

**Table S1.** List of new probes designed in this study and their targets.

Probe name	Probe sequence (5'-3')	Probe target	Taxonomical affiliation of the target	
			Family	Class/Order
<b>acetancIn</b>	GTAACGCCTGCCACCTCCGT	aquifer clones affiliated to unclassified Bacteria (with closest relatives affiliated to Acetanaerobacterium)		
<b>acetovcIn</b>	GCCACAGTTGAGCCATGGAA	aquifer clones affiliated to Ruminococcaceae	Ruminococcaceae	Firmicutes
<b>AcidP2cIn</b>	GAACCCCTTTATTAGAAGG	aquifer clones affiliated to Acidovorax	Comamonadaceae	Betaproteobacteria
<b>AficIn1</b>	TTGAGATTTGCTAGGGGTCG	ETBE-enrichment clones affiliated to Afipia; Afipia clevelandensis, Nitrobacter winogradskyi	Bradyrhizobiaceae	Alphaproteobacteria
<b>anaermycIn</b>	CATGCAGCACCTGAACCACC	aquifer clones affiliated to unclassified Deltaproteobacteria		Deltaproteobacteria
<b>AquaIn2</b>	CCAACACTACAGATCGTTGCCT	ETBE-enrichment clones affiliated to Aquabacterium	Burkholderiales_incertae_sedis	Betaproteobacteria
<b>Aqutert</b>	CAGAGCTTTTTCTTCCCGAC	Aquicola tertiarycarbonis	Burkholderiales_incertae_sedis	Betaproteobacteria
<b>ArcobcIn</b>	GATACCATACAGACCCATCC	aquifer clones affiliated to Arcobacter	Campylobacteraceae	Epsilonproteobacteria
<b>AzovcIn</b>	CTCAAGGGTCCTGGACATGT	aquifer clones affiliated to Rhodocyclaceae	Rhodocyclaceae	Betaproteobacteria
<b>bacIn</b>	AACCGTCTTTTCAGCACATCT	aquifer clones affiliated to Bacillus	Bacillaceae 1	Firmicutes
<b>bacisp</b>	GCGTAAACCGTCTTTCAGCA	aquifer clones affiliated to Bacillus	Bacillaceae 1	Firmicutes
<b>bryscIn2</b>	CTCCTCACACGCTTTACCTT	aquifer clones affiliated to unclassified Bacteria (with closest relatives affiliated to Phaselicystis)		
<b>ClostIn1</b>	GGTTTCAGCCACAATCCGA	aquifer clones affiliated to Ruminococcaceae	Ruminococcaceae	Firmicutes
<b>cryptancIn</b>	TCTGACCGAAGCCAGAAAAC	aquifer clones affiliated to Peptococcaceae 2; Cryptanaerobacter phenolicus	Peptococcaceae	Firmicutes
<b>DavocIn1</b>	CAACGGCTAGCTCTCATAGT	ETBE-enrichment clones affiliated to Devosia; several Devosia spp., Pelagibacterium halotolerans, Cucumibacter marinus	Hyphomicrobiaceae	Alphaproteobacteria
<b>DehaIn3</b>	CCTTGACCGTAGCCAAGTGG	ETBE-enrichment clones affiliated to Anaerolineaceae	Anaerolineaceae	Chloroflexi
<b>DehaIn4</b>	TCTGAATGGACCTCGCCCGG	ETBE-enrichment clones affiliated to Anaerolineaceae	Anaerolineaceae	Chloroflexi
<b>DehaIn5</b>	ACCACCCACTTACCGACCCG	ETBE-enrichment clones affiliated to Anaerolineaceae	Anaerolineaceae	Chloroflexi
<b>DehaIn6</b>	CGCACCCCTCTATCCGCCTC	ETBE-enrichment clones affiliated to Anaerolineaceae	Anaerolineaceae	Chloroflexi
<b>DehaIn9</b>	TGGACTACCGGGGTTTCTAA	ETBE-enrichment clones affiliated to Anaerolineaceae	Anaerolineaceae	Chloroflexi
<b>DoktoCIn</b>	ACTGAACTCTCAATTGAGCC	aquifer clones affiliated to Xanthomonadaceae	Xanthomonadaceae	Gammaproteobacteria
<b>DugaCIn</b>	GAGATATTAGCTCCACCGT	aquifer clones affiliated to Oxalobacteraceae	Oxalobacteraceae	Betaproteobacteria
<b>Eryaqua</b>	CCAGTATTCTAGCAACCTAG	Erythrobacter aquimaris	Sphingomonadaceae	Alphaproteobacteria
