Supplement

Table S1. Sediment- and plastic-associated microbiome enrichments in M9 minimal medium supplemented with a range of hydrophobic substrates. Numbers indicate weeks until visible change in turbidity was observed.

Substrate	Marine sediment sample (18 PSU)	Marine plastic particles (30 PSU)
Beeswax	1	1
Paraffin wax	4	1
Paraffin oil	3	1
Octadecane	17	3
Squalane	9	—
Low-Density Polyethylene (LDPE)	—	—
PET (Powder)	—	—
BHET	—	—

Table S2. Nucleotide and amino acid sequences of the four candidate enzymes

Name	Size	Sequence
*A*BHETase 1 (JHONJODE_02731, DBEOMKNH_03626)	1827 bp	ATGTTCCCCCATGGCAAATCCCTGGGACTGCTGGCCCTGTTC AGCCTGATCCTGACCGGCTGTGGCAGTGACAGCAGCAATGAT CGACCATCCCCACAACCCCCTCTGACCGCGACCACGCTGCAA GGCGAGGTCGCCGGCCAGCAACGGGCGCCGGAAAACGCCAC TGTCGATGGCACCCTGCTGGTGTGGCGGGGCATACCTTATGC CCGCCCGCCAGTGGACGACCTGCGCTGGCGCGCACCGCAAC CGCCGGAAAGCTGGAGCGGCGTGCGCGACGCCAGCGAGCC GGCATCCCGTTGCGTGCAGGCGGAAACCACCCGTCACTGGG TACGCACACAAAACATCATCGGCGACGAAGACTGCCTGTACC TGGATATCTACCGACCCAGCCGCGCTGACTGGCAACAGGAGC AATTGCCGGTTTATGTCTGGATTCACGGTGGCTCCAATAACTT CGGCACCGCCATGGATTACGATGGCGGCAACCTGGCGCTGC ACGCCGACGCGGTGGTCGTGGTGATCCAGTACCGGCTGGGG CCGCTGGGCTGGTTCTACCAACCGGAGGTCCAGACCGGCGG CGCCGACCCGCTGTCCGATTCCGGCAATTTCGGCAATCTGGA TCAGATACAGGCCCTGCGATGGGTGCGCGACAATGTGGCGG CCTTCGGCGGCGATCCCGATCAGATCACCATTGCCGGCGAGT CCGCCGGCGGCCACAACGTGATGACGCTGCTGGTGTCACCG CAGGCACAAGGCCTGTTCCACAAGGCCATGGCACAAAGCCCG GCCATGGAGACCCGCTCGCCGGCGGAGGCCGAGGCCTTCAC CAACGAACAGATCGACTATCTGCTGCGCTACCGGGGTGACGC CGGGGACGCCGGCGAAGCCGCCGCCCTGCGCCAGCAGATG GTGGACGATGGCACCCTGGACGAATACCTGTTCCAGGTCCCG GCCCATGACTACTACGCCGCCGTCCTGGCCTACACCAGCCTG TCCGCCTACGGCGCCACGGAAGACGGTGTGGTGGTGCCCAG CGGCGGCTGGATGCCGGCCATTCGGGCTGGCGAGTACAACT CCGTGCCCGTGATCATCGGCGCCAACGAATATGAGCAAAAGG CGTTCATGCCCCTTTATGGCGCCTTGGTGAAAGCCCTGTATG GCCAGCCTTCCGGAGACTACACCTGGCTCAATCTGAAGGACG TAATGGAAGGGGAATCGAAAGCGGACGGCGCTCCGTTCACCC TGGACGACGTGCTGCCCACGGAGCGGGATCGAACGATCTAC GAGCTAGCCGGCTACCATGGCAGCCGCGCCTGGCGCGCCAA GTATGTGGACGAACTGGCGGCGGCGCTGGCACAACGGCAAG AAGACGTTTTCGCCTATGATTTCCGCTGGGGCGGCCCCGGTT CCGGGCCCGAACCTTTCGACTTCATTTATGGCGCCGGACACT CCGCGGAAATTTCATTCTTCCATGGCAGGGAAGAGGGTCTGT TCGGTTACCCGTTCACCGCGGACAACGAAGCAGGGCGACGC GATCTGCAAGACGCGATGATGACCTATGTGAAGCACTTCCTTC GCCAAGGAGACCCCAGCGATGGCTGCGATGGCGACTGCCCA CCACGCTGGATGCCATGGAGCGGCGAGGGCGGTGACACCGT CATCGTACTGGATGCCGACCGCGAACAGGCCCACATAGCGAT GTCCGGCGAAGCGCTGACATTGGAAAGCGTGGAGGAGGACC

