cal, Lavon, 278       Phaeodactylibacter       Bacteroidetes         Phaeodactylibacter, xiamenensis       Phaeodactylibacter       Bacteroidetes         Phaeodactylibacter, viamenensis       Lactobacillus       Firmicutes         Provotella, Jenveri       Shiaella, Tervotella       Bacteroidetes         Beudomonas       Provotella, Jenveri       Shiaella, Tervotella       Bacteroidetes         Beudomonas, marginalis       Pseudomonas       Proteobacteria         Beudomonas, D, CAMR5420       Geobacillus, Firmicutes       Firmicutes         Flammeovirga, pacifica       Flammeovirga       Bacteroidetes         Butyricimonas, syneraistica       Butyricimonas       Bacteroidetes         Bacteroidetes       Bacteroidetes       Bacteroidetes         Bacteroidetes       Bacteroidetes       Bacteroidetes         Bacteroidetes       Bacteroidetes       Bacteroidetes         Bacteroidetes       Bacteroidete		Berkelbacteria_bacterium_GW2011_GWA2_38_9	Unclassified	Candidatus_Berkeibacteria	
Adamorans_pilvus     Adamorans_pilvus     Proteobacteria       Adamorans_pilvus     Adamorans_pilvus     Proteobacteria       Adamorans_pilvus     Acidovorax     Proteobacteria       Intervention     Proteobacteria     Proteobacteria       Intervention     Butyricimonas     Bacteroidetes       Intervention     Parabolacter viamenensis     Phaeodactilibacter       Intervention     Phaeodactilibacter     Bacteroidetes       Intervention     Prevotella     Bacteroidetes       Intervention     Prevotella     Bacteroidetes       Intervention     Shigella     Proteobacteria       Intervention     Shigella <td< td=""><td>Adamoranis_cinius     Adamoranis_cinius       Adamoranis_cinius     Adamoranis_cinius       Adamoranis_cinius     Proteobacteria       Portahyromonas_s_s_oral_taxon_278     Portahyromonas       Bacteroidetes     Phaeodactylibacter       Paeudactylibacter_xiamenensis     Phaeodactylibacter       Prevotella_cleuritidis     Prevotella       Prevotella_cleuritidis     Prevotella       Prevotella_cleuritidis     Prevotella       Paeudomonas_marcinalis     Pseudomonas       Proteobacteria     Proteobacteria       Geobacillus_so_CAMR5420     Geobacillus       Geobacillus_so_CAG7     Clastridium       Flammaeoviraa_bactrica     Playricimonas       Bacteroides     Bacteroides       Bacteroides     Bacteroides       Bacteroides     Bacteroides       Bacteroides     Bacteroides       Bacteroides     Bacteroides       Bacteroides     Bacte</td><td>Adarivorans_privo     Adarivorans_privo       Adarivorans_privo     Adarivorans_privo       Adarivorans_privo     Adarivorans_privo       Adarivorans_privo     Proteobacteria       Butyricimonas     Bacteroidetes       Prevotella_pleuritdis     Prevotella       Bacteroidetes     Primoutes       Prevotella_pleuritdis     Prevotella       Bacteroides     Primoutes       Prevotella_pleuritdis     Proteobacteria       Prevotella_pleuritdis     Proteobacteria       Bacteroides     Proteobacteria       Bacteroides     Proteobacteria       Bacteroides     Proteobacteria       Bacteroides     Bacteroides       Bacteroides     Bacteroidetes       <td< td=""><td></td><td>Alteromonas_sp_ivap_20</td><td>Alteromonas</td><td>Proteobacteria</td><td></td></td<></td></td<>	Adamoranis_cinius     Adamoranis_cinius       Adamoranis_cinius     Adamoranis_cinius       Adamoranis_cinius     Proteobacteria       Portahyromonas_s_s_oral_taxon_278     Portahyromonas       Bacteroidetes     Phaeodactylibacter       Paeudactylibacter_xiamenensis     Phaeodactylibacter       Prevotella_cleuritidis     Prevotella       Prevotella_cleuritidis     Prevotella       Prevotella_cleuritidis     Prevotella       Paeudomonas_marcinalis     Pseudomonas       Proteobacteria     Proteobacteria       Geobacillus_so_CAMR5420     Geobacillus       Geobacillus_so_CAG7     Clastridium       Flammaeoviraa_bactrica     Playricimonas       Bacteroides     Bacteroides       Bacteroides     Bacteroides       Bacteroides     Bacteroides       Bacteroides     Bacteroides       Bacteroides     Bacteroides       Bacteroides     Bacte	Adarivorans_privo     Adarivorans_privo       Adarivorans_privo     Adarivorans_privo       Adarivorans_privo     Adarivorans_privo       Adarivorans_privo     Proteobacteria       Butyricimonas     Bacteroidetes       Prevotella_pleuritdis     Prevotella       Bacteroidetes     Primoutes       Prevotella_pleuritdis     Prevotella       Bacteroides     Primoutes       Prevotella_pleuritdis     Proteobacteria       Prevotella_pleuritdis     Proteobacteria       Bacteroides     Proteobacteria       Bacteroides     Proteobacteria       Bacteroides     Proteobacteria       Bacteroides     Bacteroides       Bacteroides     Bacteroidetes <td< td=""><td></td><td>Alteromonas_sp_ivap_20</td><td>Alteromonas</td><td>Proteobacteria</td><td></td></td<>		Alteromonas_sp_ivap_20	Alteromonas	Proteobacteria	
Actabivala, Sp. 2003bb     Actabivala, Sp. 2003bb     Proteblacteria       Image: Sp. 2003bb     Variovarax     Proteblacteria       Image: Sp. 2003bb     Butyricimonas     Batteroidetes       Image: Sp. 2003bb     Pasodactvilibacter, viamenensis     Pasodactvilibacter     Batteroidetes       Image: Sp. 2003bb     Pasodactvilibacter, viamenensis     Phaeodactvilibacter, viamenensis     Batteroidetes       Image: Sp. 2003bb     Pasodactvilibacter, viamenensis     Pasodactvilibacter, viamenensis     Batteroidetes       Image: Sp. 2003bb     Proteblacteria     Batteroidetes     Batteroidetes       Image: Sp. 2003bb     Proteblacteria     Batteroidetes       Image: Sp. 2003bb     Proteblacteria     Batteroidetes       Image: Sp. 2003bb     Proteblacteria     Batteroidetes       Image: Sp. 2004bb     Proteblacteria     Batteroidetes       Image: Sp. 2004bb     Proteblacteria     Proteblacteria	Actabivalar, Sp. 2003bbb     Actabivalar, Sp. 2003bbb     Proteblacteria       Variovarax, Sp. 2014RB0020     Variovarax     Proteblacteria       Butynicimonas, sp. 2012Laxon, 278     Butynicimonas     Bacteroidetes       Butynicimonas, sp. 2012Laxon, 278     Porphynomonas     Bacteroidetes       Phaeodactylibacter, viamenensis     Phaeodactylibacter, viamenensis     Bacteroidetes       Phaeodactylibacter, viamenensis     Phaeodactylibacter, Bacteroidetes       Butynicimonas, shenzhenensis     Lactobacillus     Firmicutes       Prevotella, pleuntidis     Prevotella     Bacteroidetes       Shiaella, flexneri     Shiaella     Proteobacteria       Jianaella, muralis     Jianaella     Actinobacteria       Jianaella, muralis     Jianaella     Actinobacteria       Bacteroidetes     Fiammeoviraa     Bacteroidetes       Bacteroidetes     Costridium, sp. CAMR5420     Geobacillus       Bacteroidetes     Bacteroidetes     Bacteroidetes       Bacteroides     Bacteroidetes     Bacteroidet	Actabular, S.J., URHBO220       Variovirax, S.J., URHBO220       Variovirax, Proteobacteria         Butynicimonas, virosa       Butynicimonas       Batteroidetes         Butynicimonas, s.J., oral, taxin, 278       Porphynomonas       Batteroidetes         Phaeodacylibacter, viamenensis       Phaeodacylibacter, viamenensis       Phaeodacylibacter, viamenensis       Phaeodacylibacter, viamenensis         Phaeodacylibacter, viamenensis       Interbactilus       Firmicutes         Prevotella, pleunitidis       Prevotella       Bacteroidetes         Shigella, flexneri       Shigella       Proteobacteria         Seudomonas       Proteobacteria       Batteroidetes         Shigella, flexneri       Shigella       Proteobacteria         Costadium, Suc, CAMR5420       Geobacillus       Firmicutes         Flammeovirga, Bacteroidetes       Batteroidetes       Batteroidetes         Butyricimonas, synaraistica       Butyricimonas       Bacteroidetes         Bacteroides stercorizooris       Bacteroides       Bacteroidetes         Butyricimonas, synaraistica       Butyricimonas       Bacteroidetes         Bacteroides, stercorizooris       Bacteroides       Bacteroidetes         Bacteroides, stercorizooris       Bacteroides       Bacteroidetes         Bacteroides       Bacteroides		Adarivorans_gilvus	Adarivorans	Proteobacteria	
Varioviax, SD, Ukribuluzi     Varioviax, SD, Ukribuluzi       Varioviax, SD, Ukribuluzi     Varioviax, SD, Ukribuluzi       Varioviax, SD, Ukribuluzi     Butyricimonas       Varioviax, SD, Virisa     Butyricimonas       Varioviax, SD, Virisa     Butyricimonas       Varioviax, SD, Virisa     Buteroidetes       Varioviax, SD, Virisa     Batteroidetes       Varioviax, SD, Virisa     Pateroidetes       Varioviax, SD, Varioviax, Virisa     Batteroidetes       Varioviax, SD, Varioviax, Virisa     Pateroidetes       Varioviax, SD, Varioviax, Virisa     Batteroidetes       Varioviax, SD, Varioviax, Virisa     Batteroidetes       Varioviax, SD, Varioviax, Virisa     Pateroidetes       Varioviax, SD, Varioviax, Virisa     Pateroidetes       Varioviax, SD, Varioviax, Virisa     Pateroidetes       Varioviax, SD, Varioviax, Vari	Valtoviax, SD_Ukribudzi     Valtoviax, SD_Ukribudzi       Valtoviax, SD_Ukribudzi     Valtoviax, SD_Ukribudzi       Valtoviax, SD_Ukribudzi     Valtoviax, SD_Ukribudzi       Valtoviax, SD_Ukribudzi     Parabyromonas, SD_oral_Laxon_278       Porphyromonas, SD_oral_Laxon_278     Porphyromonas       Bacteroidetes     Bacteroidetes       Valtoviax, SD_Ukribudzi     Phaeodactvilizacter       Valtoviax, SD_Ukribudzi     Proteblacter viamensis       Valtoviax, SD_Ukribudzi     Prevotella       Bacteroidetes     Shiaella_leveni       Shiaella, Iseveni     Shiaella       Prevotella     Bacteroidetes       Shiaella, Sunta     Proteobacteria       Prevotella     Bacteroidetes       Shiaella, Suntak     Prevotella       Prevotella     Bacteroidetes       Shiaella, Suntak     Proteobacteria       Valtoviax, SD_CARR5420     Geobacillus       Geobacillus, SD_CAG:7     Clostridium       Clostridium, SD_CAG:7     Clostridium       Bacteroidetes     Bacteroidetes       Bacteroides     Bacteroidetes       Bacteroides     Bacteroidetes       Bacteroides     Bacteroidetes       Bacteroides     Bacteroidetes       Bacteroides     Bacteroidetes       Bacteroides     Bacteroidetes       Bacteroide	Image: Sector (Sector)       Variovarx, Sp. United Sector)       Variovarx, Sp. United Sector)         Image: Sector (Sector)       Butynicimonas       Batteriol detes         Image: Sector)       Porphyromonas, Sp. oral, Laxon, 278       Porphyromonas       Batteriol detes         Image: Sector)       Phaeodactri/libacter       Phaeodactri/libacter       Batteriol detes         Image: Sector)       Phaeodactri/libacter       Phaeodactri/libacter       Firmicutes         Image: Sector)       Prevotella       Batteriol detes         Image: Sector)       Sector)       Proteobatteria         Image: Sector)       Sector)       Sector)       Sector)		Acidovorax_spKoot568	Acidovorax	Proteobacteria	
Butyncimonas, virosa     Butyncimonas     Bacterolidetes       Butyncimonas, sp. oral_taxon_278     Porphyromonas     Bacterolidetes       Phaeodactylibacter, viamenensis     Phaeodactylibacter, Bacterolidetes       Butyncimonas     Bacterolidetes       Butyncimonas     Bacterolidetes       Butyncimonas     Bacterolidetes       Butyncimonas     Bacterolidetes       Butyncimonas     Bacterolidetes       Butyncimonas     Prevotella       Butyncimonas     Prevotella       Butyncimonas     Prevotella       Butyncimonas     Prevotella       Butyncimonas     Prevotella       Butyncimonas     Proteobacteria       Steudomonas     Proteobacteria       Butyncimonas     Jianaella       Cobaridius, p. CAMR5420     Geobacillus       Clostridium, p. CAG:7     Clostridium       Clostridium, p. CAG:7     Clostridium       Butyncimonas     Bacteroldetes       Bacteroldes     Bacteroldetes	Butyncimonas, virosa     Butyncimonas     Bacteroidetes       Butyncimonas, su, oral, taxon, 278     Porphyromonas     Bacteroidetes       Phaeodactylibacter, xiamenensis     Phaeodactylibacter, Bacteroidetes       Bacteroidetes     Bacteroidetes       Bacteroidetes     Firmicutes       Bacteroidetes     Bacteroidetes       Bacteroidetes     Prevotella, pleuntidis       Prevotella, pleuntidis     Prevotella       Bacteroidetes     Shiaella, fleuneri       Pseudomonas, marainalis     Pseudomonas       Prevotella, muralis     Jianaella       Actinobacteria     Actinobacteria       Bacteroidetes     Firmicutes       Bacteroidetes     Bacteroidetes       Bacteroidetes     Pseudomonas, marainalis       Bacteroides     Jianaella       Cobacillus, Dictradium     Firmicutes       Bacteroides     Bacteroidetes       Bacteroidetes     Bact	Butynicimonas_virosa       Butynicimonas       Batterioldetes         Bit in Porphyromonas_so_oral_taxon_278       Porphyromonas       Batterioldetes         Phaeodacy/lbacter, viamenensis       Phaeodacy/lbacter, Batterioldetes         Bit in Phaeodacy/lbacter, viamenensis       Phaeodacy/lbacter, Batterioldetes         Prevotella_bleunitidis       Prevotella       Batterioldetes         Prevotella_bleunitidis       Prevotella       Batterioldetes         Prevotella_nuralis       Shigella       Proteobacteria         Pseudomonas_marcinalis       Pseudomonas       Proteobacteria         Pseudomonas_marcinalis       Jiangella       Actinobacteria         Cost informas_co_CANR5420       Geobacillus       Firmicutes         Costridium_s_co_CANR5420       Geobacillus       Firmicutes         Butyricimonas_pareristica       Butyricimonas       Batterioldetes         Batterioldetes       Batterioldetes       Batterioldetes         Batterioldes_stercorinosoris       Bacterioldes       Batterioldetes         Bacterioldes       Bacterioldetes       Batterioldetes         Bacterioldes       Bacterioldetes       Bacterioldetes         Bacterioldes       Bacterioldetes       Bacterioldetes         Bacterioldes       Bacterioldetes       Bacterioldetes		Variovorax_spURHB0020	Variovorax	Proteobacteria	
