Figure S1. Sampling locations. **A)** Global perspective of sampling sites; **B)** Etang de Berre, France. Samples were taken from eight locations within the retention basin and combined (43°29'05''N; 5°11'17''E, salinity ≈ 17‰); **C)** Channel between the islands of Hoga and Kaledupa in Southeast Sulawesi, Indonesia (5°29'0.2''S; 123°45'24.7''E, salinity = 34‰).

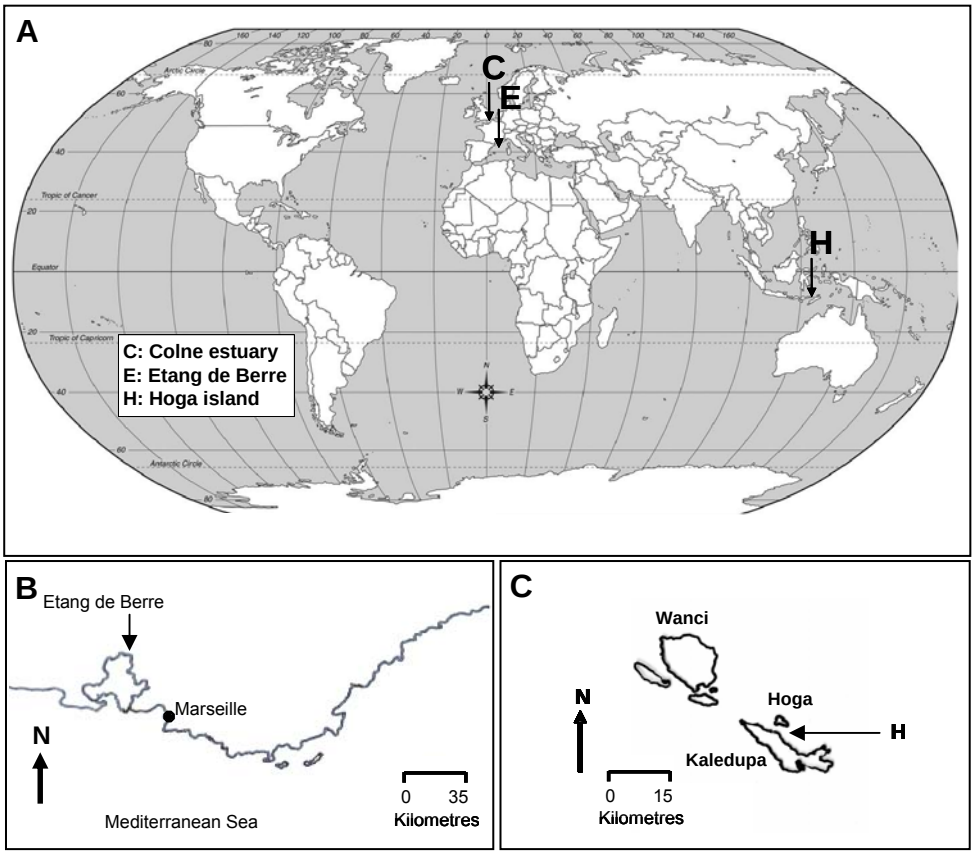

Figure S2. Isoprene concentration in the headspace relative to killed controls for, **A)** four replicate sediment samples from Etang de Berre, and **B)** subsequent enrichments (E1, E2, E3) of the single sample in which isoprene was degraded (marked with an arrow in A). Isoprene added at 0.1% v/v; microcosms incubated at 12°C.