		GGGAAGCGGCGATCAGCGCTTACAACGAAGGGGAAAAGAAC GCCGTGCGGCATTTCGCCAGCCAGAGCCCCTGGCCGGCGCC C
*A*BHETase 1 codon optimized for expression in E.coli (JHONJODE_02731, DBEOMKNH_03626)	1779 bp	CATATGTGTGGCAGTGACAGCAGCAATGATCGACCATCCCCA CAACCCCCTCTGACCGCGACCACGCTGCAAGGCGAGGTCGC CGGCCAGCAACGGGCGCCGGAAAACGCCACTGTCGATGGCA CCCTGCTGGTGTGGCGGGGCATACCTTATGCCCGCCCGCCA GTGGACGACCTGCGCTGGCGCGCACCGCAACCGCCGGAAAG CTGGAGCGGCGTGCGCGACGCCAGCGAGCCGGCATCCCGTT GCGTGCAGGCGGAAACCACCCGTCACTGGGTACGCACACAAA ACATCATCGGCGACGAAGACTGCCTGTACCTGGATATCTACC GACCCAGCCGCGCTGACTGGCAACAGGAGCAATTGCCGGTTT ATGTCTGGATTCACGGTGGCTCCAATAACTTCGGCACCGCCAT GGATTACGATGGCGGCAACCTGGCGCTGCACGCCGACGCGG TGGTCGTGGTGATCCAGTACCGGCTGGGGCCGCTGGGCTGG TTCTACCAACCGGAGGTCCAGACCGGCGGCGCCGACCCGCT GTCCGATTCCGGCAATTTCGGCAATCTGGATCAGATACAGGC CCTGCGATGGGTGCGCGACAATGTGGCGGCCTTCGGCGGCG ATCCCGATCAGATCACCATTGCCGGCGAGTCCGCCGGCGGC CACAACGTGATGACGCTGCTGGTGTCACCGCAGGCACAAGGC CTGTTCCACAAGGCCATGGCACAAAGCCCGGCCATGGAGACC CGCTCGCCGGCGGAGGCCGAGGCCTTCACCAACGAACAGAT CGACTATCTGCTGCGCTACCGGGGTGACGCCGGGGACGCCG GCGAAGCCGCCGCCCTGCGCCAGCAGATGGTGGACGATGGC ACCCTGGACGAATACCTGTTCCAGGTCCCGGCCCATGACTAC TACGCCGCCGTCCTGGCCTACACCAGCCTGTCCGCCTACGGC GCCACGGAAGACGGTGTGGTGGTGCCCAGCGGCGGCTGGAT GCCGGCCATTCGGGCTGGCGAGTACAACTCCGTGCCCGTGAT CATCGGCGCCAACGAATATGAGCAAAAGGCGTTCATGCCCCT TTATGGCGCCTTGGTGAAAGCCCTGTATGGCCAGCCTTCCGG AGACTACACCTGGCTCAATCTGAAGGACGTAATGGAAGGGGA ATCGAAAGCGGACGGCGCTCCGTTCACCCTGGACGACGTGCT GCCCACGGAGCGGGATCGAACGATCTACGAGCTAGCCGGCT ACCATGGCAGCCGCGCCTGGCGCGCCAAGTATGTGGACGAA CTGGCGGCGGCGCTGGCACAACGGCAAGAAGACGTTTTCGC CTATGATTTCCGCTGGGGCGGCCCCGGTTCCGGGCCCGAAC CTTTCGACTTCATTTATGGCGCCGGACACTCCGCGGAAATTTC ATTCTTCCATGGCAGGGAAGAGGGTCTGTTCGGTTACCCGTT CACCGCGGACAACGAAGCAGGGCGACGCGATCTGCAAGACG CGATGATGACCTATGTGAAGCACTTCCTTCGCCAAGGAGACC CCAGCGATGGCTGCGATGGCGACTGCCCACCACGCTGGATG CCATGGAGCGGCGAGGGCGGTGACACCGTCATCGTACTGGA TGCCGACCGCGAACAGGCCCACATAGCGATGTCCGGCGAAG CGCTGACATTGGAAAGCGTGGAGGAGGACCGGGAAGCGGCG ATCAGCGCTTACAACGAAGGGGAAAAGAACGCCGTGCGGCAT TTCGCCAGCCAGAGCCCCTGGCCGGCGCCCCTCGAG
*A*BHETase 1 (JHONJODE_02731, DBEOMKNH_03626)	609 AA	MFPHGKSLGLLALFSLILTGCGSDSSNDRPSPQPPLTATTLQGEV AGQQRAPENATVDGTLLVWRGIPYARPPVDDLRWRAPQPPESW SGVRDASEPASRCVQAETTRHWVRTQNIIGDEDCLYLDIYRPSR ADWQQEQLPVYVWIHGGSNNFGTAMDYDGGNLALHADAVVVVI QYRLGPLGWFYQPEVQTGGADPLSDSGNFGNLDQIQALRWVRD NVAAFGGDPDQITIAGESAGGHNVMTLLVSPQAQGLFHKAMAQS PAMETRSPAEAEAFTNEQIDYLLRYRGDAGDAGEAAALRQQMV DDGTLDEYLFQVPAHDYYAAVLAYTSLSAYGATEDGVVVPSGG WMPAIRAGEYNSVPVIIGANEYEQKAFMPLYGALVKALYGQPSG DYTWLNLKDVMEGESKADGAPFTLDDVLPTERDRTIYELAGYHG SRAWRAKYVDELAAALAQRQEDVFAYDFRWGGPGSGPEPFDFI YGAGHSAEISFFHGREEGLFGYPFTADNEAGRRDLQDAMMTYV KHFLRQGDPSDGCDGDCPPRWMPWSGEGGDTVIVLDADREQA HIAMSGEALTLESVEEDREAAISAYNEGEKNAVRHFASQSPWPA P

*A*BHETase 1 codon optimized for expression in E.coli (JHONJODE_02731, DBEOMKNH_03626)	593 AA	HMCGSDSSNDRPSPQPPLTATTLQGEVAGQQRAPENATVDGTL LVWRGIPYARPPVDDLRWRAPQPPESWSGVRDASEPASRCVQA ETTRHWVRTQNIIGDEDCLYLDIYRPSRADWQQEQLPVYVWIHG GSNNFGTAMDYDGGNLALHADAVVVVIQYRLGPLGWFYQPEVQ TGGADPLSDSGNFGNLDQIQALRWVRDNVAAFGGDPDQITIAGE SAGGHNVMTLLVSPQAQGLFHKAMAQSPAMETRSPAEAEAFTN EQIDYLLRYRGDAGDAGEAAALRQQMVDDGTLDEYLFQVPAHD YYAAVLAYTSLSAYGATEDGVVVPSGGWMPAIRAGEYNSVPVIIG ANEYEQKAFMPLYGALVKALYGQPSGDYTWLNLKDVMEGESKA DGAPFTLDDVLPTERDRTIYELAGYHGSRAWRAKYVDELAAALA QRQEDVFAYDFRWGGPGSGPEPFDFIYGAGHSAEISFFHGREE GLFGYPFTADNEAGRRDLQDAMMTYVKHFLRQGDPSDGCDGD CPPRWMPWSGEGGDTVIVLDADREQAHIAMSGEALTLESVEED REAAISAYNEGEKNAVRHFASQSPWPAPLE
*A*BHETase 2 (JHONJODE_01413)	1665 bp	ATGAGCAACGAGAACGAGCAGAATCAGAACACCACCGCGCCG GCTCCAGCGGCGAAAAAGAAAAAGGCCGCCACCCGCAAGGC GGCAGCCAGGCCAGCTGCGAAAAAAGCCGCGGTGAAGCGTG AAGCCACGGCACGGAAGAAAGCCGTGGCCGCCAAATCCAGC CGCCGTAGCGACGCGCAAAGCAAACGCAATGCGGTGAAAGA GGCGTCCGTGGTCATCGTGGGCGCAGGTTTCGCCGGTCTGG GCATGGCGATCCGGCTTCGTCAGGCGGGCGTGGATGATTTCG TGCTGTTGGAGCGTGCCGACAAGGTGGGCGGCACCTGGCGT GACAACACCTATCCGGGCGCCGCCTGCGATATTCCTTCTCAC TTGTATTCCTATTCCTTCGCGCCGAATCCGCATTGGTCCCGGC ACTTTTCCGGCAGTGACGAGATCCTGGGTTACATCGAGCACC TGGTGAAACAGTACGGTTTGCGTGACAAGATTCACTTCCAGCA GGACGTCACCGATGCGCGCTTCGATGAAACGAAAGGCCAATG GCGTGTGGATACCCGCCAGGGCGATGTCTGGCAGGGGCGGG CGGTGGTCATGGCCCAGGGGCCGCTTTCCAATGCCAGCTTTC CGGACATCGAGGGCCTGACAGACTTTAAAGGCAAGCGCATCC ATAGTGCCCGCTGGAATCACGATTACGATTTCTCCGGCAAGC GGGTGGCGGTGATTGGCACCGGTGCCAGCGCCGTGCAGATC ATTCCGGAATTGGCGAAAACCGCCGGTACCCTGAAAGTGTTT CAGCGCACCCCGGCCTGGGTGATTCCACGCCCGGATTACGC CACTCCGGACTGGAACAAAGCGCTGTTCGAGAAGCTGCCACT GACCCGTAAGGCCATGCGCCAGGCGCTGTACTGGACGCATG AAACCATGGCGCTGGCGGTGATCTGGAATTCGCCGCTGACGC GCCTGGCGGAGCGGCTCAGCCTGATGCACCTGCGTAGCCAG GTGAAGGACGACTGGATGCGCCGGCAATTGACGCCGGATTTC CGCATCGGTTGTAAACGGGTTTTGCTCTCCAACGATTACTATC CGGCCCTGCAACGGGACAACGTGGACCTGATCACCTGGCCC ATTGCCCGCATCGCCGAGAACGGTGTCCGCACCTGTGACGGC ATCGAACACCAATTCGATTGCATCGTCTTCGCCACCGGCTTTG ATGTGCCCAAGAGCGGCACGCCGTTCCCGATCCGTGGTCTCA ATGGCCGTGAGCTGGGAGAGGAGTGGTCCGGCGGCGCGCG GGCCTACAAGAGCGTCAGCGTGGCAGGCTATCCGAACCTGTT CTTTACCTTCGGGCCCAACTCCGGTCCTGGTCATAATTCGGC GCTGGTTTATATGGAAGCGCAACTGGACTATGCGGTGGAGGG CATTCGCCGCATTCTCGATCATGACCTGAAGATCCTGGACGTG CGCGAGAGTGTGCAGCAGCGTCATAATCGCCATTTGCAAAAG CGGCTGGCCAGGACCAACTGGAACTCCGGGTGTAAAAGCTG GTATCTGACGGAGGATGGCTATAACGCCACCATGTACCCGGG CTTCGCCAGCCAGTACCGCCGTCAGATGTCCCGGTTCGTGGA TCAGCACTATCGGCGGGTGCCGCAAACCGGGAGCGCG

