



**Figure S1 Multiple sequence alignment and phylogenetic tree analysis of the enzymes for 2,3-BD production in strain 10-1-A and the reported 2,3-butanediol dehydrogenases (BDHs).**

A, Multiple sequence alignment of BDHs; B, phylogenetic tree analysis of the BDHs. PpBDH, the (2R,3R)-BDH in *Paenibacillus polymyxa* (GenBank: YP\_001487573); YBDH, the (2R,3R)-BDH in *Saccharomyces cerevisiae* (GenBank: AAC04974.1); BsBDH, the (2R,3R)-BDH in *B. subtilis* (GenBank: NP\_388505.1); SBDH, *meso*-BDH in *S. marcescens* BDH (GenBank: AFH00999); KpBDH, *meso*-BDH in *K. pneumoniae* IAM 1063 (GenBank: YP\_002919837.1); OGDH, the glycerol dehydrogenase (GDH) in *Odostomia angusta* (GenBank: BAD32688.1); BIBDH, *meso*-BDH in strain 10-1-A (GenBank: KF250429); BGDH, GDH in strain 10-1-A (GenBank: KF250430).