

			24		82
	<i>Deinococcus radiodurans</i>	499191373	LLGWFDRAGRDLPWRLGDE	GRRD	PYRVVVAEILLQQTQVARGLGYERFLEAFPTVQAL
	<i>Deinococcus swuensis</i>	746728251	--A--A-----S-		-----H-D-----E-
	<i>Deinococcus deserti</i>	502012169	--A--A-----A-V-		-----IS-V-----T-D--Q-----
	<i>Deinococcus marmoris</i>	1175298040	--A--AS-E-----T-	A-	-----H-D-----S-
Genus <i>Deinococcus</i>	<i>Deinococcus reticulitermitis</i>	1094410079	-----V-A-----P-	G-	-----RL-----
(26/26)	<i>Deinococcus wulumuqiensis</i>	648447004	--A-----E--V-P-	A-	-----V--RM-----
	<i>Deinococcus geothermalis</i>	499848436	--A-----A--V-P-		-----S-V-----RV-F-----E-
	<i>Deinococcus apachensis</i>	518416424	--S-----P--V-P-		-----S-V-----RV-F--A-----
	<i>Deinococcus puniceus</i>	1028846678	--T--QH-A-----E-	A-	-----V-----T--S-E-
	<i>Deinococcus aquatilis</i>	517840375	--T--HS-A--A-A-	A-	-----V-----T--S-E-
	<i>Deinococcus actinosclerus</i>	1011240592	--A--Q-----Q-P-		-----A--V-----E-H--T--S-V-
	<i>Deinococcus maricopensis</i>	503320979	-----AHA-T--A-A-	A-	-----S-V-----V-F--A-----
	<i>Deinococcus peraridilitoris</i>	505047897	--A--EHA-----AASP		-----S-V-----V--KV-F--T--D-A-
<i>Hyphomonas</i> spp.	<i>Hyphomonas adhaerens</i>	916989539	--A--H-----MALG	E--	-----L--M--TIPH-TP-FHK-TDRW-S-E-
(11/11)	<i>Hyphomonas jannaschiana</i>	916990686	--A--H-----TALG	E--	-----L--M--TIPH-TP-FLT-TQRW-E-
	<i>Acinetobacter dijkshoorniae</i>	1008917059	--N--QH--HDLPWQVAD	-	--K--S-M--KTV-Q-FD--M-R--E-
	<i>Acinetobacter pittii</i>	507073098	--N--QH--HDLPWQVAD	-	--K--S-M--KTV-Q-FD--M-R--E-
	<i>Acinetobacter seifertii</i>	1197250511	--N--QH--HDLPWQVAD	-	--K--S-M--KTV-Q-FD--M-R--E-
	<i>Lactobacillus zymae</i>	951353339	--A-Y-Q-----HDQD		--H--S-M--NTVIP--Q--MA--E-
	<i>Muricauda antarctica</i>	1120000780	I-A-YGEHQ-----KTRD		--KI-LS-M--R--Q-MP--H--RD-
Other bacteria	<i>Roseivirga seohaensis</i>	921285074	--IN-YEENK-----KTKN		--I-LS-I--R--Q--P--I-Q--IHD-
(0/>500)	<i>Peptococcus niger</i>	1086116344	---Y-ANA-A--TSG-		--HI-IS-VM-----TVIP-----E-
	<i>Cesiribacter andamanensis</i>	496488913	--D-YQ-NQ-----QTRD		--I-LS-VI--R-QQ--P-Q--V-K--E-
	<i>Lactobacillus siliginis</i>	948985388	--D-Y-KE-----KDHD		--H--S-M--NTVIP--MKT--D-
	<i>Oscillibacter valericigenes</i>	503885511	--S-YRANA-----KTRD		-----S-M--R--AV--Q--S--S-E-
	<i>Alistipes putredinis</i>	1124923007	--E-YG-E-----RTRD		--I-IS-VI--R--Q-MS--H--L-D-A-
	<i>Jeotgalibacillus malaysiensis</i>	748252759	--V--EQEM-----ENQD		-----S-M--R-DTVIP--N--M-Q--E-
	<i>Streptococcus rattii</i>	489182032	--A-Y-QEK-----RTKD		--I--S-M-----TVIP-----DW--SI-D-
	<i>Porphyromonas levii</i>	517170226	--D--QY--T--GI-D		--I--S-I-----VQ-WD--K--I--Y-D-V-
	<i>Facklamia hominis</i>	493965538	--A-Y-QN-----RTSD		--AI--S-VM-----DTVID--Q--MQ-L-----
	<i>Hymenobacter sedentarius</i>	1056775430	--A-YP-HS-----HTRD		--AI-LS-I--R--Q--P--T--A-Y--D-
	<i>Aerococcus urinae</i>	984723132	--FD-Y--E--H--ESKD		--I-IS--M-----NTVIP--Q--Q--ED-

Figure S1. Partial sequence alignment of conserved region of 8-oxoguanine DNA glycosylase (MutY) protein showing a 4 amino acid insertion that is a distinctive characteristic from homologs of *Deinococcus* group of bacteria. This insert is also shared by *Hyphomonas* spp. and it has likely occurred independent in this group.