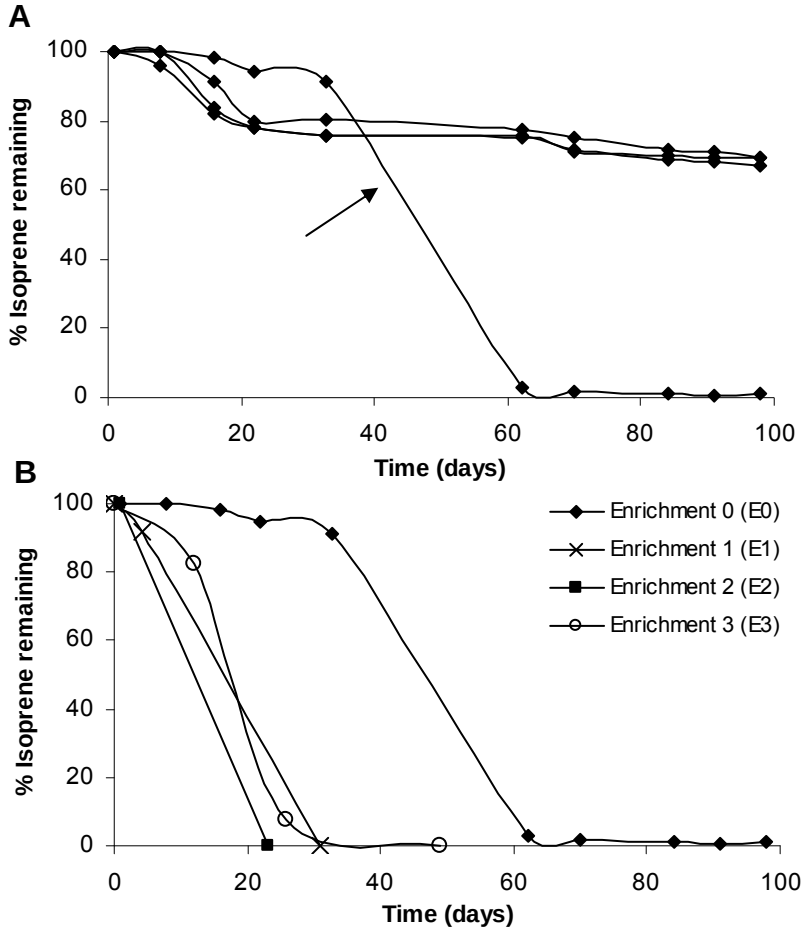

Figure S3. Isoprene concentration in the headspace relative to killed controls of four replicate water samples from Etang de Berre, incubated with, **A)** 0.001% v/v isoprene, and **B)** 0.1% v/v isoprene. Microcosms incubated at 12°C. Note the difference in the time scale (x axis) between A and B.

