Electronic Supplementary Information

Characterization of designed synthetic autotrophic-heterotrophic consortia for fixing CO_2 without light

Electronic Supplementary Information summary

Table S1 The carbon fixation efficiency of the synthetic microbial consortia composed of the five strains and NPMC

Number of consortium members	Consortium member (Inoculation is indicated by +)						Net carbon fixation (mg C/L)	
	Sinomicrobium oceani WH-15	*Ochrobactrum* sp. WH-13	*Stenotrophomonas* sp. WH-11	*Ochrobactrum* sp. WH-2	*Castellaniella* sp. WH-14	NPMC	Experimental (a, b)	
0						+	3.43	3.16
1	+						3.70	3.45
1	+					+	4.44	5.03
1		+					2.66	3.26
1		+				+	4.88	4.39
1			+				3.38	2.59
1			+			+	6.02	6.77
1				+			3.55	4.14
1				+		+	3.68	4.18
1					+		2.72	3.08
1					+	+	5.92	6.49
2	+	+					4.82	5.35
2	+	+				+	4.77	5.67
2	+		+				4.34	4.16
2	+		+			+	4.53	5.00
2	+			+			2.71	3.25
2	+			+		+	3.99	4.59
2	+				+		2.95	2.69
2	+				+	+	7.89	6.61
2		+	+				2.34	2.64
2		+	+			+	4.01	3.80
2		+		+			2.66	2.40
2		+		+		+	4.06	4.62
2		+			+		2.15	2.10
2		+			+	+	4.58	5.08
2			+	+			3.11	2.98
2			+	+		+	4.89	4.27
2			+		+		3.46	3.61
2			+		+	+	5.85	5.24

2				+	+		3.15	3.14
2				+	+	+	5.70	5.53
3	+	+	+				2.86	3.20
3	+	+	+			+	5.25	6.02
3	+	+		+			2.09	1.99
3	+	+		+		+	4.25	4.86
3	+	+			+		3.68	3.37
3	+	+			+	+	5.65	4.96
3	+		+	+			2.87	3.36
3	+		+	+		+	3.22	3.97
3	+		+		+		2.33	2.60
3	+		+		+	+	6.06	5.33
3	+			+	+		2.69	3.33
3	+			+	+	+	6.57	5.81
3		+	+	+			4.09	4.01
3		+	+	+		+	4.44	3.64
3		+	+		+		3.30	2.78
3		+	+		+	+	6.87	7.73
3		+		+	+		3.21	3.55
3		+		+	+	+	5.71	5.33
3			+	+	+		2.89	3.14
3			+	+	+	+	34.19	30.42
4	+	+	+	+			3.35	4.03
4	+	+	+	+		+	6.19	5.45
4	+	+	+		+		3.29	3.27
4	+	+	+		+	+	4.79	5.30
4	+	+		+	+		3.16	2.74
4	+	+		+	+	+	14.85	12.66
4	+		+	+	+		2.13	2.66
4	+		+	+	+	+	3.90	3.73
4		+	+	+	+		2.42	3.02
4		+	+	+	+	+	3.40	2.72
5	+	+	+	+	+		2.12	2.58
5	+	+	+	+	+	+	4.68	4.87

* The inoculum concentrations of each strain and the NPMC were approximately 1 mg C/L and 0.1 mg C/L, respectively.

Table S2 Correlations between microbial members and TOC

		***Sinomicrobium oceani* WH-15**	***Ochrobactrum* sp. WH-13**	***Stenotrophomonas* sp. WH-11**	***Ochrobactrum* sp. WH-2**	***Castellaniella* sp. WH-14**	**NPMC**
TOC	**S**	0.083	-0.009	-0.017	-0.095	0.058	0.764
	P	0.350	0.921	0.850	0.285	0.513	0.000

* There were 128 sets of data from Fig. 1. S was Spearman correlation coefficient. Five strains and NPMC were all set as a dummy variable with not added set at level 0 and added at level 1. The results of 0.000 in the table means far less than 0.001.

Table S3 Correlations between microbial members and TOC
(synthetic microbial consortia without NPMC)

		***Sinomicrobium oceani* WH-15**	***Ochrobactrum* sp. WH-13**	***Stenotrophomonas* sp. WH-11**	***Ochrobactrum* sp. WH-2**	***Castellaniella* sp. WH-14**
TOC	**S**	0.102	-0.041	0.046	-0.058	-0.164
	P	0.425	0.750	0.720	0.652	0.195

* There were 64 sets of data from Fig. 1. S was Spearman correlation coefficient. Five strains were all set as a dummy variable with not added set at level 0 and added at level 1.