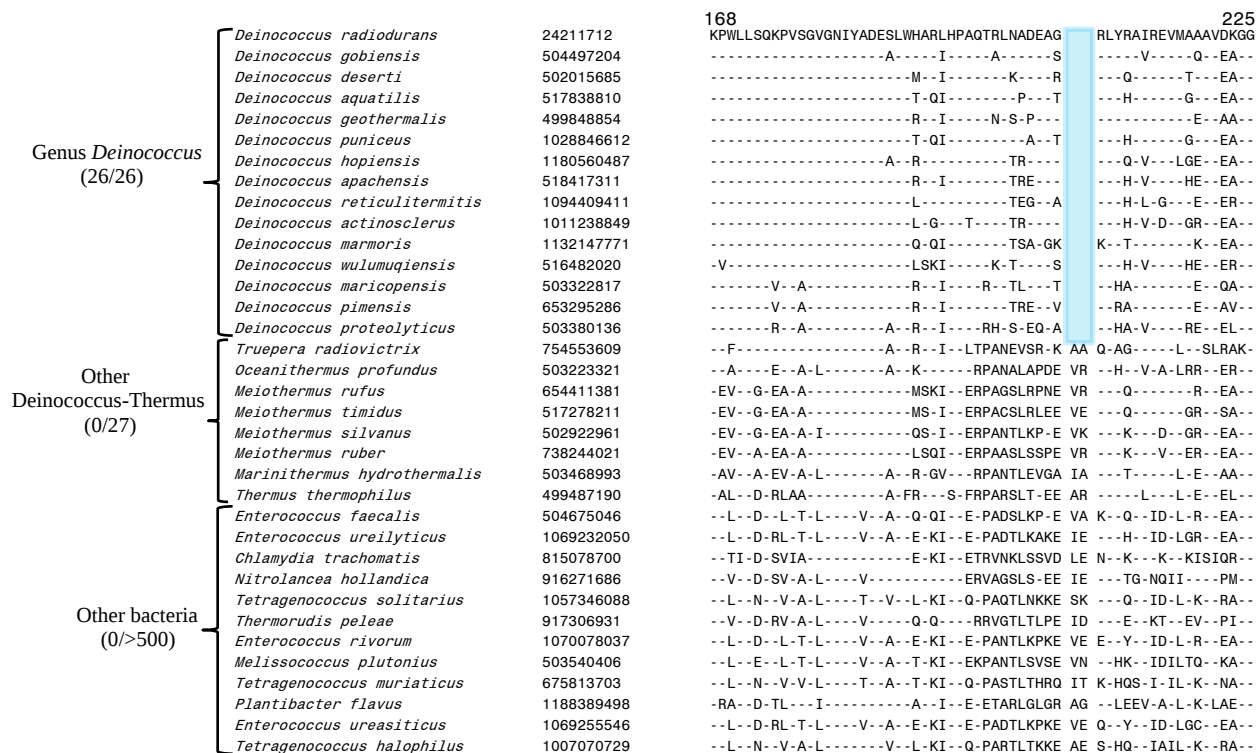


Figure S2. Partial sequence alignment of conserved region of formamidopyrimidine and 8-oxoguanine DNA glycosylase (MutM) protein showing a 2 amino acid deletion that is a distinctive molecular characteristics of *Deinococcus* spp.

Genus <i>Deinococcus</i> (26/26)	<i>Deinococcus phoenicis</i>	736331005	144	GVG	MA	228
	<i>Deinococcus geothermalis</i>	499849194	-----I-----F-S-----E-----	-----L-----	ARATFHVSAIRHGRQTCLSRPRCEVC	
	<i>Deinococcus apachensis</i>	518415322	-----W-----E-----	-----D-----	-----RA-----AC-----	
	<i>Deinococcus puniceus</i>	1028846869	-----V-----M-DTH-G-I-A-EWV-----AI-V-----E-----	-----S-YG-----E-----R-----D-A-----	-----R-----	
	<i>Deinococcus marmoris</i>	736389575	-----CV-----M-DTH-----I-R-E-V-EA-AV-V-----E-----E-----	-----Y-----RARN-A-G-----	-----	
	<i>Deinococcus maricopensis</i>	503322632	-----A-----M-DGH-D-SK-H-----E-----Y-E-----	-----Q-YAY-AT-----E-----TRA-----NA-----	-----	
	<i>Deinococcus deserti</i>	613465786	-----I-----L-----DT-E-I-K-E-V-Q-TPE-V-----A-VR-----	-----E-----AGV-----L-RPRD-----DQ-----	-----	
	<i>Deinococcus wulumuqiensis</i>	516480559	-----H-VA-V-----R-M-DG-ME-A-K-E-V-A-SH-V-----YAE-V-G-----	-----E-T-FAL-I-GV-----D-R-KH-L-PA-----	-----	
	<i>Deinococcus ficus</i>	760096023	-----L-----V-----I-----L-DG-E-TLK-EFV-PN-SAERT-----R-VS-E-----	-----L-AL-AGV-----H-PRN-----PA-----	-----	
	<i>Deinococcus gobiensis</i>	504498115	-----QR-----V-----V-----M-DT-A-M-A-----V-ET-STNRT-A-GQ-IA-----	-----E-T-YAL-L-GV-----HE-TPR-L-GR-----	-----	
	<i>Deinococcus radiodurans</i>	499190033	-----H-VA-V-----R-M-DG-ME-A-K-E-V-A-SH-V-----YAE-M-A-----	-----E-T-FAL-I-GV-----D-R-KH-L-PQ-----	-----	
	<i>Deinococcus reticulitermitis</i>	1094409371	-----H-VA-V-----G-A-M-DG-ME-A-K-E-V-G-SSDRV-----Y-EAA-----	-----E-T-FAL-L-GV-----V-RP-----L-GE-----	-----	
	<i>Deinococcus proteolyticus</i>	503380505	-----QR-----H-Q-AA-DS-E-LLH-EVV-PG-KADRQ-L-LE-----A-----	AP L-A-RAGV-----EI-TRHA-----PA-----	-----	
	<i>Thermorudis peleae</i>	1175339156	-----P-----ACV-----G-G-----L-DTHVY-----Q-G-L-P-CTSER-HQLLAALV-PE-----	Y-A-A-----LL-----C-HARN-----PT-----	-----	
Other bacteria (0/>500)	<i>Methanosaeta harundinacea</i>	504400110	-----P-----AVV-----AFRM-LL-DTHVN-LSR-GFV-GASIEE-----ILEEIT-E-----	KYCS-----NL-----AV-RARS-S-GA-----	-----	
	<i>Ktedonobacter racemifer</i>	495198690	-----P-----ACV-----NMG-LM-IDTHL-LTH-G-GPKVSAEQ-HTI-LKA-PE-----	WAY-L-NL-----TI-HA-----K-PQ-----	-----	
	<i>Anaerolinea thermolimos</i>	1011275067	-----P-----AIV-V-S-NK-F-DTH-Y-S-IG-R-HLS-EQ-HQYLA-FKP-----	QY-PG-LNL-L-E-HAR-N-PA-----	-----	
	<i>Chloroflexi bacterium</i>	1084570780	-----P-----AIV-----S-N-----F-DTH-Y-T-IG-R-KMT-EQ-HPYLESF-A-----	-YYAA-LNI-L-EV-QAR-TM-YK-----	-----	
	<i>Dehalococcoidia bacterium</i>	931359859	-----P-----ACV-----S-G-SVL-DTHVY-ISR-G-DS-VSPEQ-HQLLEE-V-SQ-----	-LYQ-LNMLA-SI-RA-L-HD-----	-----	
	<i>Chthonomonas calidirosea</i>	944158928	-----P-----AIV-C-A-G-V-DTHVF-W-G-EK-VGES-HDLLQALV-PE-----	LIYR-AL-E-RV-KAL-----	-----	
	<i>Thermogemmatipora onikobensis</i>	1181357612	-----P-----ACV-A-GW-VM-DTHV-R-G-LGPKVSAEQ-HVLLAQMT-PA-----	WVYAL-NL-RV-A-PA-----	-----	
	<i>Anaerolineae bacterium</i>	931423785	-----R-----IV-SFG-F-DTHV-IS-G-GPKVTAD-HQILENMGDP-----	TTYAM-LNL-----EV-TARN-K-DQ-----	-----	
	<i>Solirubrobacterales bacterium</i>	1113216706	-----R-----ACV-I-SWGL-E-DVH-G-G-F-KASLER-HDEMLAIV-PE-----	DAYEL-NL-TL-RP-K-GG-----	-----	
	<i>Euryarchaeota archaeon</i>	1197629305	-I-P-SSAVI-N-FDKN-F-DTHVY-TQ-G-NKT-RE-HQILEKQV-SE-----	RMYE-INL-K-TV-KARK-I-SE-----	-----	
<i>Anaerolineaceae bacterium</i>	1176212619	-----P-----AIV-SFNL-F-DTHV-SQ-G-GTQVSRE-HSTLETL-PE-----	TYYS-LNL-A-V-HARG-H-----	-----		
<i>Anaerolinea thermophila</i>	503323788	-----V-----IV-S-NK-F-DTHV-S-IG-R-PQMSAED-HAYLAQ-FTPE-----	QY-AG-LNL-L-EV-HARK-A-PR-----	-----		

Figure S3. Partial sequence alignment of conserved region of Endonuclease III (Nth) protein showing a 2 amino acid insertion that is specific for all *Deinococcus* group of bacteria.