*A*BHETase 2 codon optimized for expression in E.coli (JHONJODE_01413)	1461 bp	CATATGGTCATCGTGGGCGCAGGTTTCGCCGGTCTGGGCATG GCGATCCGGCTTCGTCAGGCGGGCGTGGATGATTTCGTGCTG TTGGAGCGTGCCGACAAGGTGGGCGGCACCTGGCGTGACAA CACCTATCCGGGCGCCGCCTGCGATATTCCTTCTCACTTGTAT TCCTATTCCTTCGCGCCGAATCCGCATTGGTCCCGGCACTTTT CCGGCAGTGACGAGATCCTGGGTTACATCGAGCACCTGGTGA AACAGTACGGTTTGCGTGACAAGATTCACTTCCAGCAGGACGT CACCGATGCGCGCTTCGATGAAACGAAAGGCCAATGGCGTGT GGATACCCGCCAGGGCGATGTCTGGCAGGGGCGGGCGGTG GTCATGGCCCAGGGGCCGCTTTCCAATGCCAGCTTTCCGGAC ATCGAGGGCCTGACAGACTTTAAAGGCAAGCGCATCCATAGT GCCCGCTGGAATCACGATTACGATTTCTCCGGCAAGCGGGTG GCGGTGATTGGCACCGGTGCCAGCGCCGTGCAGATCATTCC GGAATTGGCGAAAACCGCCGGTACCCTGAAAGTGTTTCAGCG CACCCCGGCCTGGGTGATTCCACGCCCGGATTACGCCACTCC GGACTGGAACAAAGCGCTGTTCGAGAAGCTGCCACTGACCCG TAAGGCCATGCGCCAGGCGCTGTACTGGACGCATGAAACCAT GGCGCTGGCGGTGATCTGGAATTCGCCGCTGACGCGCCTGG CGGAGCGGCTCAGCCTGATGCACCTGCGTAGCCAGGTGAAG GACGACTGGATGCGCCGGCAATTGACGCCGGATTTCCGCATC GGTTGTAAACGGGTTTTGCTCTCCAACGATTACTATCCGGCCC TGCAACGGGACAACGTGGACCTGATCACCTGGCCCATTGCCC GCATCGCCGAGAACGGTGTCCGCACCTGTGACGGCATCGAAC ACCAATTCGATTGCATCGTCTTCGCCACCGGCTTTGATGTGCC CAAGAGCGGCACGCCGTTCCCGATCCGTGGTCTCAATGGCCG TGAGCTGGGAGAGGAGTGGTCCGGCGGCGCGCGGGCCTACA AGAGCGTCAGCGTGGCAGGCTATCCGAACCTGTTCTTTACCTT CGGGCCCAACTCCGGTCCTGGTCATAATTCGGCGCTGGTTTA TATGGAAGCGCAACTGGACTATGCGGTGGAGGGCATTCGCCG CATTCTCGATCATGACCTGAAGATCCTGGACGTGCGCGAGAG TGTGCAGCAGCGTCATAATCGCCATTTGCAAAAGCGGCTGGC CAGGACCAACTGGAACTCCGGGTGTAAAAGCTGGTATCTGAC GGAGGATGGCTATAACGCCACCATGTACCCGGGCTTCGCCAG CCAGTACCGCCGTCAGATGTCCCGGTTCGTGGATCAGCACTA TCGGCGGGTGCCGCAAACCGGGAGCGCGCTCGAG
*A*BHETase 2 (JHONJODE_01413)	555 AA	MSNENEQNQNTTAPAPAAKKKKAATRKAAARPAAKKAAVKREAT ARKKAVAAKSSRRSDAQSKRNAVKEASVVIVGAGFAGLGMAIRL RQAGVDDFVLLERADKVGGTWRDNTYPGAACDIPSHLYSYSFAP NPHWSRHFSGSDEILGYIEHLVKQYGLRDKIHFQQDVTDARFDET KGQWRVDTRQGDVWQGRAVVMAQGPLSNASFPDIEGLTDFKG KRIHSARWNHDYDFSGKRVAVIGTGASAVQIIPELAKTAGTLKVF QRTPAWVIPRPDYATPDWNKALFEKLPLTRKAMRQALYWTHET MALAVIWNSPLTRLAERLSLMHLRSQVKDDWMRRQLTPDFRIGC KRVLLSNDYYPALQRDNVDLITWPIARIAENGVRTCDGIEHQFDCI VFATGFDVPKSGTPFPIRGLNGRELGEEWSGGARAYKSVSVAGY PNLFFTFGPNSGPGHNSALVYMEAQLDYAVEGIRRILDHDLKILD VRESVQQRHNRHLQKRLARTNWNSGCKSWYLTEDGYNATMYP GFASQYRRQMSRFVDQHYRRVPQTGSA
*A*BHETase 2 codon optimized for expression in E.coli (JHONJODE_01413)	487 AA	HMVIVGAGFAGLGMAIRLRQAGVDDFVLLERADKVGGTWRDNT YPGAACDIPSHLYSYSFAPNPHWSRHFSGSDEILGYIEHLVKQYG LRDKIHFQQDVTDARFDETKGQWRVDTRQGDVWQGRAVVMAQ GPLSNASFPDIEGLTDFKGKRIHSARWNHDYDFSGKRVAVIGTGA SAVQIIPELAKTAGTLKVFQRTPAWVIPRPDYATPDWNKALFEKLP LTRKAMRQALYWTHETMALAVIWNSPLTRLAERLSLMHLRSQVK