<b>Erylong</b>	CACAGACTGTTTCATCCGTGC	aquifer clones affiliated to Rhodocyclaceae	Rhodocyclaceae	Betaproteobacteria
<b>GallicIn</b>	CCGTCATCCATACAACGTAT	aquifer clones affiliated to unclassified Betaproteobacteria		Betaproteobacteria
<b>GordcIn3</b>	CAAGCTGGGCCTTCCGTTCCG	ETBE-enrichment clones affiliated to Gordonia; Gordonia terrae	Nocardiaceae	Actinobacteria
<b>HydETBE1</b>	TACCGTCATTAGCCCAGGGT	ETBE-enrichment clones affiliated to Hydrogenophaga; Hydrogenophaga taeniospiralis	Comamonadaceae	Betaproteobacteria
<b>HydETBE3</b>	CCGTCATTAGCCCAGGGTAT	ETBE-enrichment clones affiliated to Hydrogenophaga; Hydrogenophaga taeniospiralis	Comamonadaceae	Betaproteobacteria
<b>hydfla</b>	TAGCCCCGAGGTATTAACCCA	TBA-enrichment clones affiliated to Comamonadaceae; Hydrogenophaga flava	Comamonadaceae	Betaproteobacteria
<b>isosphcIn1</b>	TGATCCTTTTCGGACCGCATC	aquifer clones affiliated to Phycisphaera	Phycisphaeraceae	Planctomycetes
<b>KaistcIn3</b>	CGAGAAGCTAAGCCTCCCGA	ETBE-enrichment clones affiliated to unclassified Alphaproteobacteria		Alphaproteobacteria

<b>LeifcIn2</b>	GAGCTCATCCTGGACCGAAG	ETBE-enrichment clones affiliated to Leifsonia; Leifsonia kribbensis, Lysinimonas soli	Microbacteriaceae	Actinobacteria
<b>magnetcIn</b>	CCCAGCGAAAGGTATATTCC	acquirer clones affiliated to Magnetospirillum; Magnetospirillum gryphiswaldense	Rhodospirillaceae	Alphaproteobacteria
<b>MesocIn1</b>	GACTCGAGATTGCCAGTATG	ETBE-enrichment clones affiliated to Mesorhizobium	Phyllobacteriaceae	Alphaproteobacteria
<b>MetcycIn2</b>	GGCGATCAAACCGGGCATGT	acquirer clones affiliated to Methylocystis	Methylocystaceae	Alphaproteobacteria
<b>Metpetr3</b>	AACCAGACCATGCAGCCAGA	Mycobacterium austroafricanum, Mycobacterium vanbaalenii	Mycobacteriaceae	Actinobacteria
<b>Mycaus</b>	CTTTCCCCAACCCAGACCATG	Mycobacterium austroafricanum, Mycobacterium vanbaalenii	Mycobacteriaceae	Actinobacteria
<b>NitrospcIn</b>	CACCTACGACCTTCCTGGGT	acquirer clones affiliated to Nitrospira	Nitrospiraceae	Nitrospira
<b>NvsphingcIn</b>	TCTCCAATCCGCGACCAGGA	acquirer clones affiliated to Novosphingobium	Sphingomonadaceae	Alphaproteobacteria
<b>OP3cIn1</b>	GGCCGTACTGACTTGACGTC	acquirer clones affiliated to unclassified Bacteria		
<b>OP3cIn2</b>	GTAACGCCTGCCACCTCCGT	acquirer clones affiliated to unclassified Bacteria		
<b>OP3cIn6</b>	CTGGCCCCGCTTTTTTGAGA	acquirer clones affiliated to unclassified Bacteria		
<b>OP5cIn4</b>	GCAACTCCATCTTCACGAGG	acquirer clones affiliated to unclassified Bacteria (with closest relatives affiliated to Caldiseriaceae )		
<b>patulbcIn</b>	GGAGTAAGCCGAGACTTCCT	acquirer clones affiliated to unclassified Bacteria (with closest relatives affiliated to Actinobacteria)		
<b>PelocIn3</b>	TAGCCAGAACCTTTTCTTCC	acquirer clones affiliated to Pelomonas; Pelomonas saccharophila, Pelomonas puraquae, Pelomonas aquatica, Advenella mimigardefordensis, Alcaligenes monasteriensis, Advenella kashmirensis	Comamonadaceae/Alcaligenaceae	Betaproteobacteria
<b>pirelcIn</b>	AGCGAGGTCGTGCTCTCACA	acquirer clones affiliated to unclassified Bacteria (with closest relatives affiliated to Pasteuria)		