		216	280
		GNPETTTGGRALKFYASVRLDVRKIGQ	TKVGNDAVANTVKIKTVKNKVAAPFKEVELALVYGKG
Phylum Deinococcus-Thermus (53/53)	<i>Deinococcus radiodurans</i>	499191426	-----P-----
	<i>Deinococcus wulumuqiensis</i>	516482149	-----S-----
	<i>Deinococcus maricopensis</i>	503323319	-----S-----
	<i>Deinococcus gobiensis</i>	504499138	-----I-----
	<i>Deinococcus puniceus</i>	1028844635	-----I-----
	<i>Deinococcus aquatilis</i>	517841573	-----S-----
	<i>Deinococcus marmoris</i>	657681647	-----ST-----
	<i>Deinococcus frigens</i>	657673652	-----ST-----
	<i>Deinococcus deserti</i>	502016032	-----V-L-----G-----V-S-----P-----T-M-----
	<i>Deinococcus peraridilitoris</i>	505049365	-----M-S-----G-----V-----P-----Q-----IF-----
	<i>Deinococcus geothermalis</i>	499850523	-----V-L-----G-----V-----P-----T-L-----
	<i>Meiothermus timidus</i>	648542800	-----P-----RQ-----I-----G-R-RV-VT-----P-R-A-IE-Y-----
	<i>Meiothermus chliarophilus</i>	654422710	-----P-----RQ-----I-----G-R-RV-VT-----P-R-A-IE-Y-----
	<i>Meiothermus silvanus</i>	502922380	-----P-----Q-----I-----IG-R-V-VT-----L-P-R-H-IE-YF-----
	<i>Meiothermus ruber</i>	736243925	-----P-----Q-----I-----G-R-RV-VT-----L-P-R-H-IE-YF-----
	<i>Meiothermus cerbereus</i>	654400463	-----P-----Q-----I-S-----G-R-RV-VT-----L-P-R-H-IE-YF-----
	<i>Meiothermus rufus</i>	654410269	-----P-----Q-----I-S-E-G-R-RV-VT-----L-P-R-H-E-YF-----
	<i>Marinithermus hydrothermalis</i>	918004604	-----P-----RS-----I-Q-E-IG-R-RV-VT-----L-P-R-A-IE-YF-----
	<i>Oceanithermus profundus</i>	503222090	-----V-----S-I-----RK-----I-K-DQPI-V-RV-VT-----L-P-R-A-E-YF-R-----
Other bacteria (0/>500)	<i>Escherichia coli</i>	338843449	-----N-----I-R-A-----V-E-ENV-GSETRV-V-----I-----QA-FQIL-E-----
	<i>Shewanella benthica</i>	161330260	-----N-----I-R-A-----I-N-DEVI-G-ETRV-V-----I-----QA-FQIL-----
	<i>Acetonea longum</i>	490710638	-----E-RTES-----I-----G-RT-V-V-----I-P-----QA-FDIM-E-----
	<i>Vibrio variabilis</i>	324455904	-----N-----I-RT-S-----I-E-DEV-G-ETRV-V-----I-----QA-TQIL-Q-----
	<i>Salmonella enterica</i>	544851066	-----N-----I-R-A-----V-E-DNV-GSETRV-V-----I-----QA-FQIL-E-----
	<i>Salinivibrio siamensis</i>	1145451095	-----N-----I-R-A-----I-E-DEV-G-ETRV-V-----I-----QA-FQIL-Q-----
	<i>Tenericutes bacterium</i>	1088626595	-----P-----I-RGE-----I-E-----IIG-QARV-V-----VA-ID-IF-----
	<i>Paenibacillus rhizosphaerae</i>	1133787499	-----P-----S-R-ES-----I-M-----V-G-RTRV-V-----P-----QA-FDIM-E-----
	<i>Thermoanaerobacter mathranii</i>	90568908	-----P-----TI-----VDP-----I-Q-EI-G-RTRV-V-----P-----QA-FDIM-E-----
	<i>Nocardia farcinica</i>	916346749	-S-----I-R-ET-----L-D-T-----G-RTRV-V-----P-----QA-FDIM-Q-----
	<i>Bifidobacterium longum</i>	347369123	-----K-----I-R-QT-----L-N-DE-G-RTRV-V-----M-P-----SA-FDML-E-----

Figure S4. Partial sequence alignment of conserved region of DNA recombination protein RecA showing a 1 amino acid insertion that is specific for all bacteria of Deinococcus-Thermus phylum.

