

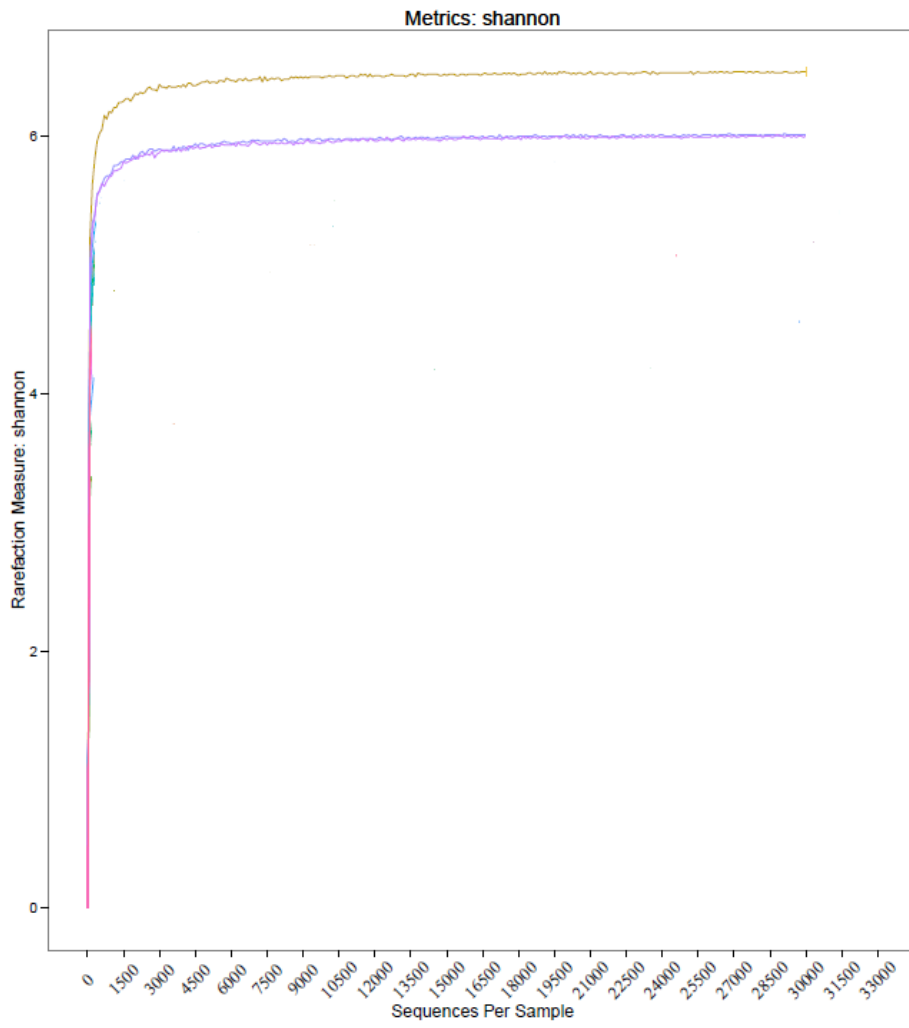
## Supplementary Material

**Table S1** Types and dosages of different substances

Types	Dosage
Hexane	10 $\mu$ mol
Hexadecane	10 $\mu$ mol
Benzene	10 $\mu$ mol
Phenanthrenecarboxylic acid	20 mg/L
Sodium propionate	20 mM
Sodium acetate	20 mM
Glucose	20 mM
Fulvic acid	0.1% (m/v)
Humic acid	0.1% (m/v)
AQDS	5 mM
BES	5 mM
Magnetite	10 mM Fe
SDS	0.01% (m/v)
L-rhamnose	0.01% (m/v)
Twain-80	0.01% (m/v)

**Table S2** Summary of Illumina sequencing data for the origin and the enriched culture

Microbial Types	Sequences and OTUs	Origin	Enriched culture
Bacteria	Number of optimized sequences	122450	156041
	Operational taxonomic units (OTUs)	789	806
Archaea	Number of optimized sequences	62904	245839
	Operational taxonomic units (OTUs)	300	398



**Fig. S1** Bacterial Shannon index curve of the initial sample and of the methanogenic enrichment culture. The yellow line: the methanogenic enrichment culture; and the purple line: the initial sample.