Table S4 Correlations between microbial members and TOC
(synthetic microbial consortia with NPMC)

		***Sinomicrobium oceani* WH-15**	***Ochrobactrum* sp. WH-13**	***Stenotrophomonas* sp. WH-11**	***Ochrobactrum* sp. WH-2**	***Castellaniella* sp. WH-14**
TOC	**S**	0.098	-0.051	-0.044	-0.201	0.457
	P	0.441	0.690	0.730	0.111	0.000

* There were 64 sets of data from Fig. 1. S was Spearman correlation coefficient. Five strains were all set as a dummy variable with not added set at level 0 and added at level 1. The results of 0.000 in the table means far less than 0.001.

Table S5 The prominent OTUs at the genus level of Consortium-I-N, Consortium-II-N, Consortium-I-H, and Consortium-II-H

OTUname	Consortium-I-N	Consortium-II-N	Consortium-I-H	Consortium-II-H
Agromyces	1	0	5	205
Pseudomonas	2	0	33	15890
Bacillus	0	0	11	14
Acinetobacter	0	0	0	1
Luteimonas	0	0	0	1
Roseburia	0	0	0	1
Bdellovibrio	0	0	0	1
Mitsuaria	0	0	0	1
Castellaniella	15210	11685	433	746
Ochrobactrum	33093	47810	47754	45488
Lysinibacillus	12	8	10605	8630
Alcanivorax	89	131	53	555
Microbacterium	42	89	1	63
Halomonas	5	0	0	0
Bordetella	37	0	0	0
Paracoccus	3	0	0	0
Dokdonella	2	0	0	0
Acidovorax	1	0	0	0
Mesorhizobium	1	0	0	0
Citrobacter	1	0	0	0
Aeromicrobium	1	0	0	0
Nitrospira	1	0	0	0
Aequorivita	1	0	0	0
Flexibacter	1	0	0	0
Pirellula	1	0	0	0
Arenibacter	1	0	0	0

Pseudorhodobacter	1	0	0	0
Arthrobacter	25	28	0	0
Hydrogenophaga	348	298	0	0
Zobellella	12	11	0	0
Pelagibacterium	7	3	0	0
Rheinheimera	6	3	0	0
Erythrobacter	4	3	0	0
Labrenzia	1	3	0	0
Nocardioides	2	1	0	0
Aurantimonas	1	2	0	0
Stappia	2	1	0	0
Rhodococcus	1	1	0	0
Mycetocola	0	0	1	0
Gillisia	0	0	1	0
Thiobacillus	0	0	1	0
Aeromonas	0	0	1	0
Pseudoalteromonas	0	0	1	0
Sandaracinus	1	0	1	0
Nitratireductor	8	0	135	0
Brevundimonas	0	2	0	0
Mycobacterium	0	4	0	0
Rhizobium	0	1	0	0
Pusillimonas	0	1	0	0
Aquamicrobium	0	102	4	34

* The table shows the 50 most prominent OTUs at the genus level.

Table S6 The prominent OTUs at the genus level of NPMC-H (Intial), NPMC-H (Cultured), Consortium-I-H, and Consortium-II-H

OTUname	NPMC-H (Intial)	NPMC-H (Cultured)	Consortium-I-H	Consortium-II-H
Roseburia	0	0	0	1
Luteimonas	0	0	0	1
Bdellovibrio	0	0	0	1
Acinetobacter	0	0	0	1
Mitsuaria	0	0	0	1
Agromyces	0	0	5	206
Alcanivorax	0	0	48	560
Microbacterium	0	0	1	64
Lysinibacillus	90577	29277	10553	8685
Ochrobactrum	44	50445	47658	45481
Pseudomonas	490	109	33	15884
Bacillus	44	36	11	14
Tenacibaculum	0	1	0	0
Planctomyces	0	1	0	0
Bradyrhizobium	0	1	0	0
Prochlorococcus	0	1	0	0
Raoultella	0	1	0	0
Oleispira	0	1	0	0
Maribacter	0	1	0	0
Castellaniella	0	1866	439	743
Pseudoalteromonas	0	0	1	0
Nitratireductor	0	0	136	0
Gillisia	0	0	1	0
Sandaracinus	0	0	1	0
Mycetocola	0	0	1	0

Aeromonas	0	0	1	0
Thiobacillus	0	0	1	0
Deferrisoma	0	0	1	0
Acidiferrobacter	1	0	0	0
Halomonas	3	0	0	0
Caulobacter	1	0	0	0
Rhodobium	1	0	0	0
Opitutus	1	1	0	0