		DDWMRRQLTPDFRIGCKRVLLSNDYYPALQRDNVDLITWPIARIA ENGVRTCDGIEHQFDCIVFATGFDVPKSGTPFPIRGLNGRELGEE WSGGARAYKSVSVAGYPNLFFTFGPNSGPGHNSALVYMEAQLD YAVEGIRRILDHDLKILDVRESVQQRHNRHLQKRLARTNWNSGC KSWYLTEDGYNATMYPGFASQYRRQMSRFVDQHYRRVPQTGS ALE
*A*BHETase 3 (JHONJODE_00892)	1998 bp	ATGCTCAAGCAGGTCCCCCACCGGCGTCAGCGGTACTCCACC GCCGTGATCGCCTTTTTATCCTCGTTATTGCTCTTGATGTCCG GGTGCGGTGGCTCATCGTCATCGGATTCCGACAGAGAGCCAC TTTCCGGTCTGTTCGGCGCCCTTCCAATATCCGGCGTCAGCTA CCGGCAGGGTGACGCGCCATGGCGAACTACCGGCGAGTTGG GTCAATTCCACTATACCGGGGATGAGACACTCACCTTCGCCCT CGGCGATCTGACCCTGGGAAGCACCTCCGGAGCAAAAGCACT CACCGTCGCCAATCTATCGCCCGCTGCCACACCGGCGGAGAC GCCGGCGATGATCAATACCCTGGTGCTGCTGCAAACCCTGGA TGCCGACGGCAGCCTTCATAATGGTATTCAGATTACACCACGG ATCCGGGAACGGGTTTCCGAGCAGGCCGCCAGCCTGACTTTG GATCAGCCCACCCCCGATTTCAACGCCGCCCTGCAAAGTGTA GTGGATGATCTGGAAAGTGCCGGCGCCTTCTCCGATACCGAT TCCAGAGCCCGTCGGCTGACCACGCCCGATGATGCGGAGGA GAACTTCCAACGTGCCGTCTCCCCCCGCCGGTTGGTTGAAAC CAACGGCGGTCAGCTCAGTGGCTTCCAAGCCGATGAACATAC CTGGCAGTTTCTTGGCATCCCCTATGCGAAACCGCCATTGGG CGAACTGCGCTGGCGCCCGCCGGTGGATCCCGAGCCGTGGT CCGGCATCCGCCACGCCGTTGCCTGGAGCGATCAGGCCGCG CAAAACACCGCCCTGGAACGGTTCGGTGAGGGCGGCATGAG TGAAGATTCGCTTTATCTCAATGTGACGGCACCGAAGAACGCC GATGGCCTGCCGGTGATGGTCTGGTTTCATGGCGGAGGCTTC ACCGCGTTGACCAGTAACACCAAGCCATTCAATAACCCGCAG GCAGTGGCGAGCAAAGGCGTGGTACAGGTCTCGGTTAACCAC CGGCTGGGGCCGTTCGGCTATATCGCACACCCCGAGTTGAGT GCGGAGAGCGGTTATAACGGCTCGGGCAACTACGGACAAATG GACCTGATCGCGGCCTTGGAGTGGGTGCGTGACAACATTGAA GCCTTTGGTGGAGATCCCGGTAACGTCACCATATTCGGAGAA TCCGGTGGCGGCCGCAAAGTGCTGTCGTTAATGGCCTCTCCC CGCGCCGCCGGCCTGTTCCATCGGGCGATCAGCCAGAGTGG CACGCTCTATCCGGATACCCGTACCCTGGCGGCCGCCGAGG CCGTCGGTAGCCAACTGCAAACTGAACTGGACGCTTCGTCTC TGGCTGAGATGCGCCAGAAGAGCTGGCAGGAAGTAGCGGCT GCCGCGGCGACGCTGGCGCCCTACACCAACATTGACAACCAC TATCTACCCTACGCCGAACGCGTCGCTTTCGAATCCGGCAATC AGAACGACGTGCCGTTTATGTTCAGTATCAACGCCAACGATAC CCCGGACCCCACCAATACCGCCATTGAGGTGTTTCCCTGGAT GGCGCCACTGTGTTCGGCCAATCACTACGCCACCTATTTCACT CACCAGCCCGCTGGCTGGAAAGCCCGGGGCGTGGAAGCCTA CCACGCCGCCGAACTGGCCTATCTGTTCAACATGCCAGAGAG CGTCATCACCCACTACCTGCTGGGCCTGGTCATCGATCCGGC AACCGGCGATTCGTTGGTCATTGATGATCTCAACGGCAACGG CGTGTCCGGATCCCAAGGCGATCCCGCCGATATTCTTGCCTC CGCCGGTTTCGACCAGACCGATCAGGCGGTAATCGATCGCAT GCTCACCATCTGGACCAACTTCGCAAAAACCGGCGATCCGAG CATTGAGGGTGACATCGACTATCCGCTTTATGACGCGGCCAG TGAAAGCTATGTGGAAATAGGCGCCAACAGCGAAGCGAAGAC CGGCCTCGGCAGTGTGCTGAGTGAC