Porphyromonas     sp. oral_taxon_2/18     Porphyromonas     Bacterioldetes       Porphyromonas     sp. oral_taxon_2/18     Porphyromonas     Bacterioldetes       Prevotella     bactaroldetes     Firmicutes       Prevotella     Bacterioldetes     Prevotella     Bacterioldetes       Shigella     Prevotella     Prevotella     Bacterioldetes       Prevotella     Bacterioldetes     Prevotella     Bacterioldetes       Shigella     Prevotella     Prevotella     Bacterioldetes       Pasudomonas     marginalis     Pasudomonas     Proteobacteria       Jiangella     Actinobacteria     Jiangella     Actinobacteria       Geobacillus     Sp. CAMR5420     Geobacillus     Firmicutes       Clostridium.sp. CAG7     Clostridium     Firmicutes       Clostridium.sp. Synervisitca     Butyricimonas     Bacteroidetes       Bacteroidetes     Bacteroidetes     Bacteroidetes	Porphyromonas_sp_oral_taxon_2/18       Porphyromonas       Bacterioldetes         Porphyromonas_sp_oral_taxon_2/18       Porphyromonas       Bacterioldetes         Prevental_alpecter_ximenensis       Phaeodactylibacter       Bacterioldetes         Prevotella_locater_ximenensis       Lactobacillus       Firmicutes         Prevotella_locater_ximenensis       Lactobacillus       Firmicutes         Shizella_flexneri       Shizella       Proteobacteria         Prevotella_locateria       Prevotella       Bacterioldetes         Prevotella_locateria       Prevotella       Bacterioldetes         Pseudomonas_marcinalis       Pseudomonas       Proteobacteria         Pseudomonas_anacinalis       Jianaella       Actinobacteria         Pseudomonas_pacifica       Flammeoviraa       Bacteroidetes         Pseudomnas_strencistica       Butynicimonas       Bacteroidetes         Bacteroides_stercorinosoris       Bacteroides       Bacteroidetes         Bacteroides_stercorinosoris       Bacteroides       Bacteroidetes         Streptosoranium_nascharinhlum       Terrimicrobium       Vertucomicrobia         Streptosoccus_equi       Streptosoccus       Firmicutes         Porthyromonas_crevionicanis       Portenyromonas       Bacteroidetes         Bizionia_argentinensis <td>Porphyromonas       sp. org/l Lakon_2/18       Porphyromonas       Bacterioldetes         Porphyromonas       sp. org/l Lakon_2/18       Phaeodacti/libacter       Bacterioldetes         Protein       Lactobacillus       Firmicutes         Proveella       Devotella       Bacterioldetes         Shiaella       Proteobacteria       Proteobacteria         Provetella       Devotella       Proteobacteria         Provetella       Bacterioldetes       Proteobacteria         Proteobacteria       Pseudomonas       Proteobacteria         Proteobacteria       Actinobacteria       Proteobacteria         Pseudomonas       Jiangella       Actinobacteria         Proteobacteria       Ceobacillus, sp. CAMR5420       Geobacillus       Firmicutes         Planmeovirga       Bacterioldetes       Bacterioldetes       Bacterioldetes         Plantineux       Clostridium.sp. CAG7       Clostridium       Firmicutes         Plantineux       Butynicimonas       Bacterioldetes       Bacterioldetes         Bacterioldetes       Bacterioldetes       Bacterioldetes       Bacterioldetes         Bacterioldetes       Bacterioldetes       Bacterioldetes       Bacterioldetes         Bacterioldetes       Bacterioldetes       Bacterioldetes<td></td><td>Butyricimonas_virosa</td><td>Butyricimonas</td><td>Bacteroidetes</td><td></td></td>	Porphyromonas       sp. org/l Lakon_2/18       Porphyromonas       Bacterioldetes         Porphyromonas       sp. org/l Lakon_2/18       Phaeodacti/libacter       Bacterioldetes         Protein       Lactobacillus       Firmicutes         Proveella       Devotella       Bacterioldetes         Shiaella       Proteobacteria       Proteobacteria         Provetella       Devotella       Proteobacteria         Provetella       Bacterioldetes       Proteobacteria         Proteobacteria       Pseudomonas       Proteobacteria         Proteobacteria       Actinobacteria       Proteobacteria         Pseudomonas       Jiangella       Actinobacteria         Proteobacteria       Ceobacillus, sp. CAMR5420       Geobacillus       Firmicutes         Planmeovirga       Bacterioldetes       Bacterioldetes       Bacterioldetes         Plantineux       Clostridium.sp. CAG7       Clostridium       Firmicutes         Plantineux       Butynicimonas       Bacterioldetes       Bacterioldetes         Bacterioldetes       Bacterioldetes       Bacterioldetes       Bacterioldetes         Bacterioldetes       Bacterioldetes       Bacterioldetes       Bacterioldetes         Bacterioldetes       Bacterioldetes       Bacterioldetes <td></td> <td>Butyricimonas_virosa</td> <td>Butyricimonas</td> <td>Bacteroidetes</td> <td></td>		Butyricimonas_virosa	Butyricimonas	Bacteroidetes	
Phaeodactylijääter, viämenensis     Phaeodactylijääter, viämenensis     Phaeodactylijääter, viämenensis     Phaeodactylijääter, viämenensis     Lactobacillus     Firmicutes       Eine Prevotella pleuhitdis     Prevotella     Batteroidetes       Shigella, Tiexneri     Shigella     Proteobacteria       Shigella, Tiexneri     Shigella     Proteobacteria       Jiangella, muralis     Jiangella     Actinobacteria       Geobacillus, D., CAMR5420     Geobacillus     Firmicutes       Geobacillus, Su, CAMR5420     Geobacillus     Firmicutes       Geobacillus, Su, CAMR5420     Geobacillus     Firmicutes       Geobacillus, Su, CAG:7     Clostridium     Firmicutes       Batteroides, stercoriosoris     Bacteroides     Batteroidetes       Batteroides, stercoriosoris     Bacteroides     Batteroidetes       Geobacillus, Firmicutes     Bacteroides     Firmicutes       Ferimicrobium, sacchariphilum     Terrimicrobium     Verucomicrobia       Geobacillus, Streptosocranium     Streptosocranium     Actinobacteria       Streptosocraniume	Phaeodactylidacter, viamenensis     Phaeodactylidacter, viamenensis     Phaeodactylidacter, viamenensis     Eactobacillus     Eirmicutes       Eactobacillus, shenzhenensis     Lactobacillus     Firmicutes       Eactobacillus, shenzhenensis     Lactobacillus     Firmicutes       Eactobacillus, shenzhenensis     Lactobacillus     Firmicutes       Eactobacillus, shenzhenensis     Shiaella, flexneri     Bacteroidetes       Pseudomonas, marcinalis     Pseudomonas     Proteobacteria       Jiangella, muralis     Jiangella     Actinobacteria       Eactobacillus, sp. CAMR5420     Geobacillus     Firmicutes       Eactorides, sp. CAG7     Clostridium     Firmicutes       Eactorides, synerosinis     Bacteroides     Bacteroidetes       Eactorides, stercorixosoris     Bacteroides     Bacteroidetes       Eactorides, stercorixosoris     Bacteroides     Bacteroidetes       Eactorides, stercorixosoris     Bactlus     Firmicutes       Eactorides, stercorixosoris     Bactlus     Firmicutes       Eactorides, stercorixosoris     Bactlus     Firmicutes       Eactorides, stercorixosoris     Bactlus     Firmicutes       Eactorides, stercorixosoris     Bacteroides     Bacteroidetes       Eactorixocut, eau     Streptosoranaium     Actinobacteria       Streptosoranaium, roseum     Streptos	Phaeodactylipacter/ kamenensis       Phaeodactylipacter/ bacteroldetes         Prevotella cleuritotis       Prevotella       Bacteroldetes         Prevotella pleuritotis       Prevotella       Bacteroldetes         Pseudomonas_marainalis       Jianaella       Actinobacteria         Jianaella_muralis       Jianaella       Actinobacteria         Geobacillus_DC_AMR5420       Geobacillus       Firmicutes         Geobacillus_DC_AMR5420       Geobacillus       Firmicutes         Geobacillus_DC_AGR7       Clostridium, accAGr7       Clostridium, accAGr7         Butyricimonas_synerolistica       Butyricimonas       Bacteroides         Bacteroides_sterocorinsoris       Bacteroides       Bacteroidetes         Bacteroides_sterocorinsoris       Bacteroides       Bacteroidetes         Bacteroides_sterocoresue_aui       Streptosporanaium_roseum       Actinobacteria         Geobacillus_thermanumunovorans       Streptosporanaium_r		Porphyromonas_sp_oral_taxon_278	Porphyromonas	Bacteroidetes	
Lactobacilus, shenzhenensis     Lactobacilus     FirmiCutes       Construction     Prevotella, alumination     Bacteroidetes       Shiaella, Jievneri     Shiaella     Proteobacteria       Seudomonas     Proteobacteria     Proteobacteria       Jianaella, muralis     Jianaella     Actinobacteria       Jianaella, tervinica, supervisitica     Butyricimonas     Bacteroidetes       Bacteroides, stercorisosoris     Bacteroides     Bacteroidetes       Bacteroides, stercorisosoris     Bacteroidetes     Bacteroidetes       Bacteroides, stercorisosoris     Bacteroidetes     Bacteroidetes       Streptosporanalium, roseum     Streptosporanalium     Actinobacteria       Streptosporanalium, roseum     Streptosporanalium     Actinobact	Lactobacillus, shenzhenensis     Lactobacillus     FirmiCutes       Construction     Prevotella, alle atterioidetes     Prevotella, alle atterioidetes       Shigella     Proteobacteria     Proteobacteria       Pseudomonas, marainalis     Jianaella     Proteobacteria       Jianaella, muralis     Jianaella     Actinobacteria       Construction     Geobacillus, succhMRS420     Geobacillus       Construction     Geobacillus, succhMRS420     Geobacillus       Construction     Firameoviraa     Bacterioidetes       Construction     Streptosoranium, succharina     Butyricimonas       Bacteroidetes     Bacteroidetes     Bacteroidetes       Bacteroidetes     Bac	Lactobacilius, shenzhenensis       Lactobacilius       Filmicutes         Pevotella, Jeunari       Proteola, lieunari       Bacteroidetes         Shigella, Tervari       Shigella       Proteobacteria         Pevotella, Jeunari       Proteobacteria       Proteobacteria         Stigella, muralis       Jiangella       Actinobacteria         Diangella, muralis       Firmicutes       Bacteroidetes         Diangella, muralis       Firmicutes       Bacteroidetes         Diangella, muralis       Jiangella       Actinobacteria         Diangella, muralis       Jiangella       Actinobacteria         Diangella, muralis       Jiangella       Actinobacteria         Diangella, muralis       Jiangella       Actinobacteria         Diangella, muralis       Bacteroidetes       Bacteroidetes         Diangella, muralis       Bacteroidetes       Bacteroidetes         Bacteroidetes       Bacteroidetes       Bacteroidetes         Bacteroidetes       Bacteroidetes		Phaeodactylibacter_xiamenensis	Phaeodactylibacter	Bacteroldetes	