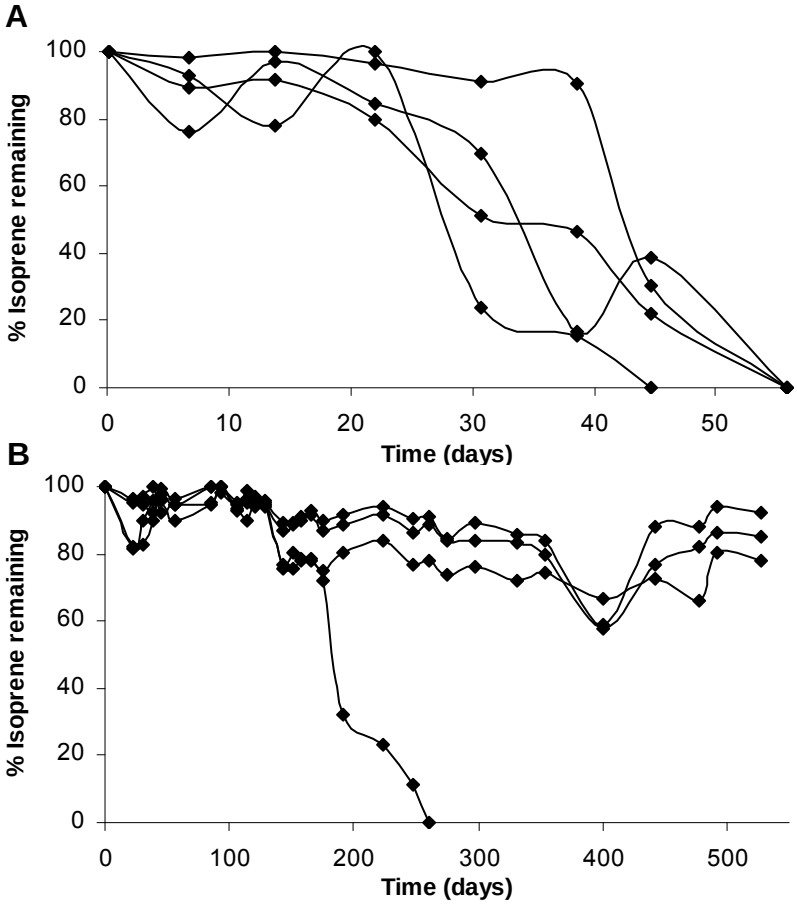

Figure S4. Isoprene concentration in the headspace relative to killed controls for, **A)** four replicate seawater samples from Sulawesi (Indonesia), and **B)** subsequent enrichment of one of the samples (marked with and arrow in A). Microcosms incubated at 30°C.

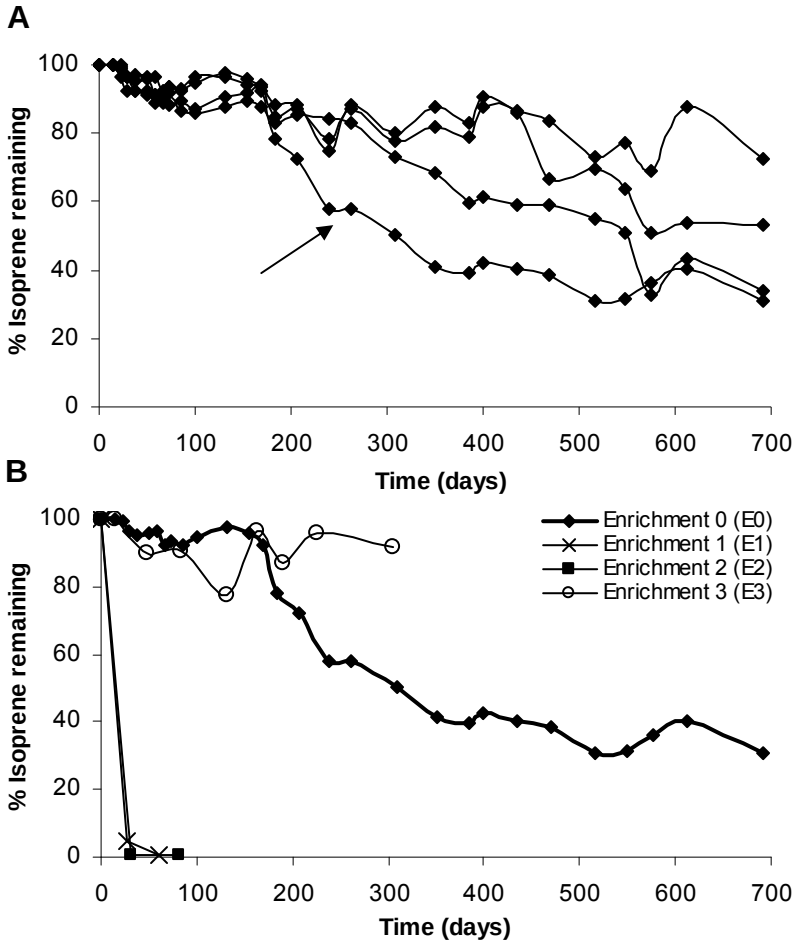

Figure S5. Isoprene concentration in the headspace relative to killed controls for the sediment samples along the Colne estuary (E0), and their subsequent enrichments (E1, E2, E3). **A)** Point 1 (head of estuary), **B)** point 2, **C)** point 3, and **D)** point 4 (mouth of estuary). The mean of four replicates is plotted, and bars represent standard errors. Isoprene added at 0.1% v/v; microcosms incubated at 12°C.