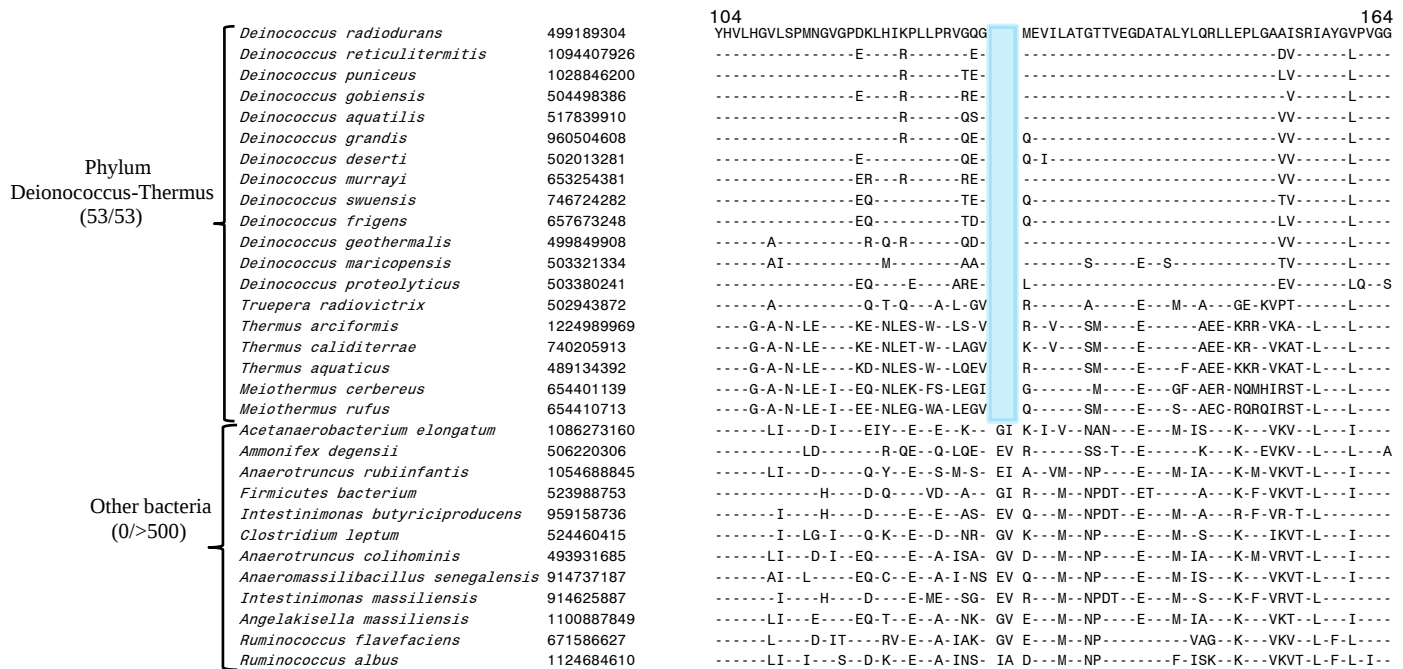


Figure S5. Partial sequence alignment of conserved region of DNA helicase recombination protein RecR showing a 2 amino acid deletion that is a distinctive molecular characteristic of the phylum Deinococcus-Thermus.

Genus <i>Deinococcus</i> (26/26)	<i>Deinococcus radiodurans</i>	499190392	453	HHQLPTFGVGKEHDEKLWRSVLRQLVSLGYLSAD	510	DHFGLRATGKSRGILKEGQKLLLR
	<i>Deinococcus wulumuqiensis</i>	516481428	--L-----R-----	--L-----R-----	-----A-----	-----A-----
	<i>Deinococcus hopiensis</i>	1180559944	-----SA---T-G-----A---	-----SA---T-G-----A---	E-Q-----A-AL--GEET-T--	E-Q-----A-AL--GEET-T--
	<i>Deinococcus reticulitermitis</i>	1094410232	--L-----RA-----AVG	--L-----RA-----AVG	-YS--G-----A-AL-SG-E---	-YS--G-----A-AL-SG-E---
	<i>Deinococcus swuensis</i>	746724908	--L-----G---M--GLI-----H--G	--L-----G---M--GLI-----H--G	E-H--S-----AL--GETT-M--	E-H--S-----AL--GETT-M--
	<i>Deinococcus deserti</i>	502015129	-----R---RF--G---T---TSG	-----R---RF--G---T---TSG	EYH--S-----A-A--GEA--A--	EYH--S-----A-A--GEA--A--
	<i>Deinococcus grandis</i>	972317926	--T-----AA---T-G-----F-A-G	--T-----AA---T-G-----F-A-G	E-H--S-----A-TL--GEAT-T--	E-H--S-----A-TL--GEAT-T--
	<i>Deinococcus proteolyticus</i>	503380202	--T-----A---RT--G---M---E-G	--T-----A---RT--G---M---E-G	E-Y--S---P---EL--GEVPF---	E-Y--S---P---EL--GEVPF---
	<i>Deinococcus phoenicis</i>	736325097	-----QG---A--GL-----A-G	-----QG---A--GL-----A-G	E-H--S---A-A-PL--GEAT-H--	E-H--S---A-A-PL--GEAT-H--
	<i>Deinococcus murrayi</i>	653257696	--T-----A---M--GL-----A-G	--T-----A---M--GL-----A-G	E-H--S---A-A-PL-RGEET-H--	E-H--S---A-A-PL-RGEET-H--
	<i>Deinococcus gobiensis</i>	504499404	-R---Y---QG--V-V-----T-G	-R---Y---QG--V-V-----T-G	PYQ--TV--RA---RGEVR---	PYQ--TV--RA---RGEVR---
	<i>Deinococcus aquatilis</i>	517838325	-RS---Y-I---P-V-----T-G	-RS---Y-I---P-V-----T-G	PYH--TV-PQAKA--RGETP---	PYH--TV-PQAKA--RGETP---
	<i>Deinococcus ficus</i>	653264797	-RT---I---D--ARV-----T-G	-RT---I---D--ARV-----T-G	PYQ--MV-A-AKYV--GERP---	PYQ--MV-A-AKYV--GERP---
	<i>Deinococcus misasensis</i>	736318342	-RT---Y-I---A-V-G--I-----T-G	-RT---Y-I---A-V-G--I-----T-G	PFQ--MT-PQAKML-TGA-R---	PFQ--MT-PQAKML-TGA-R---
	<i>Rhodanobacter fulvus</i>	494143086	---S---ADM---Q---F---LAA-L-E--	---S---ADM---Q---F---LAA-L-E--	AE GYGT--L-AA--V-SG-ESVK--	AE GYGT--L-AA--V-SG-ESVK--
Other bacteria (0/>500)	<i>Thiothrix nivea</i>	386421742	-D--S-Y-I-T--SQAE--NIF--IA-----V-	-D--S-Y-I-T--SQAE--NIF--IA-----V-	VD G-G--L-D--PL-RGEIE-H--	VD G-G--L-D--PL-RGEIE-H--
	<i>Bradyrhizobium erythrophlei</i>	1089508368	-D--SV--I-R-LN--Q--A-----AM-H-R--	-D--SV--I-R-LN--Q--A-----AM-H-R--	SD AFGA-KL-DSA--V--GETAVM--	SD AFGA-KL-DSA--V--GETAVM--
	<i>Thiothrix caldifontis</i>	1088971155	-E--S---I---SDAE--NIF--IA---TV-	-E--S---I---SDAE--NIF--IA---TV-	VD G-G--L-DNA-PL-RGEIE-H--	VD G-G--L-DNA-PL-RGEIE-H--
	<i>Dyella thiooxydans</i>	1027736903	-DK-T---ADM---A---F---LAA-L-AT-	-DK-T---ADM---A---F---LAA-L-AT-	PE GYGT--L-AA--V-TG-ERV---	PE GYGT--L-AA--V-TG-ERV---
	<i>Dyella ginsengisoli</i>	648415568	-DK-T---ADM---A---F---LAA-L-AT-	-DK-T---ADM---A---F---LAA-L-AT-	PE GYGT--L-AA--V-TG-ERV---	PE GYGT--L-AA--V-TG-ERV---
	<i>Halieta salexigens</i>	654479105	--T---I--AL-NHQ---F---AR--R--	--T---I--AL-NHQ---F---AR--R--	LD HFGLA-LEDHC-PL-RGEET-E--	LD HFGLA-LEDHC-PL-RGEET-E--
	<i>Bradyrhizobium elkanii</i>	740592818	-D--SV--I-R-LN--Q--A-----AM-H-R--	-D--SV--I-R-LN--Q--A-----AM-H-R--	SD AFGA-VL-DSA--V--GETAVM--	SD AFGA-VL-DSA--V--GETAVM--
	<i>Bradyrhizobium pachyrrhizi</i>	913367243	-D--SV--I-R-LN--Q--A-----AM-H-R--	-D--SV--I-R-LN--Q--A-----AM-H-R--	SD AFGA-VL-DSA--V--GETAVM--	SD AFGA-VL-DSA--V--GETAVM--
	<i>Thiothrix lacustris</i>	740303120	-E--S-Y-I-T--SPEE--NIF--IA---V-	-E--S-Y-I-T--SPEE--NIF--IA---V-	VD G-G--L-DN--PL-RGEIE-H--	VD G-G--L-DN--PL-RGEIE-H--
	<i>Nitrospira briensis</i>	640613188	-DKVS---I---L---A--A-F---AA--L-T--	-DKVS---I---L---A--A-F---AA--L-T--	SE G-GS--LAAA--AV-TGN-TVR--	SE G-GS--LAAA--AV-TGN-TVR--