Prevotella_Dieuritais     Prevotella_Dieuritais     Prevotella_Dieuritais       Prevotella_Dieuritais     Shiaella, la     Proteobacteria       Pseudomonas_marianalis     Pseudomonas     Proteobacteria       Diangella_muralis     Jiangella     Actinobacteria       Diangella_muralis     Jiangella     Actinobacteria       Diangella_muralis     Jiangella     Actinobacteria       Diangella_muralis     Jiangella     Actinobacteria       Diangella_muralis     Ceobacillus     Firmicutes       Diangella_muralis     Costridium_sc.accifica     Firmicutes       Diangella_muralis     Diangella     Actinobacteria       Diangella_muralis     Costridium_sc.CAMR5420     Ceobacillus       Diangella_muralis     Batteroides     Batteroidetes       Batteroides_stercoirosoris     Batteroides     Batteroidetes       Batteroides_stercoirosoris     Batteroides     Firmicutes       Diangella_muralis     Streptosocrangium_oseum     Streptosocrangium       Streptosocraniteminensis     Bizionia_arentinens	Prevotella_Dieuritais     Prevotella_Dieuritais     Bacterolotetes       Prevotella_Dieuritais     Shiaella_lia     Proteobacteria       Shiaella_file.nerin     Shiaella     Proteobacteria       Stanzella_munitis     Pseudomonas, Proteobacteria       Stanzella_munitis     Pseudomonas, Proteobacteria       Stanzella_munitis     Pianaella     Actinobacteria       Stanzella_munitis     Planmaoviraa     Bacteroldetes       Stanzella_munitis     Planmaoviraa     Bacteroldetes       Stanzella_munitis     Classindium     Firmicutes       Butyricimonas_syneraistica     Butyricimonas     Bacteroldetes       Bacteroldes     Bacteroldetes     Bacteroldetes       Bacteroldes     Bacteroldetes     Bacteroldetes       Bactlus_thermoamylovorans     Bacillus     Firmicutes       Streptosporanaium_saccharinhium     Terrimicrabium     Verucomicrobia       Streptosporanaium_roseum     Streptosporanaium     Actinobacteria       Bizionia_argentinensis     Bizionia     Bacteroldetes	Prevotella pleuntais     Prevotella bleuntais     Bacterolotetes       Prevotella pleuntais     Shiaella     Proteobacteria       Pseudomonas.marginalis     Pseudomonas     Proteobacteria       Diangella, muralis     Jiangella     Actinobacteria       Geobacillus.spCAMR5420     Geobacillus     Firmicutes       Geobacillus.spCAMR5420     Geobacillus     Firmicutes       Geobacillus.spCAMR5420     Geobacillus     Firmicutes       Geobacillus.spCAG7     Clostridium, geotifica     Bacterolotetes       Geobacillus.spCAG7     Clostridium, geotifica     Bacterolotetes       Geobacillus.spCAG7     Bacterolotetes     Bacterolotetes       Geobacillus.thermoamylovorans     Bacterolotetes     Bacterolotetes       Bacterolotes.tercorinzonis     Bacterolotes     Bacterolotetes       Bacterolotes.tercorinzonis     Bacterolotes     Firmicutes       Bacterolotes.tercorinzonis     Streptosporanaium     Actinobacteria       Streptosoccus.equi     Streptosoccus     Firmicutes       Bizionia_argentinens		Lactobacillus_shenzhenensis	Lactobacillus	Firmicutes	
Shiqalia_Tiexneri     Shiqalia     Proteboacteria       Shiqalia_Tiexneri     Shiqalia_Tiexneri     Proteboacteria       Seudomonas     Proteboacteria     Jangelia     Actinobacteria       Seudomonas     Jangelia     Actinobacteria       Seudomonas     Proteboacteria     Firmicutes       Seudomonas     Flammeoviraa     Bacteroidetes       Seudomonas     Paraneoviraa     Bacteroidetes       Seudomonas     Sinaelia     Actinobacteria       Seudomonas     Cabaridium     Firmicutes       Seudomonas     Suprimiconas     Bacteroidetes       Seudomonas     Bacteroidetes     Bacteroidetes       Seudomonas     Bacteroidetes     Bacteroidetes       Seudomonas     Bacteroidetes     Bacteroidetes       Seudomonas     Bacteroidetes     Bacteroidetes       Streptosporanaium_roseum     Streptosporanaium     Actinobacteria       Streptococcus_equi     Streptococcus     Firmicutes       Porphyromonas_crevioricanis     Porphyromonas     Bacteroidetes       Bizionia_arcentinensis     Bizionia     Bacteroidetes	Sindella_Iterneri     Sindella_Iterneri       Sindella_Iterneri     Sindella_Iterneri       Sindella_Iterneri     Proteobacteria       Baudomonas     Proteobacteria       Jianaella_muralis     Jianaella       Geobacillus_spCAMR5420     Geobacillus       Fiammeoviraa_bachfica     Fiammeoviraa       Batteroidetes     Geobacillus       Clostridium_spCAG.7     Clostridium       Batteroidetes     Bacteroidetes       Bacteroidetes, stercorirosoris     Bacteroidetes       Bacteroidetes, stercoricosoria     Streatosporanaium       Vertecomicrobia     Streatosporanaium       Porphyromonas_crevioricanis     Porphyromonas       Bizionia, argentinensis     Bizionia	Shidella, Jiennen       Shidella       Proteobacteria         Shidella, Jiennen       Shidella, Jiennen       Proteobacteria         Seudomonas       Proteobacteria       Jiangella       Actinobacteria         Seudomonas       Jiangella       Actinobacteria         Seudomonas       Jiangella       Actinobacteria         Seudomonas       Costridium       Firmicutes         Flammeovirga_gacifica       Flammeovirga       Bacteroidetes         Sutvincimonas_synergistica       Butyricimonas       Bacteroidetes         Bacteroides       Bacteroidetes       Bacteroidetes         Bacteroidetes       Bacteroidetes       Bacteroidetes		Prevotella_pleuritidis	Prevotella	Bacteroidetes	
Fseudomonas_marginalis     Fseudomonas     Proteopacteria       Fig. Jiangella_muralis     Jiangella     Actinobacteria       Geobacillus_spCAMR5420     Geobacillus     Firmicutes       Flammeovirga_pactifica     Flammeovirga     Bacteroidetes       Geobacillus_spCAG7     Clostrialium, SpCAG7     Firmicutes       Butyricimonas_syneroistica     Butyricimonas     Bacteroidetes       Butyricimonas_syneroistica     Butyricimonas     Bacteroidetes       Bacteroides_stercorirosoris     Bacteroidetes     Bacteroidetes       Bacillus_thermoantylovorans     Bacillus     Firmicutes       Firmicorbium_sacchariphilum     Terrimicrobium     Verucomicrobia       Firmicotes_equi     Streptosocranaium_roseum     Streptosocranaium       Streptococcus_equi     Streptococcus     Firmicutes       Porphyromonas_crevioricanis     Porphyromonas     Bacteroidetes       Bizionia_arcentinensis     Bizionia     Bacteroidetes	Fseudomonas, marginalis     Pseudomonas, Proteopacteria       Jiangella, muralis     Jiangella       Actinobacteria     Jiangella       Geobacillus, sp., CAMRS420     Geobacillus, Firmicutes       Butyricimonas, syneroistica     Butyricimonas       Bacteroides     Bacteroides       Bacteroides     Firmicrobium       Verucomicrobia     Streptosporanajum, Actinobacteria       Streptosporanajum, coseum     Streptosporanajum       Actinobacteria     Porphyromonas, crevioricanis       Porphyromonas, crevioricanis     Porphyromonas       Bizionia, argentinensis     Bizionia	Pseudomonas, marginalis       Pseudomonas       Proteobacteria         Pseudomonas, marginalis       Jiangella, marginalis       Pseudomonas       Proteobacteria         Pseudomonas, marginalis       Jiangella, Marginalis       Jiangella, Actinobacteria         Pseudomonas, marginalis       Jiangella, Marginalis       Filmicutes         Pseudomonas, cevinica, pacifica       Flanmeoviraa       Bacteroides         Pseudomonas, synercistica       Butynicimonas, synercistica       Butynicimonas         Bacteroides sterooritosonis       Bacteroides       Bacteroides         Bacteroides sterooritosonis       Bacteroides       Bacteroides         Bacillus, thermoamylovorans       Bacillus       Firmicutes         Bacillus, thermoamylovorans       Bacillus       Firmicutes         Streptosporanalum, roseum       Streptosporanalum       Actinobacteria         Streptosporanalum, roseum       Streptosporanalum       Actinobacteria         Streptosporanalum, roseum       Streptosporanalum       Actinobacteria         Streptosporanalum, roseum       Streptosporanalum       Streptosporanalum         Porphyromonas, crevinicanis       Bizionia       Bacteroidetes         Bizionia_argentinensis       Bizionia       Bacteroidetes		Shiqella_flexneri	Shiqella	Proteopacteria	
Jiangelia_murais     Jiangelia     Actinopacteria       Jiangelia_murais     Jiangelia     Actinopacteria       Geobacillus_co_CAMR5420     Geobacillus     Firmicutes       Geobacillus_co_CAMR5420     Geobacillus     Firmicutes       Clostridium,so_CAG:7     Clostridium     Firmicutes       Butyricimonas_synergistica     Butyricimonas     Bacteroides       Bacteroides_stercoritosoris     Bacteroides     Bacteroidetes       Bacteroides_stercoritosoris     Bacteroides     Bacteroidetes       Bacteroides_stercoritosoris     Bacteroides     Bacteroidetes       Bacteroides_stercoritosoris     Bacteroidetes     Bacteroidetes       Bacteroides_steroing     Streptosoranaium_oseum     Streptosoccus_enaium       Streptosoccus_equi     Streptosoccus_enaium     Firmicutes       Porphyromonas_crevioricanis     Porphyromonas     Bacteroidetes       Bizionia_arcentinensis     Bizionia     Bacteroidetes	Janaella_muralis     Janaella     Actinobacteria       Janaella_muralis     Janaella     Actinobacteria       Geobacillus_CAMR5420     Geobacillus     Firmicutes       Flammeoviraa_pacifica     Flammeoviraa     Bacteroidetes       Clostridium_sp_CAG.7     Clostridium     Firmicutes       Bacteroidetes     Butyricimonas     Bacteroidetes       Bacteroidetes     Bacteroidetes     Bacteroidetes       Streptococcus     Firmicutes     Firmicutes       Porphyromonas_crevioricanis     Porphyromonas     Bacteroidetes       Bizionia_argentinensis     Bizionia     Bacteroidetes	Janaella, muralis     Janaella     Actinobacteria       Janaella, muralis     Janaella     Actinobacteria       Geobacillus, pacifica     Flammeovirga     Batteroidetes       Geobacillus, pacifica     Flammeovirga     Batteroidetes       Butyricimonas, syneraistica     Butyricimonas     Batteroidetes       Bacteroides, stercorrisooris     Bacteroides     Bacteroidetes       Bacteroides, stercorrisooris     Bacteroidetes     Bacteroidetes       Bacteroides, stercorrisooris     Bacteroides     Bacteroidetes       Bacteroides, steroides, steroider     Bacteroidetes     Bacteroidetes       Bacteroides, steroider, steroider     Streptoscoraujum, roseum     Streptoscoraujum, roseum       Streptoscorau, equi     Streptoscoraujetes     Bacteroidetes       Bizionia, argentinensis     Bizionia     Bacteroidetes       Bizionia     Bacteroidetes     Bizionia		Pseudomonas_marginalis	Pseudomonas	Proteobacteria	
Geobacillus, sp., CAMR5420     Geobacillus     Firminutes       Geobacillus, sp., CAMR5420     Geobacillus     Firminutes       Geobacillus, sp., CAG, 7     Firmineovira     Bacteroidetes       Geobacillus, sp., CAG, 7     Clostridium     Firminutes       Geobacillus, sp., CAG, 7     Clostridium     Firminutes       Geobacillus, sp., CAG, 7     Clostridium     Firminutes       Geobacillus, thermosoria     Buttroindeas     Bacteroidetes       Bacteroides, stencoriosoria     Bacillus     Firmicutes       Bacillus, thermosynicorans     Bacillus     Firmicutes       Terrimicrobium, secchariabilum     Terrimicrobium     Verrucomicrobia       Streptosporanalum, roseum     Streptosporanalum     Actinobacteria       Streptosporanalum, coseum     Streptococcus     Firmicutes       Porphyromonas, crevioricanis     Porphyromonas     Bacteroidetes       Bizionia, argentinensis     Bizionia     Bacteroidetes	Geobacillus sa., CAMR5420     Geobacillus Firmicutes       Geobacillus sa., CAMR5420     Geobacillus Firmicutes       Geobacillus sa., CAG, T     Flammeoviraa       Butyricimonas, syneraistica     Butyricimonas       Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes       Bacturyricimonas, stantinihum     Terrimicrobium       Vertu comicrobia     Streptosporanium, caseum       Streptosporanium, caseum     Streptosporanium       Streptosporanium, caseum     Streptosporanium       Porphyromonas, crevioricanis     Porphyromonas       Bizionia, argentinensis     Bizionia	Geotacillus, sp., CAMR5420     Geotacillus     Finimicutes       Geotacillus, sp., CAMR5420     Geotacillus     Finimicutes       Geotacillus, sp., CadGr.7     Clostridium     Finicutes       Clostridium, sp., CAG;7     Clostridium     Finicutes       Butyricimonas, synergistica     Butyricimonas     Bacteroidetes       Bacteroides     Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes     Bacteroidetes       Bacteroidetes     Bacteroidetes     Bacteroidetes       Streptosporanaium_roseum     Streptosporanaium     Actinobacteria       Streptosporanaium_roseum     Streptosporanaium     Actinobacteria       Streptosporanaium_roseum     Bacteroidetes     Bacteroidetes       Bizionia_argentinensis     Bizionia     Bacteroidetes		Jiangella_muralis	Jiangella	Actinobacteria	