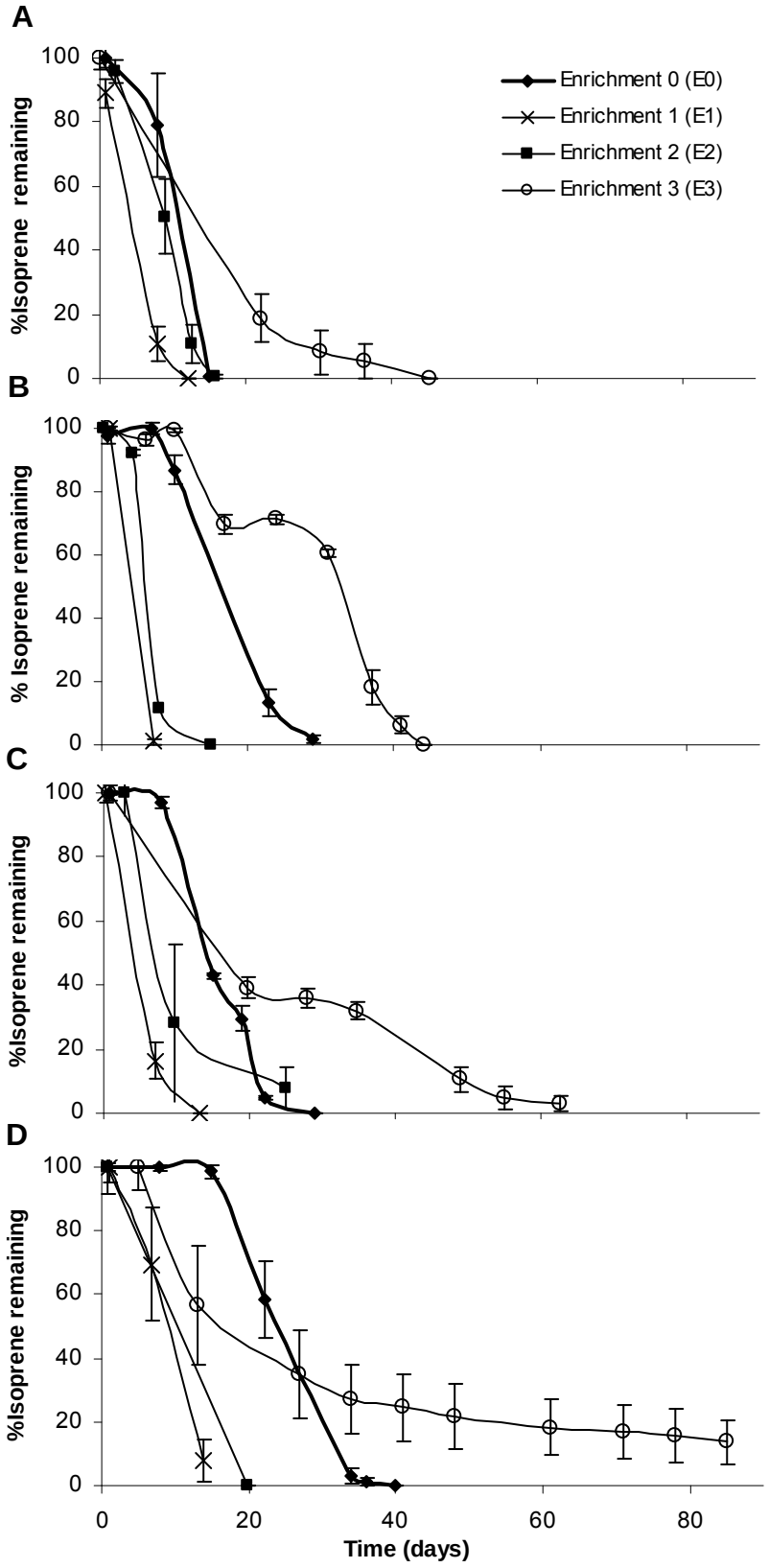

Figure S6. Isoprene concentration in the headspace relative to killed controls for the undiluted water samples along the Colne Estuary (E0), and their subsequent enrichments (E1, E2, E3). **A)** Point 1 (head of estuary) and **B)** point 3. The mean of four replicates is plotted, and bars represent standard errors. Isoprene added at 0.1% v/v; microcosms incubated at 12°C.

