

**Supplemental Table 1. Full Pathway Names of Supper Class in Figure 4**

BIO:AAB	Biosynthesis → Amino Acid Biosynthesis
BIO:CAB	Biosynthesis → Carboxylic Acid Biosynthesis
BIO:CB	Biosynthesis → Carbohydrate Biosynthesis
BIO:CCVB	Biosynthesis → Cofactor, Carrier, and Vitamin Biosynthesis
BIO:CSB	Biosynthesis → Cell Structure Biosynthesis
BIO:FALB	Biosynthesis → Fatty Acid and Lipid Biosynthesis
BIO:NNB	Biosynthesis → Nucleoside and Nucleotide Biosynthesis
BIO:PB	Biosynthesis → Polyprenyl Biosynthesis
BIO:SMB	Biosynthesis → Secondary Metabolite Biosynthesis
BIO:OTHER	Biosynthesis → Other Biosynthesis
DUA:AAAPD	Degradation/Utilization/Assimilation → Amide, Amidine, Amine, and Polyamine Degradation
DUA:AD	Degradation/Utilization/Assimilation → Alcohol Degradation
DUA:C1CUA	Degradation/Utilization/Assimilation → C1 Compound Utilization and Assimilation
DUA:CD	Degradation/Utilization/Assimilation → Carbohydrate Degradation
DUA:INM	Degradation/Utilization/Assimilation → Inorganic Nutrient Metabolism
DUA:NND	Degradation/Utilization/Assimilation → Nucleoside and Nucleotide Degradation
GEN:Ferm	Generation → Fermentation Generation of Precursor Metabolites and Energy
GEN:PPP	Generation → Pentose Phosphate Pathways Generation of Precursor Metabolites and Energy
GEN:TCA	Generation → TCA Generation of Precursor Metabolites and Energy
MAR:NAP	Maromolecule → Nucleic Acid Processing Macromolecule Modification