Flammeovirda_Dactrica     Flammeovirda     Bacteroidetes       Figure     Clostridium, p., CAG-7     Clostridium, p.     Firmicutes       Butyricimonas_syneroitsica     Butyricimonas     Bacteroidetes       Bacteroides_stercoirosoris     Bacteroides     Bacteroidetes       Bacteroides_stercoirosoris     Bacteroides     Bacteroidetes       Bacteroides_stercoirosoris     Bacteroides     Bacteroidetes       Bacteroides_stercoirosoris     Bacteroides     Firmicutes       Bacteroides_stercoirosoris     Bacteroidetes     Bacteroidetes       Bacteroides_stercoirosoris     Bacteroides     Firmicutes       Bacteroides_stercoirosoris     Bacteroidetes     Bacteroidetes       Bacteroides_stercoirosoris     Bacteroidetes     Bacteroidetes       Bacteroides_steroirosoris     Bacteroidetes     Bacteroidetes       Bacteroidetes_steroirosoris     Parahyromonas     Bacteroidetes       Bacteroidetes     Bizionia_areeninensis     Bizionia     Bacteroidetes	Flammeoviraa_pacitica     Flammeoviraa     Bacteroidetes       Geodesidium_pacifica     Clostridium     Firmicutes       Butvricimonas_syneraistica     Butvricimonas     Bacteroides       Butvricimonas_syneraistica     Butvricimonas     Bacteroides       Bacteroides     Bacteroides     Bacteroides       Bacteroides     Bacteroides     Bacteroides       Bacillus_thermoamylovorans     Bacillus     Firmicutes       Terrimicrobium_sacchariphilum     Terrimicrobium     Verucomicrobia       Streptoscoranaium_roseum     Streptoscoranaium     Actinobacteria       Streptococcus_edui     Streptococcus     Firmicutes       Parthyromonas_crevioricanis     Parthyromonas     Bacteroidees       Bizionia_argentinensis     Bizionia     Bacteroidetes	Flammeoviraa     Bacteroidetes       Flammeoviraa     Bacteroidetes       Flammeoviraa     Bacteroidetes       Butyricimonas     supricimonas       Butyricimonas     supricimonas       Bacteroides     stecroides       Bacteroides     stecroides       Bacteroides     stecroides       Bacillus     Firmicutes       Bacillus     Firmicutes       Bacillus     Firmicutes       Bacillus     Streptosporanium       Streptosporanium     Streptosporanium       Actinobacteria     Streptosporanium       Bizionia_argentinensis     Bizionia       Bizionia     Bizionia		Geobacillus_spCAMR5420	Geobacillus	Firmicutes	
Clostridium, sp.,CAG.7     Clostridium     Firmicutes       Clostridium, sp.,CAG.7     Buryricimonas     Bacteroidetes       Bacteroides, stercorizosoris     Bacteroides     Bacteroidetes       Bacteroides, stercorizosoris     Bacteroides     Bacteroidetes       Bacteroides, stercorizosoris     Bacteroidetes     Bacteroidetes       Bacteroides, stercorizosoris     Bacteroides     Bacteroidetes       Bacteroides, stercorizosoris     Bacteroidetes     Bacteroidetes       Terrimicrobium_sacchariphilum     Terrimicrobium     Verucomicrobia       Streptosporanaium_noseum     Streptosporanaium     Actinobacteria       Streptosporanaium_caseumi     Streptococcus     Firmicutes       Porphyromonas_crevioricanis     Porphyromonas     Bacteroidetes       Bizionia_argenentinensis     Bizionia     Bacteroidetes	Clostridium, sp.,CAG.7 Clostridium Firmicutes Butyricimonas, synaraistica Butyricimonas Bacteroidetes Bacteroides, stercorirosoris Bacteroidetes Bacillus, thermoamylovorans Bacillus Firmicutes Firmicutes Streatosporanaium, coseum Streatosporanaium Actinobacteria Streatosporanaium, coseum Streatosporanaium Actinobacteria Porphyromonas_crevioricanis Porphyromonas Bacteroidetes Bizionia, argentinensis Bizionia Bacteroidetes	Clostrialium, sc., CAG.7     Clostrialium     Firmicutes       Ending     Butyricimonas     Bacteroidetes       Bacteroides, stercorirosoris     Bacteroides     Bacteroidetes       Bacillus, thermoamylovorans     Bacillus     Firmicutes       Bacillus, thermoamylovorans     Bacillus     Firmicutes       Streptosporanaium_roseum     Streptosporanaium     Actinobacteria       Streptococcus, eaui     Streptococcus     Firmicutes       Porphyromonas, crevioricanis     Porphyromonas     Bacteroidetes       Bizionia_argentinensis     Bizionia     Bacteroidetes		Flammeovirga_pacifica	Flammeovirga	Bacteroidetes	
Butyricimonas_syneriistica         Butyricimonas         Bacteroides         Bacteroides           Bacteroides tercorirosoris         Bacteroides         Bacteroides         Bacteroides           Bacteroides tercorirosoris         Bacteroides         Bacteroides         Bacteroides           Bacteroides         Bacteroides         Bacteroides         Bacteroides           Bacillus_thermoamylovorans         Bacillus         Firmicutes           Terrimicrobium_sacchariphilum         Terrimicrobium         Verucomicrobia           Streptococcus_eaui         Streptococcus         Firmicutes           Porphyromonas_crevioricanis         Porphyromonas         Bacteroidetes           Bizionia_arcentinensis         Bizionia         Bacteroidetes	Butynicimonas_syneroitsica     Butynicimonas     Bacteroides       Bacteroides     Bacteroides     Bacteroides       Bactinus_thermoamylovorans     Bacteroides     Bacteroides       Bacilius_thermoamylovorans     Bacilius     Firmicutes       Fermicrobium     Terrimicrobium     Verucomicrobia       Streptosporanaium_roseum     Streptosporanaium     Actinobacteria       Streptococcus_eaui     Streptococcus     Firmicutes       Parhyromonas_crevionicanis     Parhyromonas     Bacteroidetes       Bizionia_argentinensis     Bizionia     Bacteroidetes	Butynicimonas_syneroistica     Butynicimonas     Bacteroides       Bacteroides stercoritosoris     Bacteroides     Bacteroides       Bacteroides     Bacteroides     Bacteroides       Streotosocranaium_roseum     Streotosocranaium     Actinobacteria       Streotosocranaium_roseum     Streotosocranaium     Actinobacteria       Streotosocranaium_roseum     Streotosocranaium     Bacteroidetes       Bizionia_argentinensis     Bizionia     Bacteroidetes       Bizionia_argentinensis     Bizionia     Bacteroidetes		Clostridium_spCAG:7	Clostridium	Firmicutes	
Bacteroides         Bacteroides         Bacteroides           Bacteroides         Bacteroides         Bacteroides         Bacteroides           Bacteroides         Bacteroides         Bacteroides         Bacteroides           Bacteroides         Bacteroides         Bacteroides         Bacteroides           Bacteroides         Bacteroides         Bacteroides         Bacteroides           Terrimicrobium         Streptosporanaium         Verucomicrobia           Streptosporanaium_roseum         Streptosporanaium         Actinobacteria           Streptosporanaium_roseum         Streptosporanaium         Actinobacteria           Porphyromonas_crevioricanis         Porphyromonas         Bacteroidetes           Bizionia_arcentinensis         Bizionia         Bacteroidetes	Bacteroides stercorirosoris     Bacteroides     Bacteroides       Bacteroides stercorirosoris     Bacteroides     Bacteroides       Bacteroides stercorirosoris     Bacteroides     Bacteroides       Bacteroides stercorirosoris     Bacteroides     Firmicutes       Ferrimicrobium_sacchariphilum     Terrimicrobium     Verucomicrobia       Streptosporanolum_roseum     Streptosporanolum     Actinobacteria       Streptosporanolum     Streptosporanolum     Actinobacteria       Porphyromonas_crevioricanis     Porphyromonas     Bacteroidetes       Bizionia_argentinensis     Bizionia     Bacteroidetes	Bacteroides, stercorirosoris     Bacteroides     Bacteroides       Bacteroides, stercorirosoris     Bacillus, thermannylovorans     Bacillus       Bacteroides     Firmicutes       Bacteroides     Firmicutes       Bacteroides     Firmicutes       Bacteroides     Firmicutes       Bacteroides     Firmicutes       Bacteroides     Streatosorandium, secharibhilum       Streatosorandium, roseum     Streatosocaus       Streatosocaus, eaui     Streatosocaus       Porphyromonas, crevioricanis     Porphyromonas       Bacteroidetes     Bizionia       Bacteroidetes     Bizionia		Butyricimonas_synergistica	Butyricimonas	Bacteroidetes	
Bacillus:     Firmicutes       Bacillus:     Terrimicrobium       Terrimicrobium:     Streptosporanaium, roseum       Streptosporanaium, roseum     Streptosporanaium       Streptosporanaium, roseum     Streptosporanaium       Streptosporanaium, roseum     Streptosporanaium       Porphyromonas:     periphyromonas       Bizionia_argentinensis     Bizionia	Bacillus; thermoamylovorans     Bacillus     Firmicutes       Bacillus; thermoamylovorans     Bacillus     Firmicutes       Streptosporanajum, oseum     Streptosporanajum, Actinobacteria       Streptosporanajum, oseum     Streptosporanajum, Actinobacteria       Portphyromonas_crevionicanis     Portphyromonas       Bizionia_argentinensis     Bizionia	Bacillus, thermoamylovorans     Bacillus     Firmicutes       Bacillus, thermoamylovorans     Bacillus     Firmicutes       Fermicrobium     Terrimicrobium     Verucomicrobia       Streptosporanajum_roseum     Streptosporanajum_Actinobacteria       Streptococcus_eaui     Streptococcus       Porphyromonas, crevioricanis     Porphyromonas       Bizionia_argentinensis     Bizionia       Bizionia_argentinensis     Bizionia		Bacteroides_stercorirosoris	Bacteroides	Bacteroidetes	
Terrimicrobium_sacchariphilum     Terrimicrobium     Verucomicrobia       Streptosocranjum_roseum     Streptosocranjum     Actinobacteria       Streptosoccus_equi     Streptosoccus     Firmicutes       Porphyromonas_crevioricanis     Porphyromonas     Bacteroidetes       Bizionia_arcentinensis     Bizionia     Bacteroidetes	Terrimicrobium_sacchariphilum     Terrimicrobium     Verucomicrobia       Streptosporanaium_roseum     Streptosporanaium     Actinobacteria       Streptococcus_eaui     Streptococcus     Firmicutes       Porphyromonas_crevioricanis     Porphyromonas     Bacteroidetes       Bizionia_argentinensis     Bizionia     Bacteroidetes	Terrimicrobium_sacchariphilum     Terrimicrobium     Verucomicrobia       Streptosporangium_roseum     Streptosporangium     Actinobacteria       Streptospocangium_roseum     Streptospocangium     Actinobacteria       Streptospocangium_roseum     Streptospocangium     Actinobacteria       Streptospocangium_roseum     Streptospocangium     Actinobacteria       Streptospocangium_roseum     Streptospocangium     Streptospocangium       Streptospocangium_roseum     Streptospocangium     Streptospocangium<		Bacillus_thermoamylovorans	Bacillus	Firmicutes	
Streptosporanajum     Streptosporanajum     Actinobacteria       Streptococcus, eaui     Streptococcus     Firmicutes       Parphyromonas_crevioricanis     Parphyromonas     Bacteroidetes       Bizionia_argentinensis     Bizionia     Bacteroidetes	Streptosporanajum, Caseum Streptosporanajum, Actinobacteria Streptosporanajum, Caseum Streptosporanajum, Actinobacteria Porphyromonas_crevioricanis Porphyromonas Bacteroidetes Bizionia_argentinensis Bizionia Bacteroidetes	Streptosporanqium, Joseum     Streptosporanqium, Actinobacteria       Streptosporanqium, Joseum     Streptosporanqium, Actinobacteria       Porphyromonas, crevioricanis     Porphyromonas       Bizionia, argentinensis     Bizionia       Bizionia     Bacteroidetes		Terrimicrobium_sacchariphilum	Terrimicrobium	Verrucomicrobia	
Streptococcus, equi         Streptococcus         Firmicutes           Porphyromonas, crevioricanis         Porphyromonas         Bacteroidetes           Bizionia_argentinensis         Bizionia         Bacteroidetes	Streptococcus     Firmicutes       Porphyromonas_crevioricanis     Porphyromonas       Bizionia_argentinensis     Bizionia       Bizionia     Bacteroidetes	Streptococcus_equi Streptococcus Firmicutes Porphyromonas, crevioricanis Porphyromonas Bacteroidetes Bizionia_argentinensis Bizionia Bacteroidetes		Streptosporangium_roseum	Streptosporangium	Actinobacteria	
Porphyromonas_crevioricanis Porphyromonas Bacteroidetes Bizionia_argentinensis Bizionia Bacteroidetes	Porphyromonas_crevioricanis Porphyromonas Bacteroidetes Bizionia_argentinensis Bizionia Bacteroidetes	Porphyromonas_crevioricanis Porphyromonas Bacteroidetes Bizionia_argentinensis Bizionia Bacteroidetes アロロクラ ここのちらの		Streptococcus_equi	Streptococcus	Firmicutes	
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shown with its phylum and genus information.