*A*BHETase 3 codon optimized for expression in E.coli (JHONJODE_00892)	1923 bp	CATATGTGCGGTGGCTCATCGTCATCGGATTCCGACAGAGAG CCACTTTCCGGTCTGTTCGGCGCCCTTCCAATATCCGGCGTC AGCTACCGGCAGGGTGACGCGCCATGGCGAACTACCGGCGA GTTGGGTCAATTCCACTATACCGGGGATGAGACACTCACCTTC GCCCTCGGCGATCTGACCCTGGGAAGCACCTCCGGAGCAAAA GCACTCACCGTCGCCAATCTATCGCCCGCTGCCACACCGGCG GAGACGCCGGCGATGATCAATACCCTGGTGCTGCTGCAAACC CTGGATGCCGACGGCAGCCTTCATAATGGTATTCAGATTACAC CACGGATCCGGGAACGGGTTTCCGAGCAGGCCGCCAGCCTG ACTTTGGATCAGCCCACCCCCGATTTCAACGCCGCCCTGCAA AGTGTAGTGGATGATCTGGAAAGTGCCGGCGCCTTCTCCGAT ACCGATTCCAGAGCCCGTCGGCTGACCACGCCCGATGATGCG GAGGAGAACTTCCAACGTGCCGTCTCCCCCCGCCGGTTGGTT GAAACCAACGGCGGTCAGCTCAGTGGCTTCCAAGCCGATGAA CATACCTGGCAGTTTCTTGGCATCCCCTATGCGAAACCGCCAT TGGGCGAACTGCGCTGGCGCCCGCCGGTGGATCCCGAGCCG TGGTCCGGCATCCGCCACGCCGTTGCCTGGAGCGATCAGGC CGCGCAAAACACCGCCCTGGAACGGTTCGGTGAGGGCGGCA TGAGTGAAGATTCGCTTTATCTCAATGTGACGGCACCGAAGAA CGCCGATGGCCTGCCGGTGATGGTCTGGTTTCATGGCGGAG GCTTCACCGCGTTGACCAGTAACACCAAGCCATTCAATAACCC GCAGGCAGTGGCGAGCAAAGGCGTGGTACAGGTCTCGGTTA ACCACCGGCTGGGGCCGTTCGGCTATATCGCACACCCCGAGT TGAGTGCGGAGAGCGGTTATAACGGCTCGGGCAACTACGGAC AAATGGACCTGATCGCGGCCTTGGAGTGGGTGCGTGACAACA TTGAAGCCTTTGGTGGAGATCCCGGTAACGTCACCATATTCGG AGAATCCGGTGGCGGCCGCAAAGTGCTGTCGTTAATGGCCTC TCCCCGCGCCGCCGGCCTGTTCCATCGGGCGATCAGCCAGA GTGGCACGCTCTATCCGGATACCCGTACCCTGGCGGCCGCC GAGGCCGTCGGTAGCCAACTGCAAACTGAACTGGACGCTTCG TCTCTGGCTGAGATGCGCCAGAAGAGCTGGCAGGAAGTAGCG GCTGCCGCGGCGACGCTGGCGCCCTACACCAACATTGACAAC CACTATCTACCCTACGCCGAACGCGTCGCTTTCGAATCCGGC AATCAGAACGACGTGCCGTTTATGTTCAGTATCAACGCCAACG ATACCCCGGACCCCACCAATACCGCCATTGAGGTGTTTCCCT GGATGGCGCCACTGTGTTCGGCCAATCACTACGCCACCTATT TCACTCACCAGCCCGCTGGCTGGAAAGCCCGGGGCGTGGAA GCCTACCACGCCGCCGAACTGGCCTATCTGTTCAACATGCCA GAGAGCGTCATCACCCACTACCTGCTGGGCCTGGTCATCGAT CCGGCAACCGGCGATTCGTTGGTCATTGATGATCTCAACGGC AACGGCGTGTCCGGATCCCAAGGCGATCCCGCCGATATTCTT GCCTCCGCCGGTTTCGACCAGACCGATCAGGCGGTAATCGAT CGCATGCTCACCATCTGGACCAACTTCGCAAAAACCGGCGAT CCGAGCATTGAGGGTGACATCGACTATCCGCTTTATGACGCG GCCAGTGAAAGCTATGTGGAAATAGGCGCCAACAGCGAAGCG AAGACCGGCCTCGGCAGTGTGCTGAGTGACCTCGAG
*A*BHETase 3 (JHONJODE_00892)	666 AA	MLKQVPHRRQRYSTAVIAFLSSLLLLMSGCGGSSSSDSDREPLS GLFGALPISGVSYRQGDAPWRTTGELGQFHYTGDETLTFALGDL TLGSTSGAKALTVANLSPAATPAETPAMINTLVLLQTLDADGSLH NGIQITPRIRERVSEQAASLTLDQPTPDFNAALQSVVDDLESAGA FSDTDSRARRLTTPDDAEENFQRAVSPRRLVETNGGQLSGFQA DEHTWQFLGIPYAKPPLGELRWRPPVDPEPWSGIRHAVAWSDQ AAQNTALERFGEGGMSEDSLYLNVTAPKNADGLPVMVWFHGGG FTALTSNTKPFNNPQAVASKGVVQVSVNHRLGPFGYIAHPELSAE

