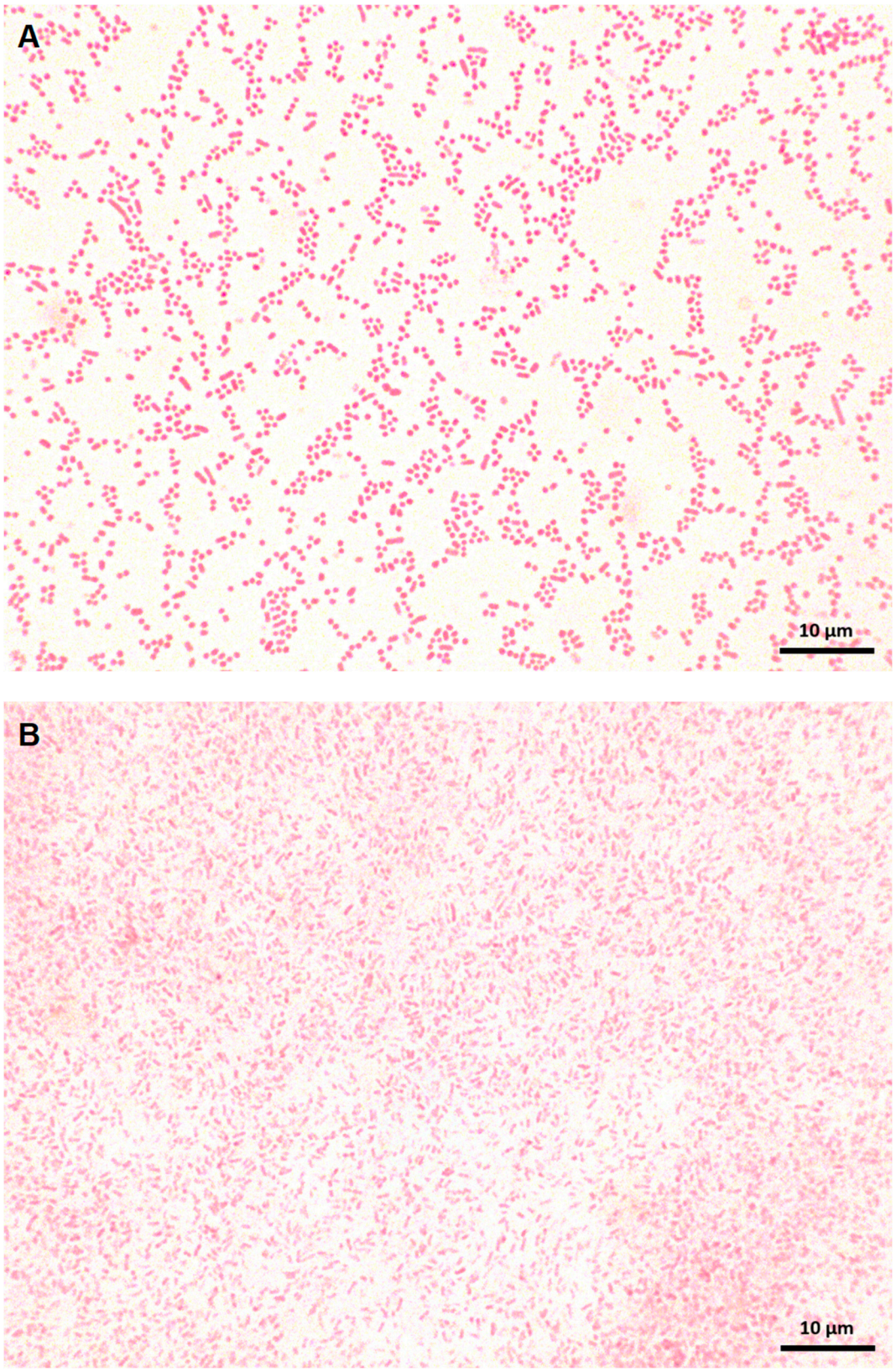


Figure S1. Gram-stained micrograph of strain (**A**) BB2 showing Gram-negative, short rod-shaped (coccobacillary) cells occurring singly or in small clusters (scale bar = 10 µm) and (**B**) BB3 showing Gram-negative, slender rod-shaped cells occurring mostly singly, with occasional small clusters (scale bar = 10 µm).



Figure S2. The morphology of the BB2 (**A**) and BB3 (**B**) colonies on TSA plates.