and untargeted metabolomics to uncover the regulatory mechanism of APS on host health. The metagenomic and metabolic profiling revealed that APS partially reversed HFD induced changes of bacterial structure and function as well as metabolism. Purine metabolism pathway and glutathione metabolism pathway might play important roles on the improvement of metabolic disorders by APS.

The gut microbiota composition has been shown to closely link with host health. Our data showed HFD increased the abundance of Firmicutes and decreased abundance of Bacteroidetes, while APS was effective in reversing these changes. A large number of clinical studies show that fecal microbiota from patients with non-alcoholic fatty liver and cirrhotic contained an increased abundance of Firmicutes and a decreased abundance of Bacteroidetes (Wei et al., 2016; Sookoian et al., 2020). Increased Firmicutes can produce more lipopolysaccharide and deoxycholic acid, which pass into the liver through hepatic portal vein, leading to inflammation in the liver (Yoshimoto et al., 2013; Bourzac, 2014). Bacteroidetes, that mostly inhabits the distal gut, participates in the fermentation of indigestible polysaccharides, such as dietary fiber includes cellulose, hemicellulose, β-glucan, to produce SCFAs (Salyers et al., 1977; Koropatkin et al., 2012). SCFAs can directly activate G protein-coupled-receptors (GPCRs), inhibit histone deacetylases, and serve as energy substrates, thus regulate various physiological processes and may contribute to health (Henao-Mejia et al., 2012; Bourzac, 2014). Interestingly, in our study, APS significantly reduced the abundance of Deferribacteres. Deferribacteres is a kind of bacteria that obtain energy through obligate or facultative anaerobic metabolism. Walker A et al., unraveled the nature and specificity of metabolic profiles related to gut ecology in obesity through combinatory approach using metabolomics and gut microbiome analysis, and found significant differences between the microbiome of the C57BL/6J mice (C57J, without obesity susceptibility) and the C57BL/6N mice (C57N, with obesity susceptibility) on phylum