Figure S6. Partial sequence alignment of conserved region of DNA helicase RecQ protein showing a 2 amino acid deletion that is uniquely shared by all *Deinococcus* group of bacteria.

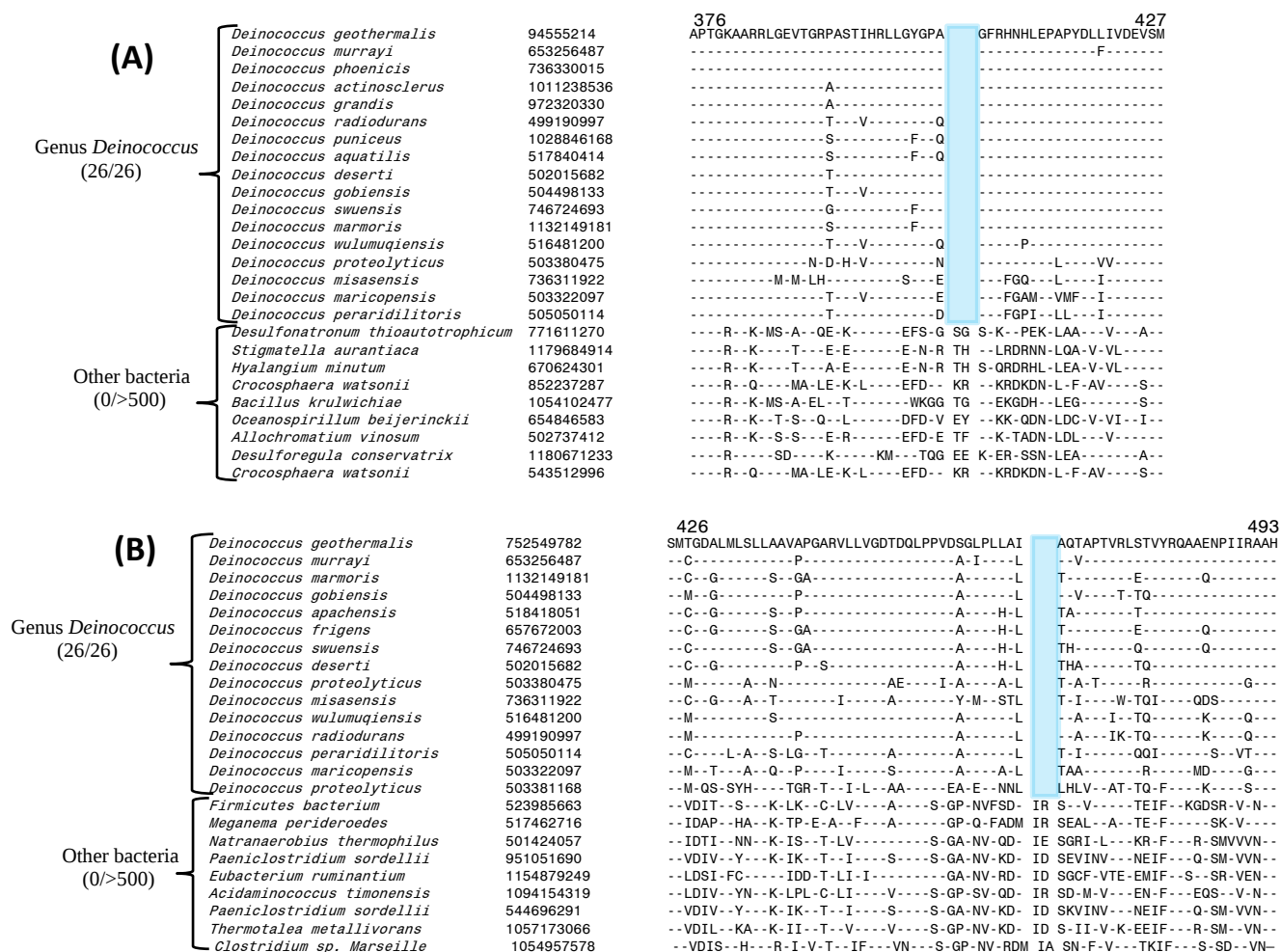


Figure S7. Partial sequence alignments of two conserved regions of helicase RecD protein showing two 2 amino acid deletions that are specific for all *Deinococcus* group of bacteria.