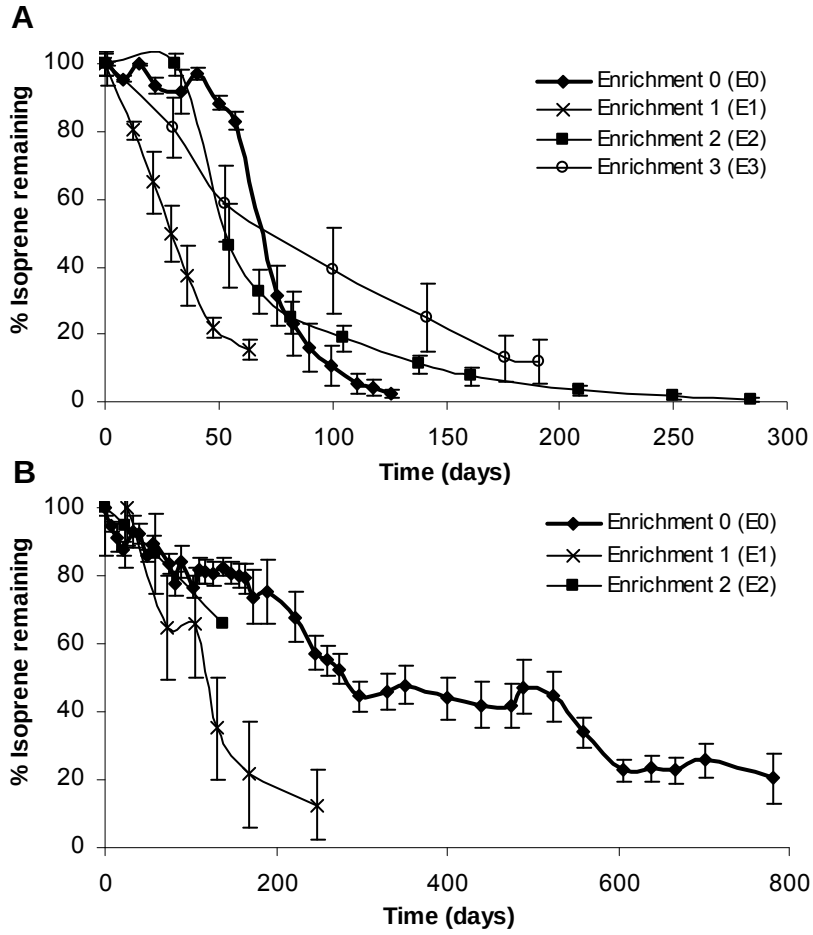

Figure S7. Representative DGGE gel (45-55% gradient) of partial 16S rRNA genes amplified from DNA extracted from the Colne estuary sediment samples and subsequent enrichments with isoprene (as shown in Fig. S5), from **A**, point 2 and **B**, point 4. IS: non-inoculated initial sediments, E0: initial sediments inoculated with isoprene (two shown), E1: first enrichment, E2: second enrichment and E3: third enrichment (quadruplicates shown). The bands that increased most in density during the enrichment process were cut out, re-amplified and sequenced, and their identity is indicated.

