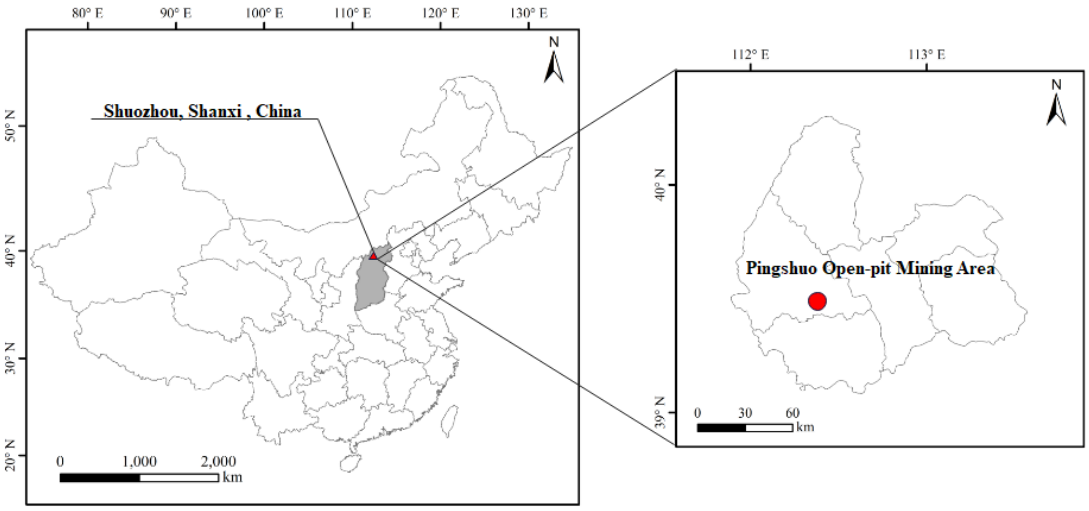

Fig. S1. **Geographic location of Shuozhou, Shanxi, China and the Pingshuo Open-pit Mining Area.**

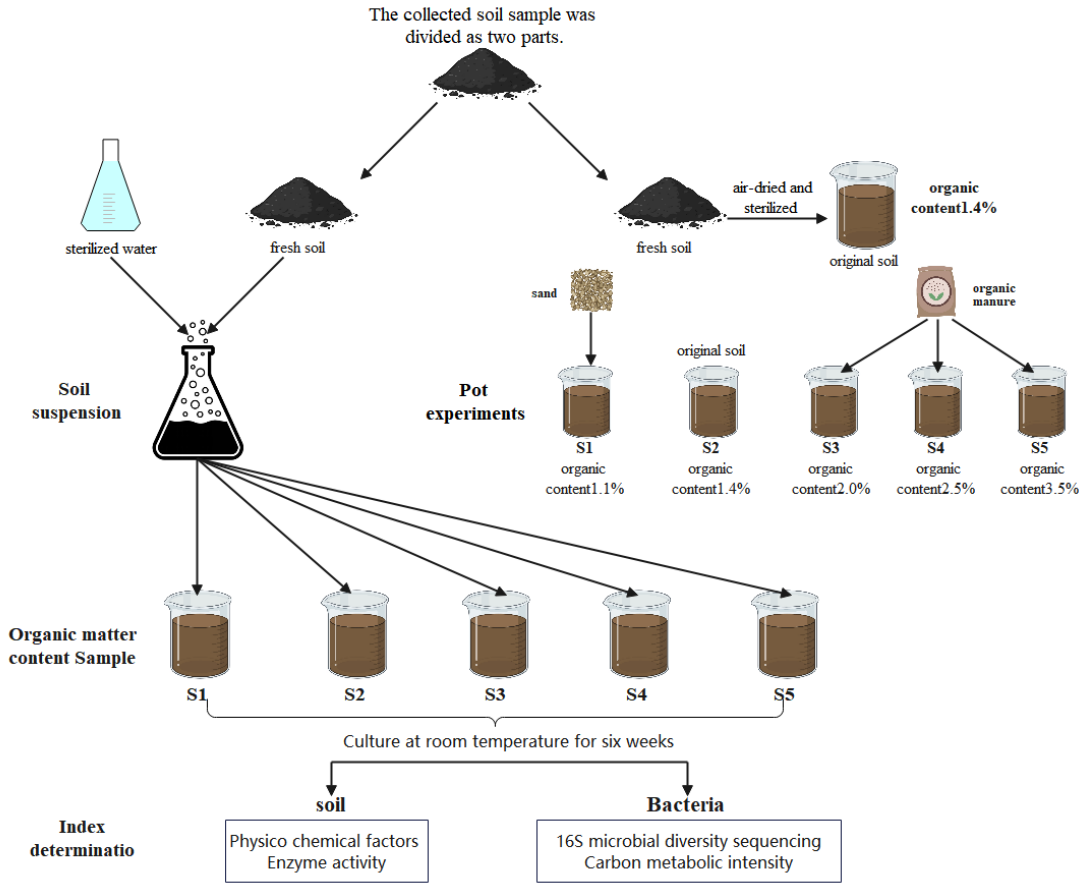

Fig S2 Workflow of this study. The collected soil sample was divided as two parts. The fresh soil was added to 300 mL sterilized water for configuring the soil suspension. The other soil was air-dried and sterilized for inoculation. The sterilized soil was configured with organic matter to be different content. The soil suspension was inoculated to the sterilized soil with different organic matter content for strain inoculation. After culture at room temperature for six weeks, the indexes were determined.