level of Deferribacteres, which propose an essential role of the microbiome in obesity susceptibility (Walker et al., 2014).

Polysaccharides can be used as carbon source for the growth of gut microbiota, which partially or completely fermented in the large intestine (El Kaoutari et al., 2013). Recent studies have noticed that polysaccharides intervention might be an efficient method to improve glycometabolism-related diseases by modulating specific bacteria associated with glycometabolism disorder (Jackson et al., 2018; Sanna et al., 2019). The polysaccharides from *Ophiopogon japonicus* (Thunb.) Ker Gawl. significantly improved the gut dysbiosis in obese mice, with the increase of the number of Lactobacillus (Shi et al., 2015). The intake of *Ganoderma lucidum* polysaccharides alleviated obesity on mice, with reduced Firmicutes to Bacteroidetes ratio in the intestinal tract (Chang et al., 2017), which is consistent with our finding.

The gut microbiota exerts an enormous impact on the health status of the host via modulation of its metabolic functions. In the present study, we found six bacterial pathways were increased and eight bacterial pathways were reduced by HFD based on metagenomic sequencing, and APS could reverse thus changes. For example, tryptophan metabolism and methane metabolism were significantly enriched by HFD and reversed by APS supplementation. Tryptophan metabolism has a central role in physiology and physiopathology. Disorder of tryptophan metabolism has been linked to irritable bowel syndrome, metabolic syndrome, obesity, infectious diseases, and neuropsychiatric disorders (Agus et al., 2018; Platten et al., 2019). In addition, methane metabolism is associated with obesity. Several studies suggested that methane-produced bacteria were significantly negatively associated with the percentage of visceral fat (Visconti et al., 2019). Moreover, nicotinate and nicotinamide metabolism pathway were reduced by HFD intake and increased by APS. In obese human subjects, low nicotinate intake is associated with reduced  $\alpha$ -diversity and Bacteroidetes abundance in the microbiome (Fangmann et al., 2018). In humans in vivo, gut-targeted delayed-release nicotinate significantly increases Bacteroidetes, with an improvement of biomarkers for systemic insulin sensitivity and metabolic inflammation (Fangmann et al., 2018). Our current study suggested that differential shifted bacterial pathways that induced by HFD and reversed by APS can explain the beneficial effect of APS on improving metabolic disorders to a certain extent.