		SGYNGSGNYGQMDLIAALEWVRDNIEAFGGDPGNVTIFGESGG GRKVLSLMASPRAAGLFHRAISQSGTLYPDTRTLAAAEAVGSQL QTELDASSLAEMRQKSWQEVAAAAATLAPYTNIDNHYLPYAERV AFESGNQNDVPFMFSINANDTPDPTNTAIEVFPWMAPLCSANHY ATYFTHQPAGWKARGVEAYHAAELAYLFNMPESVITHYLLGLVID PATGDSLVIDDLNGNGVSGSQGDPADILASAGFDQTDQAVIDRM LTIWTNFAKTGDPSIEGDIDYPLYDAASESYVEIGANSEAKTGLGS VLSD
*A*BHETase 3 codon optimized for expression in E.coli (JHONJODE_00892)	641 AA	HMCGGSSSSDSDREPLSGLFGALPISGVSYRQGDAPWRTTGEL GQFHYTGDETLTFALGDLTLGSTSGAKALTVANLSPAATPAETPA MINTLVLLQTLDADGSLHNGIQITPRIRERVSEQAASLTLDQPTPD FNAALQSVVDDLESAGAFSDTDSRARRLTTPDDAEENFQRAVSP RRLVETNGGQLSGFQADEHTWQFLGIPYAKPPLGELRWRPPVD PEPWSGIRHAVAWSDQAAQNTALERFGEGGMSEDSLYLNVTAP KNADGLPVMVWFHGGGFTALTSNTKPFNNPQAVASKGVVQVSV NHRLGPFGYIAHPELSAESGYNGSGNYGQMDLIAALEWVRDNIE AFGGDPGNVTIFGESGGGRKVLSLMASPRAAGLFHRAISQSGTL YPDTRTLAAAEAVGSQLQTELDASSLAEMRQKSWQEVAAAAATL APYTNIDNHYLPYAERVAFESGNQNDVPFMFSINANDTPDPTNTA IEVFPWMAPLCSANHYATYFTHQPAGWKARGVEAYHAAELAYLF NMPESVITHYLLGLVIDPATGDSLVIDDLNGNGVSGSQGDPADILA SAGFDQTDQAVIDRMLTIWTNFAKTGDPSIEGDIDYPLYDAASES YVEIGANSEAKTGLGSVLSDLE
*P*BHETase 1 (P_005068)	1044 bp	ATGACCATTGCACGCTGCGTGTTGGCGCTGGTCTTGCTCGGC GGCCTGTTGGTCCGCGCCGAGGCCGCGCCGTGGGTTGCCGG CCTGCACCTTATGACCTTGACCGACCCGGTCGATAGCCGCCC AATGCAAGCGCTTGCGTTCTACCCGGCCATTGGCAAGACCCG TCGCAGCCGAATAGACGGGTATCCCGTCGATGTGGCCGAAGA GGCGCCCGTCGCCATGGGCCGATTCCCGTTGCTGGTGCTGT CTCACGGCAATACGGGCAGCCCATTGGCCTTGCATTACCTGG CCACGTCGCTGGCGCGGCAAGGGTTCGTGGTGGTGGCGGTT GTGCACCCGGGGGACAACGTGCGCGACCACAGTCGCCTTGG CACCCTGAGCAACCTTTATGGACGGCCGCTACAACTCAGCGC GGCGATCACCGCAGCGCGCGCTGATAGGGTGGTCGGGCCTT ATCTGAACGAAGGCAAGGTGGGGGTTATCGGCTACTCGGCCG GCGGAGAAACCGCGTTGATCCTGTCTGGTGCACGCCCCGATC TGGACCGTCTGCGTCAGTACTGCCTGGAGCGCCCGAAGGAC GCAGACGCCTGCAAAACCCACGGCATACTGATTGCCGACCGC AGCGAACTGGCGCCTGAGACCGACCCGCGAGTGGGGGCGGT CATGTTGATGGCGCCGCTGAGCCTGTTGTTCGGGCGCCATGC CTTGGCCGGGGTACAGGTACCCGTGCTGATCTACAGTGGCGA CAGCGATCAGCTTGTGGCTGTGGACCGTAATGCCGAGGCCCT GGCCCGCAAACTGCCGGTCACACCGGACTACCGCCTGTTGG CCGGTGCCGGGCACTTCGTATTCATGGCCCGTTGCGATGCCG AGCAGTACGCGCGGATGGCAGCGCTGTGCAAGGATGCCGAT GGCGTCGACCGCCGGCATATCCATCGCTCGCTGCAGCGAGA AACGGCGGCGTTCTTCAGCCAGGCGCTGGGTGCGCCAGCGC CGGCTGAGCGTTCAGCTGCGACGGGCGCGCCGCGCCAGCAA CAACGT
*P*BHETase 1 codon optimized for expression in E.coli (P_005068)	990 bp	CATATGGCGCCGTGGGTTGCCGGCCTGCACCTTATGACCTTG ACCGACCCGGTCGATAGCCGCCCAATGCAAGCGCTTGCGTTC TACCCGGCCATTGGCAAGACCCGTCGCAGCCGAATAGACGG GTATCCCGTCGATGTGGCCGAAGAGGCGCCCGTCGCCATGG GCCGATTCCCGTTGCTGGTGCTGTCTCACGGCAATACGGGCA GCCCATTGGCCTTGCATTACCTGGCCACGTCGCTGGCGCGGC

		AAGGGTTCGTGGTGGTGGCGGTTGTGCACCCGGGGGACAAC GTGCGCGACCACAGTCGCCTTGGCACCCTGAGCAACCTTTAT GGACGGCCGCTACAACTCAGCGCGGCGATCACCGCAGCGCG CGCTGATAGGGTGGTCGGGCCTTATCTGAACGAAGGCAAGGT GGGGGTTATCGGCTACTCGGCCGGCGGAGAAACCGCGTTGA TCCTGTCTGGTGCACGCCCCGATCTGGACCGTCTGCGTCAGT ACTGCCTGGAGCGCCCGAAGGACGCAGACGCCTGCAAAACC CACGGCATACTGATTGCCGACCGCAGCGAACTGGCGCCTGAG ACCGACCCGCGAGTGGGGGCGGTCATGTTGATGGCGCCGCT GAGCCTGTTGTTCGGGCGCCATGCCTTGGCCGGGGTACAGG TACCCGTGCTGATCTACAGTGGCGACAGCGATCAGCTTGTGG CTGTGGACCGTAATGCCGAGGCCCTGGCCCGCAAACTGCCG GTCACACCGGACTACCGCCTGTTGGCCGGTGCCGGGCACTTC GTATTCATGGCCCGTTGCGATGCCGAGCAGTACGCGCGGATG GCAGCGCTGTGCAAGGATGCCGATGGCGTCGACCGCCGGCA TATCCATCGCTCGCTGCAGCGAGAAACGGCGGCGTTCTTCAG CCAGGCGCTGGGTGCGCCAGCGCCGGCTGAGCGTTCAGCTG CGACGGGCGCGCCGCGCCAGCAACAACGTCTCGAG
*P*BHETase 1 (P_005068)	348 AA	MTIARCVLALVLLGGLLVRAEAAPWVAGLHLMTLTDPVDSRPMQ ALAFYPAIGKTRRSRIDGYPVDVAEEAPVAMGRFPLLVLSHGNTG SPLALHYLATSLARQGFVVVAVVHPGDNVRDHSRLGTLSNLYGR PLQLSAAITAARADRVVGPYLNEGKVGVIGYSAGGETALILSGAR PDLDRLRQYCLERPKDADACKTHGILIADRSELAPETDPRVGAVM LMAPLSLLFGRHALAGVQVPVLIYSGDSDQLVAVDRNAEALARKL PVTPDYRLLAGAGHFVFMARCDAEQYARMAALCKDADGVDRRH IHRSLQRETAAFFSQALGAPAPAERSAATGAPRQQQR
*P*BHETase 1 codon optimized for expression in E.coli (P_005068)	330 AA	HMAPWVAGLHLMTLTDPVDSRPMQALAFYPAIGKTRRSRIDGYP VDVAEEAPVAMGRFPLLVLSHGNTGSPLALHYLATSLARQGFVV VAVVHPGDNVRDHSRLGTLSNLYGRPLQLSAAITAARADRVVGP YLNEGKVGVIGYSAGGETALILSGARPDLDRLRQYCLERPKDADA CKTHGILIADRSELAPETDPRVGAVMLMAPLSLLFGRHALAGVQV PVLIYSGDSDQLVAVDRNAEALARKLPVTPDYRLLAGAGHFVFMA RCDAEQYARMAALCKDADGVDRRHIHRSLQRETAAFFSQALGA PAPAERSAATGAPRQQQRLE

Table S3: Confocal laser scanning microscope (CLSM) settings for LIVE/DEAD staining with propidium iodide and SYTO™ 9. The table includes laser wavelengths, detector ranges, and other microscope parameters used for the detection of live and dead cells.