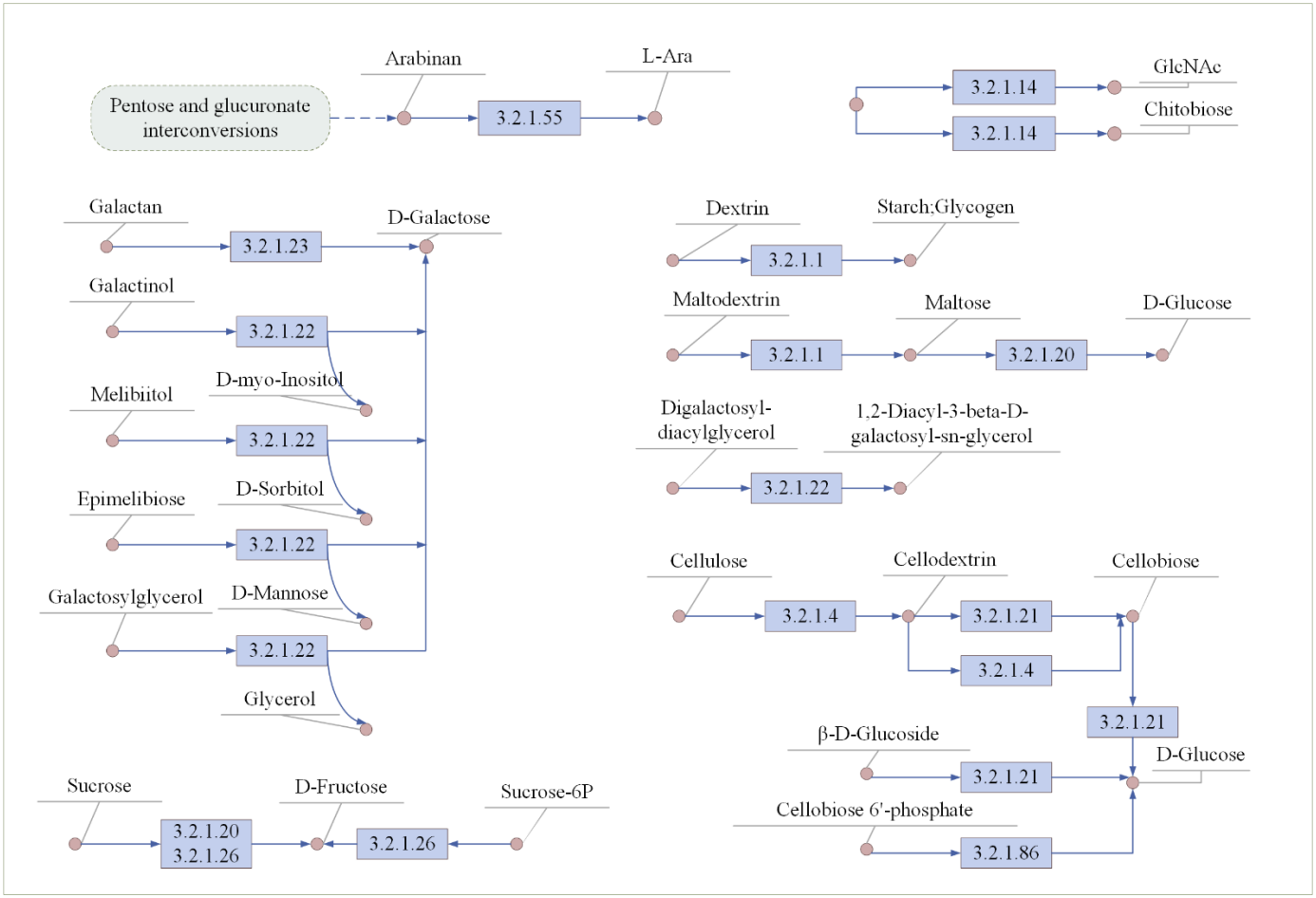

Fig S3 Effect of soil organic matter on bacterial enzymes involved in carbon metabolism. (a) Summarized Kyoto Encyclopedia of Genes and Genomes (KEGG) pathways involved in organic carbon degradation. (b) Summarized Kyoto Encyclopedia of Genes and Genomes (KEGG) pathways involved in organic carbon biosynthesis. Substrates and products are annotated with red circles.

Table S1 The specific configuration ratio of soils with different contents of organic matter, based on a 100 g mixed system composed of soil, organic matter, and sand.

Samples	Organic matter (%)	Sand (g)	Soil (g)	Exogenous organic matter (g)
S1	1.1	22	78	0
S2	1.4	0	100	0
S3	2	0	98.1	1.9
S4	2.5	0	96.7	3.3
S5	3.5	0	93.7	6.3

Soil: Organic matter content is 13.98 g/kg; Exogenous organic matter: Organic matter content is 350 g/kg.

Table S2 Basic properties of the exogenous organic matter used for the laboratory incubation.

Physicochemical characteristics	Values
Composition	peat, perlite, vermiculite (by volume) 1:1:1
Total nitrogen (%)	2.8
Total phosphorus (%)	0.8
Total potassium (%)	0.7
Organic matter (%)	35
Electrical conductivity	2
pH	6.5

Table S3 Related enzymes involved in organic carbon degradation in soils with different organic matter contents based on KEGG database.

Enzyme	Description
3.2.1.23	Beta-galactosidase
3.2.1.22	Alpha-galactosidase
3.2.1.86	6-phospho-beta-glucosidase
3.2.1.55	Non-reducing end alpha-L-arabinofuranosidase
3.2.1.14	Chitinase
3.2.1.21	β-Glucosidase
3.2.1.4	Endo-1,4-β-glucanase
3.2.1.1	α-Amylase
3.2.1.20	α-Glucosidase
3.2.1.26	β-Fructofuranosidase