Gut metabolites, which are jointly generated by host and gut microbiota, play essential roles in maintaining host health. In order to find out the differential metabolites that involved in the beneficial effect of APS, we analyzed metabolite profile and metabolic pathway changes using cecum samples. The starch and sucrose metabolism pathway, which contains two differential metabolites glucose and maltose, showed the highest fold enrichment. A number of studies have shown that long-term HFD feeding result in dysregulated glucose homeostasis and insulin resistance (Luck et al., 2019), and our results confirmed that APS could normalize the fasting blood glucose and insulin levels in HFD-fed mice. In addition, purine metabolism and glutathione metabolism were reduced and increased by HFD, respectively, and tended to be reversed by ASP supplementation in metagenomic function analysis. Meanwhile, purine metabolism and glutathione metabolism were also significantly changed based on metabolites pathway enrichment analysis. Three differentially changed metabolites deoxyguanosine, guanosine, and inosine are from the purine metabolism pathway. The dysfunction of purine metabolism has drastic physiological and pathological consequences (Daignan-Fornier and Pinson, 2019). Additionally, purine metabolic pathway is involved in various inflammatory processes (Crittenden et al., 2018), and its end product, uric acid, is associated with a series of metabolic disorders, including insulin resistance, obesity, NAFLD, and chronic kidney disease (Ndrepepa, 2018). Moreover, we noticed that different species were correlated with these three metabolites with no overlap, suggesting that these differential species might involve in different stages of purine metabolism pathway. Two differential metabolites, pyroglutamic acid and glutamic acid, which were changed by HFD and reversed by APS, are included in glutathione metabolism pathway. Glutathione plays critical roles in protecting cells from oxidative damage and the toxicity of xenobiotic electrophiles and maintaining redox homeostasis (Wu et al., 2004). Glutamic acid and pyroglutamic acid are intermediates in the glutathione metabolism. Elevated glutamic acid and pyroglutamic acid levels are involved in impaired glutathione metabolism (Emmett, 2014; Liu et al., 2014). Our data suggested that APS reduced these two metabolites, which were increased by HFD intake, indicating the protective effect of APS on normalizing glutathione metabolism. In addition, we also found 20 differential species, including Streptococcus\_equi and Bizionia\_argentinensis, were negatively correlated with glutamic acid and pyroglutamic acid, suggesting these species might participate in the effects of APS on altering glutathione metabolism.

Altogether, our current study highlights that APS has beneficial effects on reversing HFD-induced metabolic disorders by regulating intestinal metabolism as well as gut microbial structure and function. The gut microbial alteration of APS mice is correlated with the changes of metabolites in the cecum. Additionally, purine metabolism and glutathione metabolism were found both in metagenomic function analysis and metabolites pathway enrichment analysis, suggesting the importance of these two pathways in APS-associated improvement of metabolic disorders. In conclusion, our current study provides novel evidence of the underlying mechanisms of APS in treating metabolic disorders at both gut microbiota and metabolism levels.

#### DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/ **Supplementary Material**.

#### ETHICS STATEMENT

The animal study was reviewed and approved by the institutional Animal Ethics Committee, Shanghai University of Traditional Chinese Medicine.

#### **AUTHOR CONTRIBUTIONS**

YH and BL conducted the *in vivo* experiments, data analysis, and manuscript writing. NZ and GW analyzed LC/MS-based untargeted metabolomic. JM, XT, and LC helped in animal experiment. JZ helped in H&E staining of tissues and hepatic steatosis evaluation. LS helped in data analysis and manuscript revision. HL supervised the project and revised the manuscript.

#### REFERENCES

- Agus, A., Planchais, J., and Sokol, H. (2018). Gut Microbiota Regulation of Tryptophan Metabolism in Health and Disease. *Cell Host. Microbe* 23 (6), 716–724. doi: 10.1016/j.chom.2018.05.003
- Bennett, B. J., de Aguiar Vallim, T. Q., Wang, Z., Shih, D. M., Meng, Y., Gregory, J., et al. (2013). Trimethylamine-N-oxide, a metabolite associated with atherosclerosis, exhibits complex genetic and dietary regulation. *Cell Metab.* 17 (1), 49–60. doi: 10.1016/j.cmet.2012.12.011
- Boulange, C. L., Neves, A. L., Chilloux, J., Nicholson, J. K., and Dumas, M. E. (2016). Impact of the gut microbiota on inflammation, obesity, and metabolic disease. *Genome Med.* 8 (1), 42. doi: 10.1186/s13073-016-0303-2
- Bourzac, K. (2014). Microbiome: the bacterial tightrope. *Nature* 516 (7529), S14– S16. doi: 10.1038/516S14a
- Cani, P. D. (2019). Microbiota and metabolites in metabolic diseases. Nat. Rev. Endocrinol. 15 (2), 69–70. doi: 10.1038/s41574-018-0143-9
- Chang, C. J., Lin, C. S., Lu, C. C., Martel, J., Ko, Y. F., Ojcius, D. M., et al. (2015). Ganoderma lucidum reduces obesity in mice by modulating the composition of the gut microbiota. *Nat. Commun.* 6, 7489. doi: 10.1038/ncomms8489
- Chang, C. J., Lin, C. S., Lu, C. C., Martel, J., Ko, Y. F., Ojcius, D. M., et al. (2017). Corrigendum: Ganoderma lucidum reduces obesity in mice by modulating the composition of the gut microbiota. *Nat. Commun.* 8, 16130. doi: 10.1038/ ncomms16130
- Crittenden, S., Cheyne, A., Adams, A., Forster, T., Robb, C. T., Felton, J., et al. (2018). Purine metabolism controls innate lymphoid cell function and protects against intestinal injury. *Immunol. Cell Biol.* 96 (10), 1049–1059. doi: 10.1111/ imcb.12167
- Dahiya, D. K., Renuka, Puniya, M., Shandilya, U. K., Dhewa, T., Kumar, N., et al. (2017). Gut Microbiota Modulation and Its Relationship with Obesity Using Prebiotic Fibers and Probiotics: A Review. *Front. Microbiol.* 8, 563. doi: 10.3389/fmicb.2017.00563
- Daignan-Fornier, B., and Pinson, B. (2019). Yeast to Study Human Purine Metabolism Diseases. *Cells* 8 (1), 67. doi: 10.3390/cells8010067
- El Kaoutari, A., Armougom, F., Gordon, J. I., Raoult, D., and Henrissat, B. (2013). The abundance and variety of carbohydrate-active enzymes in the human gut microbiota. *Nat. Rev. Microbiol.* 11 (7), 497–504. doi: 10.1038/nrmicro3050
- Emmett, M. (2014). Acetaminophen toxicity and 5-oxoproline (pyroglutamic acid): a tale of two cycles, one an ATP-depleting futile cycle and the other a useful cycle. *Clin. J. Am. Soc. Nephrol.* 9 (1), 191–200. doi: 10.2215/CJN.07730713
- Fangmann, D., Theismann, E. M., Turk, K., Schulte, D. M., Relling, I., Hartmann, K., et al. (2018). Targeted Microbiome Intervention by Microencapsulated Delayed-Release Niacin Beneficially Affects Insulin Sensitivity in Humans. *Diabetes Care* 41 (3), 398–405. doi: 10.2337/dc17-1967
- Fu, L., Niu, B., Zhu, Z., Wu, S., and Li, W. (2012). CD-HIT: accelerated for clustering the next-generation sequencing data. *Bioinformatics* 28 (23), 3150– 3152. doi: 10.1093/bioinformatics/bts565
- Gu, C., Zeng, Y., Tang, Z., Wang, C., He, Y., Feng, X., et al. (2015). Astragalus polysaccharides affect insulin resistance by regulating the hepatic SIRT1-PGC-