Genus <i>Deinococcus</i> (25/25)	<i>Deinococcus radiodurans</i>	499189545	82	147
	<i>Deinococcus phoenicis</i>	736332972	GGAFGVVQLACAQAGVPIHAYGPMQVKSLVGTGRADKEQVIYMKASLGIRELF	NNHAADALALA
	<i>Deinococcus wulumuqiensis</i>	516481650	-----R-----E-----	
	<i>Deinococcus hopiensis</i>	1180561417	-----TY-----	
	<i>Deinococcus puniceus</i>	1028846711	-----RTI-----G-----	
	<i>Deinococcus aquatilis</i>	517840778	-----V-S-----R-----E-----T-----I-----	
	<i>Deinococcus geothermalis</i>	499848740	-----R-----I-----T-----	
	<i>Deinococcus apachensis</i>	518417162	-----RA-----L-V-----	
	<i>Deinococcus grandis</i>	972321186	-----V-H-----R-----E-----	
	<i>Deinococcus deserti</i>	752556384	-----S-----A-----V-----	
	<i>Deinococcus marmoris</i>	657681960	-----V-S-----S-----V-----	
	<i>Deinococcus frigens</i>	657676762	-----V-Y-----A-----A-----V-----	
	<i>Deinococcus gobiensis</i>	760118814	-----V-S-----QAV-----T-----V-----	
	<i>Thermus brockianus</i>	1103715214	-W-L-A-LV-AFE---VY-----QA-A-H-H-A-E-AL--RGI--LK-TP S PS-L---I-	
	<i>Thermus scotoductus</i>	740228181	-W-L-A-LV-AFE---VY-----QA-A-H-H-G-E-AL--RGI--LK-AP K PS-L---I-	
Other Deionococcus-Thermus (0/27)	<i>Thermus islandicus</i>	551066800	-W-L-A-LV-AFE---AY-----QA-A-H-H-G-E-AL--RGI--L-TP G PS-L---I-	
	<i>Thermus parvatiensis</i>	982899943	-W-L-A-LV-AFE---VY-----QA-A-H-H-A-E-AL--RGI--LK-AP R PS-L---I-	
	<i>Thermus thermophilus</i>	499486524	-W-L-A-LV-AFE---VY-----QA-A-H-H-A-E-AL--RGI--LK-AP R PS-L---I-	
	<i>Thermus caliditerrae</i>	740204878	-W-L-A-LV-AFET---VY-----QA-A-H-H-S-E-AL--RGM--LK-AP K PS-L---I-	
	<i>Marinithermus hydrothermalis</i>	503469220	-W-M-A-LV-ADE--L-VF-----QA-----A--A--R-I-NL--AP K VS-V-----I-	
	<i>Meiothermus cerebeus</i>	654401651	-W-M-A-F-VAD-LAI-VYG--PK-QA---Q--D--A--R-I--LKT-P R PT-L-----I-	
	<i>Meiothermus silvanus</i>	502923137	-W-M-A-FI-ANEW-LEVYG---K-QA---Y-H-E---AF--R-I--LK-NP K PT-V-----I-	
	<i>Meiothermus timidus</i>	517276951	-W-M-A-LVVA--HDL-VYG--PK-QA---Y-H--D--AF--R-V--LK-TP K PS-K---I-	
	<i>Oceanithermus profundus</i>	503222960	-W-M-A-F--AG---LEVFG---E-RA-----R--AF--R-L--LKQTP S SS-----V-	
	<i>Veillonella seminalis</i>	493603869	--R--IL--AS-RRI--YE-T-L--QAV--Y--T-----TMNM----KI K PDDT-----I-	
Other bacteria (0/>500)	<i>Desulfotobacterium metallireducens</i>	493767406	--R--L--A---I-VYE-T-L--QAV--Y-K--K--QQ--R-L--LN-IP K PDDT-----I-	
	<i>Desulfotobacterium dichloroeliminans</i>	505075819	--R--IL--A---I-VSE-T-L--Q-VT-Y---Q-IQQ---L--LP-IP K PDDT-----I-	
	<i>Acidaminococcus massiliensis</i>	1130378838	-E-R--IL-TA---I-VYG-T-I--QAIT-----N---T--QKL-H-E-KP K PDDV-----IG	
	<i>Veillonella parvula</i>	987849252	--R--IL--AE-QRI--YE-T-L-I-QAVT-Y-K--N----TMNI----KI K PDDT-----V-	
	<i>Acidaminococcus fermentans</i>	502703599	-E-R--IL-TA-R--I-VYG-T-I--QAIT-----N---T--QKL-H-E-KP K PDDV-----IG	
	<i>Desulfosporosinus orientis</i>	503949428	-H-R-I-L-T--Q-I--YE-T-L--QAV--Y-K-E-R--QQ--RGL--LDDIP K PDDT-----	
	<i>Veillonella magna</i>	654800968	--R--IL--AH-QDI--YE-T-L-I-QAV--Y-K-T-D--T--TMNI----KI K PDDT-----V-	
	<i>Peptococcaceae bacterium</i>	669259538	--R--L--A-N-NLTVYE-T-L--QT--Y---K-IE---VL-KLP-ER W PDDVT-----V-	
	<i>Bacillus thermozeamaize</i>	1198395410	--R--IL--AV-H---VYE-T-L--QGV--Y---Q-QE--QRL-SLS-PL R PDDV-----V-	
	<i>Vulcanibacillus modesticaldus</i>	1069272223	--R-ILM--AVE-NL--YE-T-L--QA---Y--E-K-IQE---MY-NLK-IP K PDDV-----I-	

Figure S8. Partial sequence alignment of conserved region of crossover junction endodeoxyribonuclease RuvC protein showing a 2 amino acid deletion that is a distinctive molecular characteristic of *Deinococcus* spp.

Genus <i>Deinococcus</i> (23/26)	<i>Deinococcus geothermalis</i>	499849539	14	PLAAELAAGCADRVVAGGVERLLAS P	LAGPFPQVREALRGYAEALDAAGRAAALHRLALL	73
	<i>Deinococcus murrayi</i>	653256037		-----S-----	-----G-----G--GA--E--G-----	
	<i>Deinococcus hopiensis</i>	1180559598		-----G-----	-----G--V-----GVA--E--G--E--	
	<i>Deinococcus ficus</i>	653259472		-----T-----K----	-GN--K-----A--G--P-A-E--TQ--E--	
	<i>Deinococcus radiodurans</i>	499191011		-----G--H-----K--ST	-----K--V-S--G--ESA--V--RE--T--	
	<i>Deinococcus actinosclerus</i>	1011239130		-----S--QN-----K----	-GN--K-----A--A-----EV--RA--D--	
	<i>Deinococcus grandis</i>	972319627		-----S--QN-----K----	-GN--K-----A--G-----EV--RA--D--	
	<i>Deinococcus wulumuqiensis</i>	516481212		-----G--H-----K--ST	-----R--V-S--GQMREDE--G--RE-----	
	<i>Deinococcus swuensis</i>	746727406		-----G--QN-----DK----	-GN--KI--T--GD-GVTE-EE--KT--A--	
	<i>Deinococcus marmoris</i>	657681888		-----QN-----DK----	-GN--KI--V-G--G--SVGE-EEV--KT--A--	
	<i>Deinococcus frigens</i>	657673578		-----QN-----DK----	-GN--R--V-G--GA-SVSE-EDI--KT--M--	
	<i>Deinococcus deserti</i>	502014968		-----QN-----K----	-GN-----V-G--GS-EP-K-E--KS-----	
	<i>Deinococcus marmoris</i>	1131054793		-----QNH-----DK----	-GN--KI--V-G--G--SVGE-EEV--KT--A--	
	<i>Deinococcus misasensis</i>	736303153		--ER--LM--QNK-----L-K--DN	-GK--K--V--H-ET-PVEE-ETK-RQ--Q--	
	<i>Deinococcus pimensis</i>	653295271		--ER--LT--TN-----K--DN	-GK-----T--S--EP--EK-RS-----	
	<i>Deinococcus peraridilitoris</i>	505047055		--ER--LT--SN-----K--EH	-GK-----AM-EDE-GER-RA-----	
Other Deionococcus-Thermus (0/27)	<i>Thermus thermophilus</i>	499547772		--LR--QD-AR---V--L-A-VQN	--R--KLL-LF--G-KPQEE-KRV-QE--R--	
	<i>Thermus arciformis</i>	1086163620		--LR--QD-AR---V--L-A-VQN	--R--KLL-LF--G-RPPPE-KRV-QE--R--	
	<i>Thermus aquaticus</i>	927054814		-ILR--QD-AR---V--L-G-VRN	--R--KLLDLFQ--G-K-PEA-KKV-EE--RI-	
	<i>Thermus islandicus</i>	655041914		-ILR--QD-AR---V--L-G-VQN	--R--KLL-LF--G-RPPPE-KRI-EE--R--	
	<i>Oceanithermus profundus</i>	503222827		--ER--T--R-----L-K-VHN	--R--E-I-L-E--A-EPDA-C-R-RE--R--	
	<i>Meiothermus cerbereus</i>	916922623		-I-R--D-AQ-----L-K-IQN	-GQ--E-GRV-A--RQM-VEA-K-Q-KK--E--	
	<i>Meiothermus rufus</i>	654411370		-QR--D-AR-----L--QN	-GH--ELGQV-A--RQM-P-T-R-R-EE--R--	
	<i>Meiothermus ruber</i>	502779467		-I-R--D-AQ-----L-K-IQN	-GQ--E-GRL-A--RQM-VET-KEQ-KK--E--	
	<i>Meiothermus taiwanensis</i>	738241890		-I-R--D-AQ-----L-K-IQN	-GQ--E-GRL-A--RQMEVEA-KER-IK--E--	