<b>PolarcIn</b>	ACTCGTCGGCTTAACCCGTT	acquirer clones affiliated to Polaromonas; Polaromonas naphthalenivorans; Polaromonas hydrogenivorans	Comamonadaceae	Betaproteobacteria
<b>Psdonoca</b>	CGAACTCCAGTCATGCCCGT	Pseudonocardia spp. (P. hydrocarbonoxydans, P. sulfidoxydans, P. benzenivorans, P. oroxyli, P. ailaonensis, P. petroleophila)	Pseudonocardiaceae	Actinobacteria
<b>PsenocIn2</b>	CCCCTACCGTCCAAATTCGT	ETBE-enrichment clones affiliated to Pseudonocardia	Pseudonocardiaceae	Actinobacteria
<b>RalstcIn2</b>	GTGTCCACTTTCCCTTTTCGG	acquirer clones affiliated to Cupriavidus; several Cupriavidus spp., Ralstonia spp., Wautersia spp.	Burkholderiaceae	Betaproteobacteria
<b>Rhodaeth1</b>	CTTTCCCAAGCTTATCCCCA	Rhodococcus aetherivorans	Nocardiaceae	Actinobacteria
<b>RhodocIn3</b>	ACCCAACAACCAAGTGACAT	acquirer clones affiliated to Rhodoferax	Comamonadaceae	Betaproteobacteria
<b>RhodofcIn</b>	CGAGGCCCATGCTGAGTCC	acquirer clones affiliated to Comamonadaceae	Comamonadaceae	Betaproteobacteria
<b>Rhodrub</b>	TGCGAGTCCCCAACCGAATT	Rhodococcus ruber, Rhodococcus aetherivorans, Rhodococcus rhodochrous, Rhodococcus artemisiae	Nocardiaceae	Actinobacteria
<b>rhodtercIn2</b>	GGGCTTCCTCTGGGCATACT	acquirer clones affiliated to Nitrospira		Nitrospira
<b>rubritcIn</b>	TAGCTCACACGTCTCAAACG	acquirer clones affiliated to Acetobacteraceae	Acetobacteraceae	Alphaproteobacteria
<b>smitcIn</b>	CCGATCGCCGAAGAAATCGG	acquirer clones affiliated to Syntrophaceae	Syntrophaceae	Deltaproteobacteria
<b>sphincln</b>	CAATACCAGTCCAGTCAGCC	acquirer clones affiliated to Sphingomonas	Sphingomonadaceae	Alphaproteobacteria
<b>stenocIn</b>	ATCAGCGCCAGGCCATTGCT	acquirer clones affiliated to Pseudoxanthomonas; Pseudoxanthomonas spadix	Xanthomonadaceae	Gammaproteobacteria
<b>sulfurcIn</b>	ATGCCTCAAGACCCCCAGTT	acquirer clones affiliated to unclassified Bacteria (with closest relatives affiliated to Sulfuricurvum)		
<b>Syncln1</b>	GCAATCAATTTTCCGGGTGT	acquirer clones affiliated to Syntrophaceae; Syntrophus gentianae, Syntrophus buswellii, Syntrophus aciditrophicus	Syntrophaceae	Deltaproteobacteria
<b>thermanacln</b>	TCACCGCCCCACCTTCTTT	acquirer clones affiliated to unclassified Bacteria (with closest relatives affiliated to Thermoanaerobacteraceae)		
<b>thermcIn</b>	GGCCGTCTCTCATTCCCTGT	acquirer clones affiliated to Dehalogenimonas	Dehalococcoidia	Chloroflexi

<b>trepncln</b>	AAGCATCCGCCCCAGCACCT	aquifer clones affiliated to Treponema ETBE-, TBA- and BTEX-enrichment clones affiliated to Acidovorax; Acidovorax soli, Acidovorax defluvii, Acidovorax delafieldii	Spirochaetaceae	Spirochaetes
<b>VarAcidcln1</b>	CTCCGTTATCCCCACTCTC		Comamonadaceae	Betaproteobacteria
<b>Varcln3</b>	GGCCCATCTTCGTCCGGCGC	aquifer clones affiliated to Treponema	Spirochaetaceae	Spirochaetes
<b>Varvpara1</b>	GGTATTAGCACAGCTTCGCT	Variovorax paradoxus	Comamonadaceae	Betaproteobacteria
<b>verrucomcln</b>	GTCCTTACCGACTTGGCCG	aquifer clones affiliated to unclassified Bacteria (with closest relatives affiliated to Verrucomicrobiaceae)		