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#### SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fphar.2020. 00833/full#supplementary-material

1alpha/PPARalpha-FGF21 signaling pathway in male Sprague Dawley rats undergoing catch-up growth. *Mol. Med. Rep.* 12 (5), 6451–6460. doi: 10.3892/mmr.2015.4245

- Henao-Mejia, J., Elinav, E., Jin, C., Hao, L., Mehal, W. Z., Strowig, T., et al. (2012). Inflammasome-mediated dysbiosis regulates progression of NAFLD and obesity. *Nature* 482 (7384), 179–185. doi: 10.1038/nature10809
- Huang, Y. C., Tsay, H. J., Lu, M. K., Lin, C. H., Yeh, C. W., Liu, H. K., et al. (2017). Astragalus membranaceus-Polysaccharides Ameliorates Obesity, Hepatic Steatosis, Neuroinflammation and Cognition Impairment without Affecting Amyloid Deposition in Metabolically Stressed APPswe/PS1dE9 Mice. Int. J. Mol. Sci. 18 (12), 2746. doi: 10.3390/ijms18122746
- Jackson, M. A., Verdi, S., Maxan, M. E., Shin, C. M., Zierer, J., Bowyer, R. C. E., et al. (2018). Gut microbiota associations with common diseases and prescription medications in a population-based cohort. *Nat. Commun.* 9 (1), 2655. doi: 10.1038/s41467-018-05184-7
- Jung, U. J., and Choi, M. S. (2014). Obesity and its metabolic complications: the role of adipokines and the relationship between obesity, inflammation, insulin resistance, dyslipidemia and nonalcoholic fatty liver disease. *Int. J. Mol. Sci.* 15 (4), 6184–6223. doi: 10.3390/ijms15046184
- Ke, B., Ke, X., Wan, X., Yang, Y., Huang, Y., Qin, J., et al. (2017). Astragalus polysaccharides attenuates TNF-alpha-induced insulin resistance via suppression of miR-721 and activation of PPAR-gamma and PI3K/AKT in 3T3-L1 adipocytes. Am. J. Transl. Res. 9 (5), 2195–2206.
- Khan, M. J., Gerasimidis, K., Edwards, C. A., and Shaikh, M. G. (2016). Role of Gut Microbiota in the Aetiology of Obesity: Proposed Mechanisms and Review of the Literature. J. Obes. 2016, 7353642. doi: 10.1155/2016/7353642
- Koropatkin, N. M., Cameron, E. A., and Martens, E. C. (2012). How glycan metabolism shapes the human gut microbiota. *Nat. Rev. Microbiol.* 10 (5), 323– 335. doi: 10.1038/nrmicro2746
- Li, S. P., Zhang, P., Xia, Q., Huang, Z. G., and Zhu, Q. (2003). Analysis of Polysaccharides from Natural Cordyceps sinensis and Cultured Cordyceps mycelia by HPLC. *Chin. J. Pharmaceut. Analysis* 23 (1), 20–22.
- Li, R., Li, Y., Kristiansen, K., and Wang, J. (2008). SOAP: short oligonucleotide alignment program. *Bioinformatics* 24 (5), 713–714. doi: 10.1093/ bioinformatics/btn025
- Li, D., Liu, C. M., Luo, R., Sadakane, K., and Lam, T. W. (2015). MEGAHIT: an ultra-fast single-node solution for large and complex metagenomics assembly via succinct de Bruijn graph. *Bioinformatics* 31 (10), 1674–1676. doi: 10.1093/ bioinformatics/btv033
- Lin, L., Wang, P., Du, Z., Wang, W., Cong, Q., Zheng, C., et al. (2016). Structural elucidation of a pectin from flowers of Lonicera japonica and its antipancreatic cancer activity. *Int. J. Biol. Macromol.* 88, 130–137. doi: 10.1016/j.ijbiomac.2016.03.025
- Liu, Y., Hyde, A. S., Simpson, M. A., and Barycki, J. J. (2014). Emerging regulatory paradigms in glutathione metabolism. Adv. Cancer Res. 122, 69–101. doi: 10.1016/B978-0-12-420117-0.00002-5
- Luck, H., Khan, S., Kim, J. H., Copeland, J. K., Revelo, X. S., Tsai, S., et al. (2019). Gut-associated IgA(+) immune cells regulate obesity-related insulin resistance. *Nat. Commun.* 10 (1), 3650. doi: 10.1038/s41467-019-11370-y

- Mao, X. Q., Wu, Y., Wu, K., Liu, M., Zhang, J. F., Zou, F., et al. (2007). Astragalus polysaccharide reduces hepatic endoplasmic reticulum stress and restores glucose homeostasis in a diabetic KKAy mouse model. *Acta Pharmacol. Sin.* 28 (12), 1947–1956. doi: 10.1111/j.1745-7254.2007.00674.x
- Ndrepepa, G. (2018). Uric acid and cardiovascular disease. Clin. Chim. Acta 484, 150–163. doi: 10.1016/j.cca.2018.05.046
- Noguchi, H., Park, J., and Takagi, T. (2006). MetaGene: prokaryotic gene finding from environmental genome shotgun sequences. *Nucleic Acids Res.* 34 (19), 5623–5630. doi: 10.1093/nar/gkl723
- Peng, Z., Borea, P. A., Varani, K., Wilder, T., Yee, H., Chiriboga, L., et al. (2009). Adenosine signaling contributes to ethanol-induced fatty liver in mice. *J. Clin. Invest.* 119 (3), 582–594. doi: 10.1172/JCI37409
- Platten, M., Nollen, E. A. A., Rohrig, U. F., Fallarino, F., and Opitz, C. A. (2019). Tryptophan metabolism as a common therapeutic target in cancer, neurodegeneration and beyond. *Nat. Rev. Drug Discovery* 18 (5), 379–401. doi: 10.1038/s41573-019-0016-5
- Salyers, A. A., Vercellotti, J. R., West, S. E., and Wilkins, T. D. (1977). Fermentation of mucin and plant polysaccharides by strains of Bacteroides from the human colon. *Appl. Environ. Microbiol.* 33 (2), 319–322. doi: 10.1128/ AEM.33.2.319-322.1977
- Sanna, S., van Zuydam, N. R., Mahajan, A., Kurilshikov, A., Vich Vila, A., Vosa, U., et al. (2019). Causal relationships among the gut microbiome, short-chain fatty acids and metabolic diseases. *Nat. Genet.* 51 (4), 600–605. doi: 10.1038/s41588-019-0350-x
- Shi, L. L., Wang, Y., and Feng, Y. (2015). Effect of MDG-1, a polysaccharide from Ophiopogon japonicas, on diversity of lactobacillus in diet-induced obese mice. *Zhongguo Zhong Yao Za Zhi* 40 (4), 716–721.
- Sookoian, S., Salatino, A., Castano, G. O., Landa, M. S., Fijalkowky, C., Garaycoechea, M., et al. (2020). Intrahepatic bacterial metataxonomic signature in non-alcoholic fatty liver disease. *Gut.* gutjnl-2019-318811. doi: 10.1136/gutjnl-2019-318811
- Visconti, A., Le Roy, C. I., Rosa, F., Rossi, N., Martin, T. C., Mohney, R. P., et al. (2019). Interplay between the human gut microbiome and host metabolism. *Nat. Commun.* 10 (1), 4505. doi: 10.1038/s41467-019-12476-z

- Walker, A., Pfitzner, B., Neschen, S., Kahle, M., Harir, M., Lucio, M., et al. (2014). Distinct signatures of host-microbial meta-metabolome and gut microbiome in two C57BL/6 strains under high-fat diet. *ISME J.* 8 (12), 2380–2396. doi: 10.1038/ismej.2014.79
- Wei, X., Jiang, S., Zhao, X., Li, H., Lin, W., Li, B., et al. (2016). Community-Metabolome Correlations of Gut Microbiota from Child-Turcotte-Pugh of A and B Patients. *Front. Microbiol.* 7, 1856. doi: 10.3389/fmicb.2016.01856
- Wu, G., Fang, Y. Z., Yang, S., Lupton, J. R., and Turner, N. D. (2004). Glutathione metabolism and its implications for health. J. Nutr. 134 (3), 489–492. doi: 10.1093/jn/134.3.489
- Wu, T. R., Lin, C. S., Chang, C. J., Lin, T. L., Martel, J., Ko, Y. F., et al. (2018). Gut commensal Parabacteroides goldsteinii plays a predominant role in the antiobesity effects of polysaccharides isolated from Hirsutella sinensis. *Gut* 68 (2), 248–262. doi: 10.1136/gutjnl-2017-315458
- Yoshimoto, S., Loo, T. M., Atarashi, K., Kanda, H., Sato, S., Oyadomari, S., et al. (2013). Obesity-induced gut microbial metabolite promotes liver cancer through senescence secretome. *Nature* 499 (7456), 97–101. doi: 10.1038/ nature12347
- Zou, F., Mao, X. Q., Wang, N., Liu, J., and Ou-Yang, J. P. (2009). Astragalus polysaccharides alleviates glucose toxicity and restores glucose homeostasis in diabetic states via activation of AMPK. *Acta Pharmacol. Sin.* 30 (12), 1607– 1615. doi: 10.1038/aps.2009.168

**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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