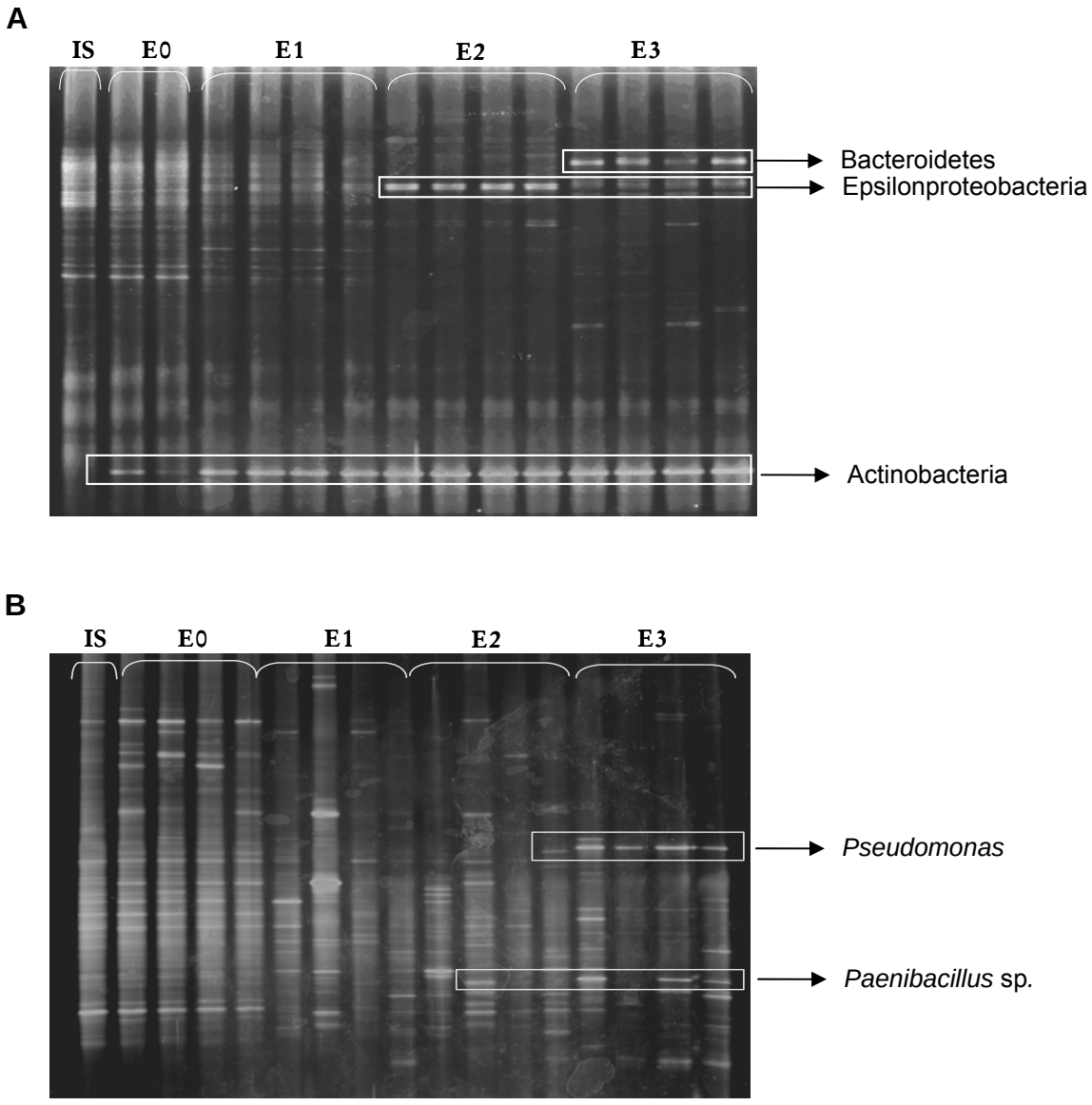

Figure S8. Experimental set up for the incubations of algae and bacteria. Double borosilicate bottles connected at the top that only allowed exchange of volatile compounds were used to test whether a bacterial mixture could utilise isoprene liberated from different phytoplankton cultures (B, P). In order to test whether there was a net change in isoprene production, isoprene concentrations were also measured in negative controls consisting of the same phytoplankton cultures incubated without bacteria (Ø, P). Additional negative controls of bacterial isolates incubated without phytoplankton were also prepared (B, Ø). B: bacteria, P: phytoplankton, Ø: blank.