Figure S9. Partial sequence alignment of a conserved region of DNA helicase RecG protein showing a 1 amino acid insertion that is specific for the *Deinococcus* group of bacteria. Three *Deinococcus* spp. do not contain this insertion.

		290068	191	257
	<i>Deinococcus radiodurans</i>	290068	DNIPGAKGIGPKTAAKLLQEGYGTLEKVEEAA	HA GTLKPdGTRKKLLDSEENVKFSHDLSCMVTDLPL
	<i>Deinococcus wulumuqiensis</i>	516480923	-----I-----	-----QD-Q--S-----
	<i>Deinococcus deserti</i>	502015562	-----GI-----	-----Q-----A-----E-----
	<i>Deinococcus ficus</i>	760095321	-----GI-----	-----V-Q-----A-Q--E-----
	<i>Deinococcus actinosclerus</i>	1011239262	-----GI-A-	-----Q-----A-E--R-----
	<i>Deinococcus grandis</i>	972319813	-----GI-A-	-----Q-----A-E--R-----
	<i>Deinococcus marmoris</i>	1132147896	-----S--D-----IF--	-----E-K--E--A-----Q--QM-----
	<i>Deinococcus gobiensis</i>	380000174	-----GI-A-	-----A-Q--A--SD-Q--E-----
	<i>Deinococcus geothermalis</i>	499850060	-----R-----DA-LA-	-----E-K--E--A--AD-L--RE-----
	<i>Deinococcus hopiensis</i>	1180560144	-----T-R--DA-LA-	-----E-K--E--T--AD-R--E--N--
	<i>Deinococcus apachensis</i>	518414954	-----Q-----DT-L--	-----E-K--E--A--AD-L--R--R-----
	<i>Deinococcus maricopensis</i>	503321933	-----H-S-DA-LQ--	-----A--K--QE-IAA-VQD-L--RE-----
	<i>Deinococcus murrayi</i>	653254158	-----I-----DAAL--	-----E-K--E--A--KD-LL--RE--R-----
	<i>Deinococcus proteolyticus</i>	503380145	-----T-I--DAALD--	-----Q-K--Q-----DA-R--RE--Q--C--E--
	<i>Truepera radiovictrix</i>	502943864	-----D--S-DAIL-NL	ERV--ESAA--VRA-L-D--RE--RII--AD--
	<i>Thermus antranikianii</i>	655044621	-----V--E-----IR-W-S--NLLKHL	EQV--ASV-E-I-SHM-DL-L-LE--RVV--
	<i>Thermus scotoductus</i>	505921010	-----V--E-----IR-W-S--NLLKHL	EQV--ASV-E-I-SHM-DL-L-LE--RVH--
	<i>Oceanithermus profundus</i>	503223021	-----VR-V-A-----ARW-S-DRI--HL	DEVT-P-V--EEGR-AAF--REI-R-RA-V--
	<i>Meiothermus silvanus</i>	502923661	-----G--A-W-S--NLLAHL	EEV--ERL-EL-RA-L-DIRL-YE--K-R--I
	<i>Meiothermus chliarophilus</i>	654421930	-----G-V--E-W-S--NLLAHL	EEV--ER--ELIRA-LDD-LL-RQ--EIH--V--
	<i>Meiothermus taiwanensis</i>	654415690	--L-----E--R--W-S--GL-ANL	EA-S-K I-AS-EE-RD--RL-RA--LIH--I
	<i>Meiothermus ruber</i>	738244489	--L-----E--R--W-S--GL-ANL	EA-S-K I-AS-EE-RD--QL-RT--LIH--
	<i>Thermotogales bacterium</i>	973153189	--V--VP-V--Y--KQ--SV-N--NI	RD-S-G L--I-GKKSLOM-S--VKL--AD--
	<i>Leptonema illini</i>	488857666	-----V--S-E--IS--DDIDGI-KNL	DAI--L--EE-R--FL-RK-ATIL--DI
	<i>Sphingomonas koreensis</i>	1054815407	--V--V-----I--F--VDA-L--	PSM--SKM-DN-IEYADMARL-RK-VELAS-V--
	<i>Liberibacter crescens</i>	505086248	-----IP-----L--E--N-DNILLQ-	H-M--SKR-DA-IEHANMARL-RE-VTLR--
	<i>Acidocella aminolytica</i>	1175533126	--V--VP-----G--A-ID-----L--	PSM--SKR-ES-I-HA-AARL-KQ-VTLRD-A--
	<i>Solibacillus isronensis</i>	1160667273	-----VP-V-E--I--K-H--I--L--M	DS--ASKMKE--V-N--MAHL-KK-ATIH--A--
	<i>Dehalococcoides mccartyi</i>	1155162918	-----VP-----Q--IE--GI-DI-KNL	DKIS-P-LQ--A-NA-VARQ-KI-TTI-C--
	<i>Lysinibacillus saudiensis</i>	674649521	-----VP--E--I--K--SV-NL--HI	DDM--SKMKE--I-NR-QAFM-KE-ATILVEA-I

Figure S10. Partial sequence alignment of a conserved region of DNA polymerase I (PolA) protein showing a 2 amino acid insertion that is specific for all *Deinococcus* group of bacteria.