Parameter	Value	
	Propidium iodide	SYTO™ 9
Gamma value	1.0	1.0
Pinhole [µm]	46	46
Detector digital	1.0	1.0
Laser intensity [%]	0.2	0.2
Laser λ [nm]	561	488
Detector λ [nm]	560-700	410-560
Detector gain [V]	663	685

Table S4. Primers used in this study for enzyme target amplification and /or SDM (site directed mutagenesis).

Plasmid/ Protein	Purpose	Forward	Reverse
pRS1993/ *A*BHETase2/ JHONJODE_01413	Amplification from gDNA	5'-GCGCATATGGCGAATGAA CAGACC-3'	5'-GCGCTCGAGTTTTGCAGTCTC C-3'
	SDM	-	-
pRS2108/ *A*BHETase1/ JHONJODE_02731	Amplification from gDNA	-	-
	SDM	5'-TGTGGCAGTGACAGCAGC -3'	5'-CATATGTATATCTCCTTCTTAAA GTTAAAC-3'
pRS2109/ *A*BHETase3/ JHONJODE_00892	Amplification from gDNA	5'-GCGCATATGCTCAAGCAG GTCCC-3'	5'-CGCTCGAGGTCACTCAGCACA CTGC-3'
	SDM	5'-TGCGGTGGCTCATCGTC- 3'	5'-CATATGTATATCTCCTTCTTAAA GTTAAAC-3'
pRS2110/ *P*BHETase1/ _005068	Amplification from gDNA	5'-CTAGCATATGACCATTGCA CGCTGCG-3'	5'-GTCACTCGAGACGTTGTTGCT GGCGCG-3'
	SDM	5'-GCGCCGTGGGTTGCCG-3'	5'-CATATGTATATCTCCTTCTTAAA GTTAAAC-3'

Table S5. Strains and plasmids used in this study.

Strain/Plasmid	Genotype/Relevant Characteristics	Source/Reference
E. coli DH5α	General cloning strain	(Miller and Mekalanos 1988)
E. coli BL21 (DE3)/pRIL	General expression strain	Stratagene, La Jolla, USA
pET21a(+)	General expression vector	Novagen, Darmstadt, Germany
pRS1993	pET21a(+)_*A*BHETase2	This study
pRS2108	pET21a(+)_*A*BHETase1	This study
pRS2109	pET21a(+)_*A*BHETase3	This study
pRS2110	pET21a(+)_*P*BHETase1	This study

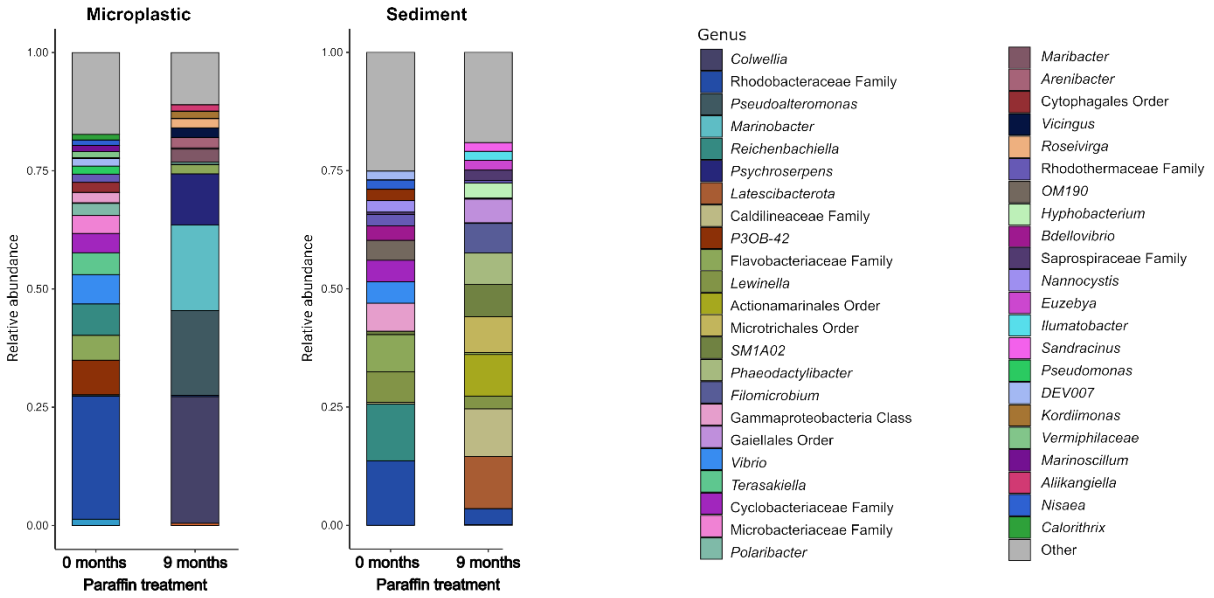

Figure S1. Abundant bacterial genera in marine samples before and after enrichment. ASV abundance is based on the V1-V2 region of the 16S rRNA gene, comparing bacterial communities deriving from microplastic samples or from oil contaminated sediment before and after enrichment with paraffin. Relative abundances of the thirty most abundant genera originating from each sample type were plotted as stacked bar charts. Genera lacking taxonomic assignment are presented at the lowest possible taxonomic rank.