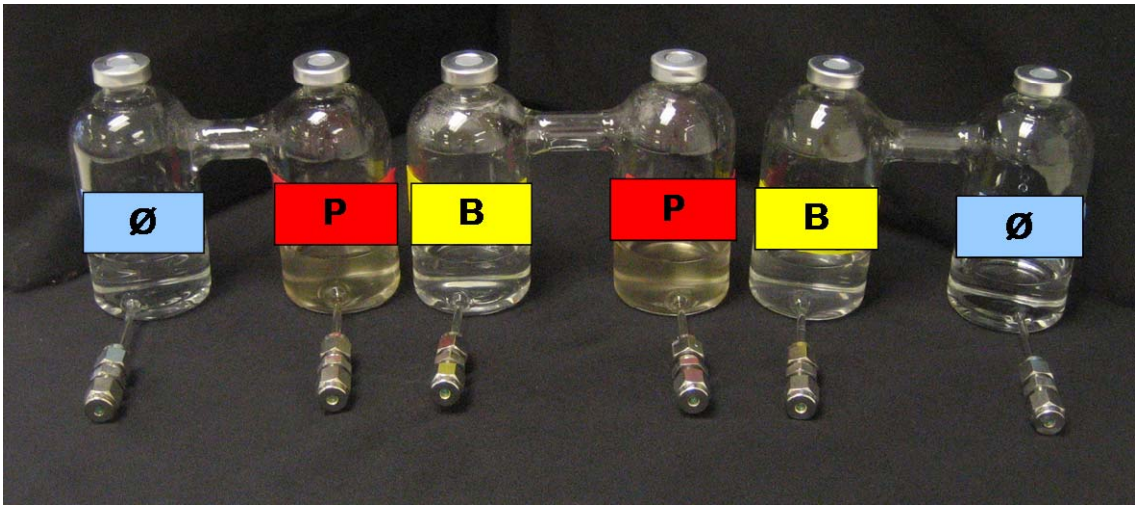

Figure S9. Isoprene concentration and cell numbers for isoprene-producing *Phaeodactylum tricornutum* and isoprene-consuming bacteria incubated in separate vessels that allow exchange of volatile compounds. **A**, Isoprene concentration in the headspace. Cell numbers of **B**, *Phaeodactylum tricornutum* and **C**, bacteria. Three experiments were performed (Fig. S8): green lines, *Phaeodactylum tricornutum* minus isoprene-consuming bacteria; black lines, *Phaeodactylum tricornutum* plus bacteria; blue line, bacteria alone.