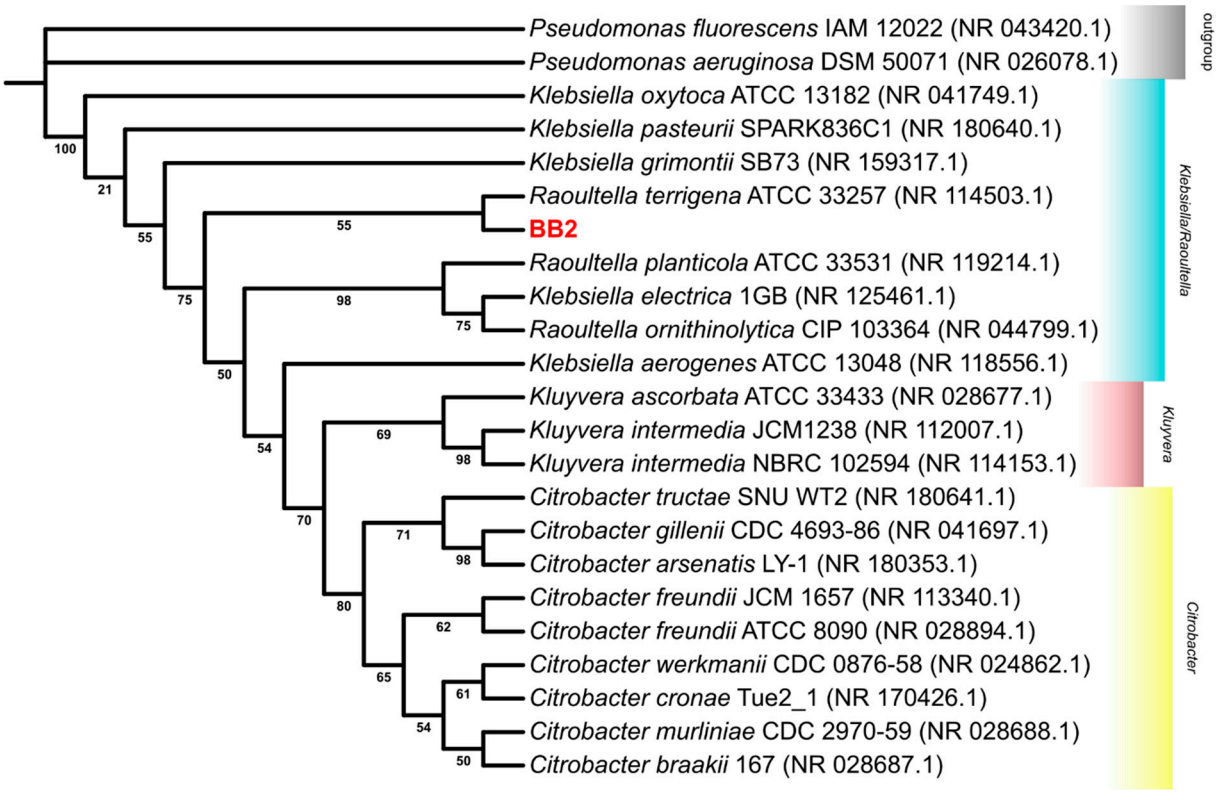


Figure S3. The cladogram of BB2 and related strains. The tree was calculated using IQ-TREE software based on the alignment of 16S rRNA sequences. *Pseudomonas* strains were used as an outgroup. The numbers on the branches indicate the bootstrap value (% of 1000 repeats). Numbers in brackets indicate sequence accession numbers in the NCBI database. The BB2 strain is highlighted in red.