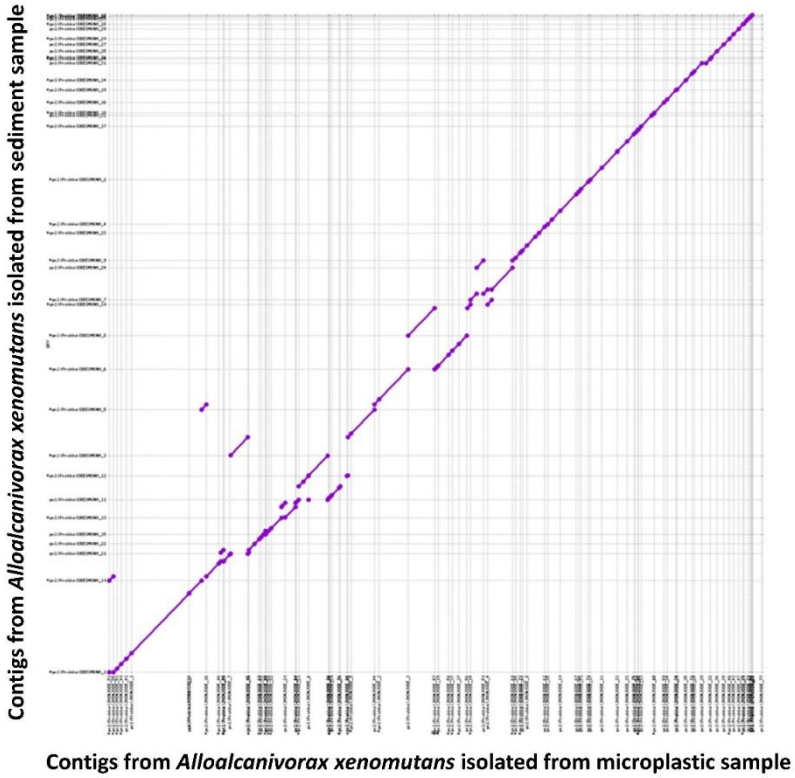

Figure S2. Comparative genomic analysis of *A. xenomutans* isolates. Pangenomic analysis comparing the two *Alloalcanivorax* isolates from this study with 19 reference genomes from the *Alcanivorax*, *Alloalcanivorax*, and *Isoalcanivorax* genera. The analysis highlights the core and accessory genome components, illustrating the genetic relationships and distinctions among these species. Distinct clusters corresponding to each genus show the genetic diversity within and between these groups.

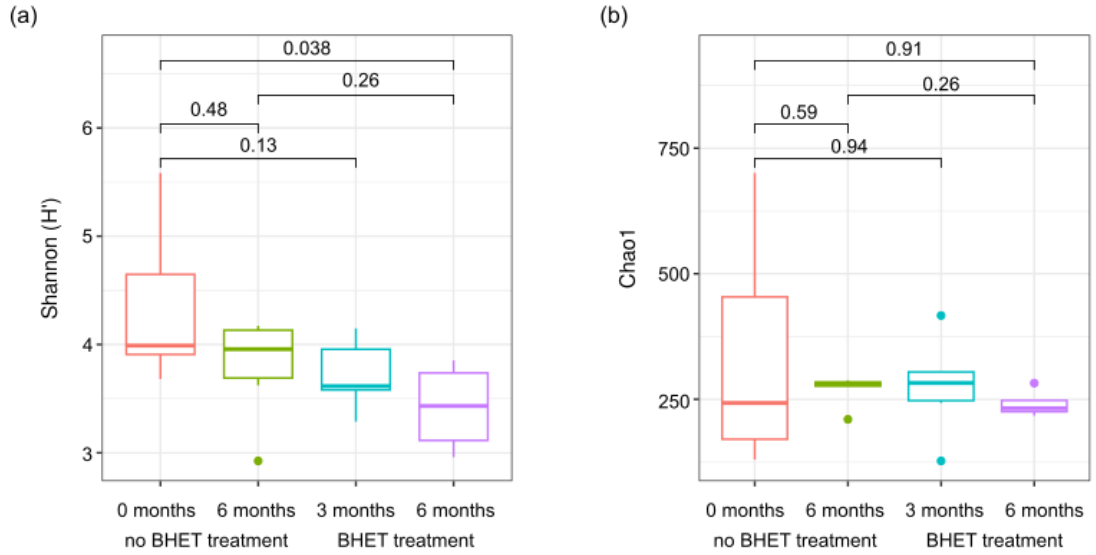

Figure S3. Diversity analysis of *A. aurita* polyp microbiota during BHET treatment. Polyps were treated with 0.1 ‰ BHET for six months, and their microbiota were sampled after three (blue) and six months (purple) for 16S rRNA gene amplicon sequencing. (a) Shannon diversity (H') and (b) Chao1 richness indices were calculated using the vegan package (Oksanen *et al.* 2022) within the ampvis2 package (Andersen *et al.* 2018). Statistical significance of differences in diversity was assessed using the Kruskal-Wallis test and pairwise Wilcoxon test, implemented in the ggpubr package (Kassambara 2023). Two untreated controls were implemented both after zero (orange) and after six months (green).

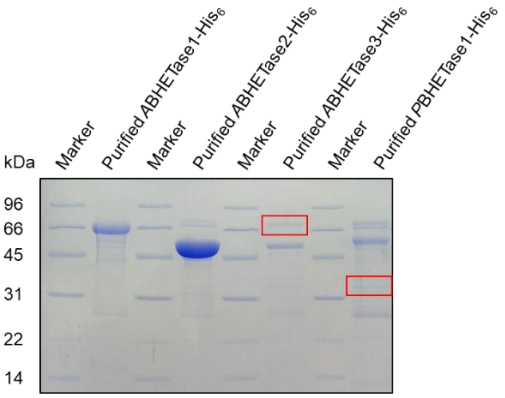

Figure S4. Purification of BHETases. Coomassie-stained SDS-PAGE analysis of heterologously expressed and purified His-tagged BHETases. Proteins were overexpressed in *E. coli* BL21 (DE3)-Codonplus-RIL, induced with 100 µM IPTG in LB medium, and purified using Ni-NTA chromatography. *A*BHETase3-His_6 and *P*BHETase1- His_6 are only partially purified, the box indicates the the respective protein. Marker, low molecular weight, from the Amersham LMW Calibration Kit for SDS Electrophoresis

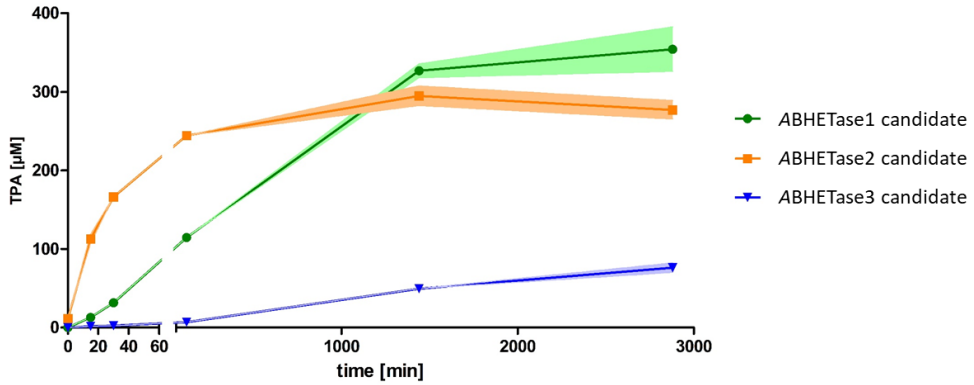

Figure S5. *A*BHETase2 degrades BHET more effectively than *A*BHETase1 and *A*BHETase3. BHET degradation was measured at 30°C for *A*BHETase1 and 40°C for *A*BHETase2-3. Enzyme amounts used were 0.1 µg for *A*BHETase1, 0.25 µg for *A*BHETase2, and 0.03 µg for *A*BHETase3. TPA release was analyzed by reverse-phase UHPLC as described in Materials and Methods. TPA release due to autohydrolysis at each temperature was subtracted at each time point. Shaded areas indicate standard deviation from three technical replicates.