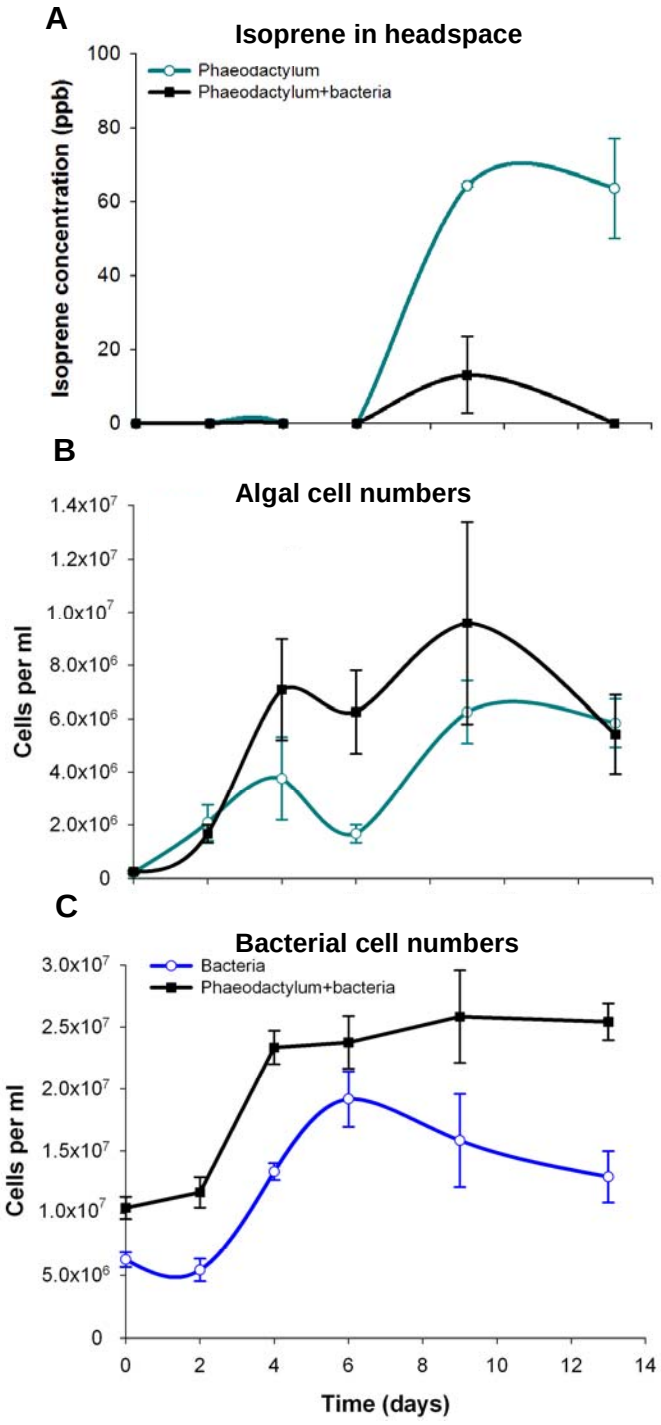

Table S1. Characteristics of selected isoprene-degrading strains. Isolates are from samples: CS1, 2, 3, 4: Colne sediment points 1, 2, 3, 4, respectively; EWH, EWL: Etang de Berre water with 0.1% v/v, 0.001% v/v of isoprene, respectively. Effects of temperature and NaCl concentration were tested with isoprene as sole carbon source in ONR7a medium, with 22.8°/₀₀ NaCl for the temperature tests, and at 20°C for the NaCl-concentration tests. The ability to use different compounds as the sole source of carbon and energy was assessed by incubating in ONR7a medium with 22.8°/₀₀ NaCl at 20°C. There was no growth in the negative control without any carbon source. + indicates that both replicates were positive, - indicates that both replicates were negative, +/- indicates they replicates gave different results.

	Strain designation					
	i8	i24	i37	i47	i49	i48
Phylum/ Class	Bacteroidetes	Actinobacteria	Actinobacteria	Actinobacteria	Alphaproteobacteria	Actinobacteria
Genus	*Dyadobacter*	*Rhodococcus*	*Gordonia*	*Leifsonia*	*Xanthobacter*	*Rhodococcus*
Environment	CS2	CS1	CS3	CS4	EWH	EWL
Colony morphology	Circular, white	Irregular, white	Circular, yellow	Punctiform, white	Punctiform, yellow	Punctiform, yellow
Characteristic						
Temp. range for growth (°C)	4-30	4-30	12-37	4-30	4-30	4-30
NaCl range for growth (°/₀₀)	3.4-35	3.4-35	3.4-70	3.4-35	3.4-35	3.4-35
Growth with sole C source (0.1%)						
Glucose, fructose	+	+	+	+	+	+
Sucrose	+	-	+	+	+	+
Alanine	+	+	+	+	+	+
Arginine	+	-	-	+	+/-	+
Methionine	-	-	-	-	-	-
Acetate, benzoate, pyruvate	+	+	+	+	+	+
Ethanol	+	+	+	+	+	+
Glycerol	+	+	-	+	+/-	-
Methanol	-	-	-	-	+	-
Tetradecane	+	+	+	+	+	-
Pristane	+	-	-	-	-	-
Squalane	-	-	-	-	-	+/-
Biphenyl	-	-	-	-	-	-
Benzene	-	-	-	-	+	-
Toluene	-	-	-	-	-	-
Ethene, propene	-	-	-	-	-	-
Poly-*cis*-isoprene[†]	-	-	-	-	-	-
DMS, methane	-	-	-	-	-	-
Isoprene	+	+	+	+	+	+

[†] The poly-*cis*-isoprene turned yellow and aggregated in the presence of strain i37