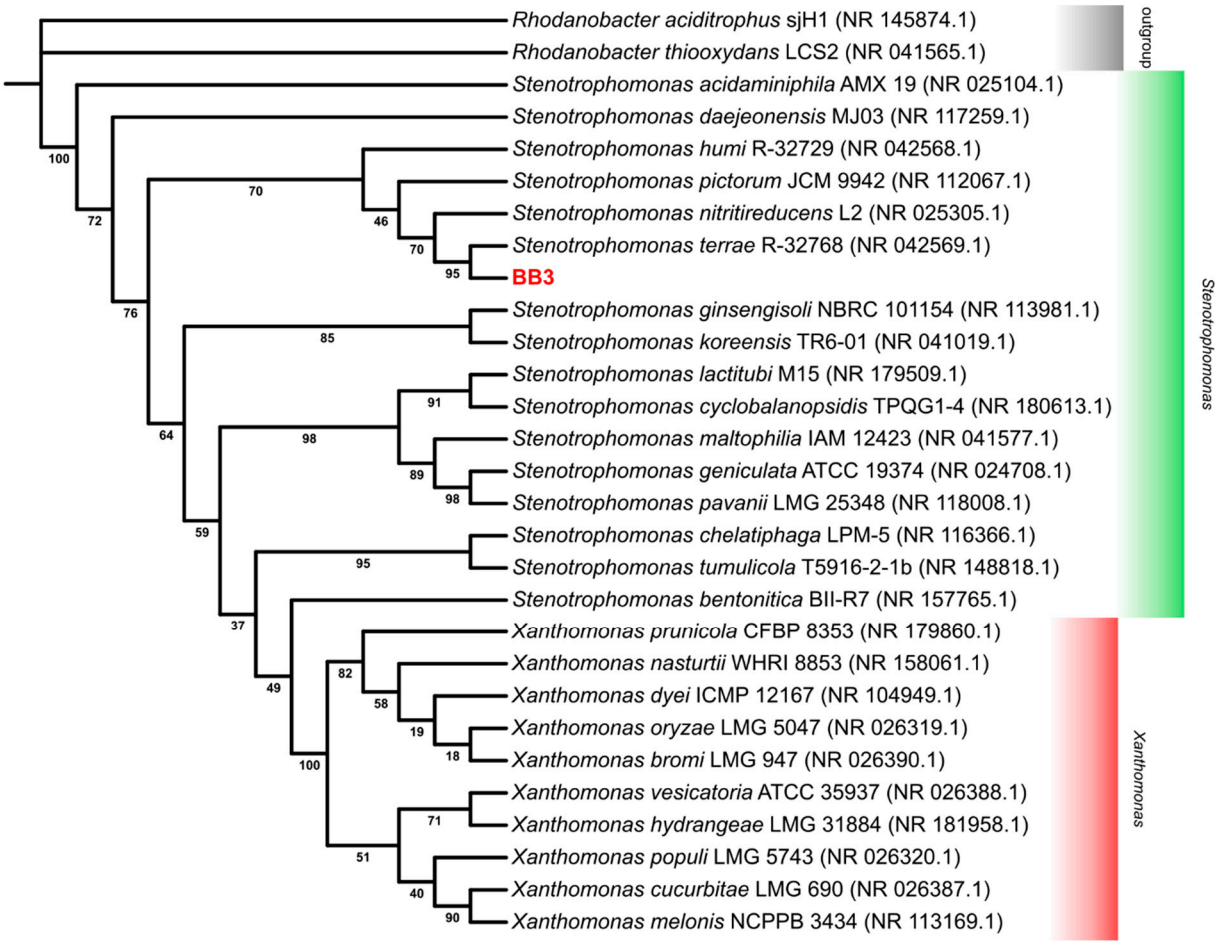


Figure S4. The cladogram of BB3 and related strains. The tree was calculated using IQ-TREE software based on the alignment of 16S rRNA sequences. *Rhodanobacter* strains were used as an outgroup. The numbers on the branches indicate the bootstrap value (% of 1000 repeats). Numbers in brackets indicate sequence accession numbers in the NCBI database. The BB3 strain is highlighted in red.

Table S1. Functional comparison of metabolic traits and cometabolic pathways supporting β-blocker biotransformation in BB2 and BB3.

Feature	***Raoultella terrigena* BB2**	***Stenotrophomonas terrae* BB3**	**Interpretation**
β-blocker transformed	Propranolol	Metoprolol	Strain-specific substrate preference
Growth on β-blocker alone	No growth	No growth	Cometabolic transformation required
Most effective co-substrate	Ammonium acetate	Glucose	Co-substrate-dependent activation
Transformation behavior	Faster activation, higher efficiency	Slower activation	Linked to pollutant hydrophobicity and metabolic regulation
Ecological traits	Broad metabolism, MDR	Narrower metabolism, motile, antibiotic-sensitive	Reflects adaptation to activated sludge niches
Bioremediation implication	Suitable for conditions with nitrogen-rich co-substrates	Suitable for carbon-rich (glucose-present) systems	Candidate strains for tailored bioaugmentation