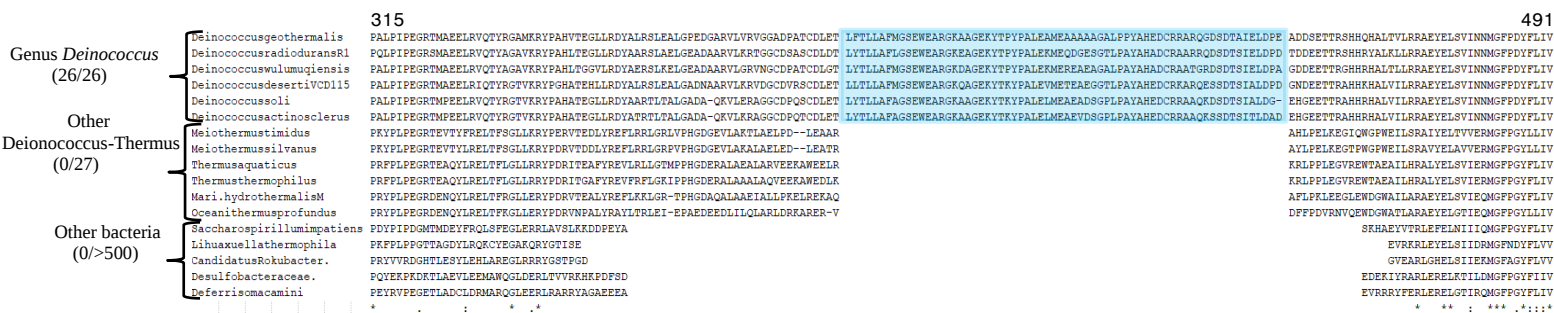


Figure S11. Partial sequence alignment of conserved region of DNA polymerase III alpha (DnaE) protein showing a 65 amino acid insertion that is uniquely shared by all *Deinococcus* group of bacteria.

		75		131
		FYNYSQLGVKPILGYEAYV	VP	GFGTRRDKKPGVSGEKGIFHLTLLARDFTGYQNL
Genus <i>Deinococcus</i> (24/26)	<i>Deinococcus geothermalis</i>	499848670	-----M-----	-----E-----
	<i>Deinococcus murrayi</i>	653254503	-----M-----	-----E-----
	<i>Deinococcus ficus</i>	653266326	-----TGM-----	-----Q-----RTR-QD-----E-----
	<i>Deinococcus gobiensis</i>	504498818	-----TGM-----I-----	-----Q-----RTR-QD-----E-----
	<i>Deinococcus maricopensis</i>	503320977	-----TGM-----I-----	-----V-----ERTR-QD-----E-----
	<i>Deinococcus radiodurans</i>	499189612	-----MGME-----I-----	-----RSRAQD-----E-----
	<i>Deinococcus actinosclerus</i>	1011240344	-----TGM-----I-----	-----E-----RTRAQD-----E-----
	<i>Deinococcus grandis</i>	972312411	-----TGM-----I-----	-----E-----RTRAQD-----E-----
	<i>Deinococcus wulumuqiensis</i>	516483568	-----MGME-----I-----	-----M-----RSR-QD-----E-----
	<i>Deinococcus deserti</i>	502016316	-----QAA-----I-----	-----Q-----RTRAQD-----E-----
	<i>Deinococcus peraridilitoris</i>	505048928	-----L-M-----	AA-S-F-R---E---T-----E-----
	<i>Deinococcus pimensis</i>	653296196	-----VSM-----I-----	AA-S-H-R---E---T-----E-----
Other Deionococcus-Thermus (0/27)	<i>Thermus brockianus</i>	1103714457	--RK-TE-----	AAES-H-R-R-KGLDG-Y-----K-R-----
	<i>Thermus igniterrae</i>	516808234	--RK-TE-----	AAES-H-R-R-KGLDG-Y-----K-R-----
	<i>Thermus thermophilus</i>	499546976	--KK-TEM-I-----	AAES-F-R-R-KGLDG-Y-----K-----
	<i>Thermus parvatiensis</i>	495906241	--KK-TEM-I-----	AAES-F-R-R-KGLDG-Y-----K-K-----
	<i>Thermus islandicus</i>	551066077	--KK-TEM-I-----	AAES-F-R-R-KGLDG-Y-----K-R-----
	<i>Thermus amyloliquefaciens</i>	740213346	--KK-TSM-----	AAES-Y-R-R-KGLDG-Y-----K-R-----
	<i>Meiothermus chliarophilus</i>	916697201	--K--TEAE-----I-----	AADS-F-R-Q-KGLDG-Y-----K-E-----
	<i>Meiothermus rufus</i>	1181339566	--K--EM-----I-----	AAES-F-R-Q-KGLDG-Y-----QNMQ-----
	<i>Meiothermus timidus</i>	517277716	--K--TEAE-----I-----	AAES-F-R-Q-KGLDG-Y-----K-E-----
	<i>Meiothermus silvanus</i>	908633755	--K--TEAE-----I-----	AAES-F-R-Q-KGLDG-Y-----K-E-----
	<i>Meiothermus ruber</i>	738244534	--K--TE-----I-----	AA-A-F-PEQ-KGLDG-Y-----QNM-----
	<i>Marinithermus hydrothermalis</i>	503468711	--KK-TAA-----I-----	AAES-F-R-M-KGLDG-Y-----I-EN-----
Other bacteria (0/>500)	<i>Oceanithermus profundus</i>	503223813	--KK-TAA-----I-----	AAES-F-RTMRKGLDG-Y-----K-K-----
	<i>Chloroflexi bacterium</i>	1125312738	--VA---A-----I-V---I	ARQS-F-RD-RIE-HGKP---V---K-----
	<i>Pirellula staleyii</i>	502675500	--K-KA--IN---I-----I	AP-S-FE--DAANSKEASY-----QNRQ-FK--
	<i>Rhodopirellula baltica</i>	499431723	--RK-KDA-IN--I-----I	AP-S-F--GGAS-SKAASY-----QNR--FK--
	<i>Opitutaceae bacterium TAV5</i>	918203265	--E-KKA-I--LV-C-L--	AP-S-LE-AGKSEDG-NYY--G---NI-----
	<i>Clostridium sp. Marseille-P253</i>	1054809256	--RA-KAA-I-----C-V--	AP-S-F--EA-G---DRYY--V---ENDL--H--
	<i>Opitutaceae bacterium TAV1</i>	494601190	--E-KKA-I--LV-C-L--	AP-S-LE-AGKSEDG-NYY--G---NI-----

Figure S12. Partial sequence alignment of conserved region of DNA polymerase III alpha (DnaE) showing a 2 amino acid insertion that is a distinctive characteristics from homologs of *Deinococcus* group of bacteria. Two *Deinococcus* spp. do not contain this CSI.

		502015237	101		169
	<i>Deinococcus deserti</i>	502015237	SLDNVFDADLEWQEKRLSLNLP	PES	DDFTFTGEIKIDGLSVNLYLDGTLQWAATRGNGRVGEMVT
	<i>Deinococcus wulumuqiensis</i>	516482604	-----D-----D-----	--H	-----L-----G-E-----
	<i>Deinococcus radiodurans</i>	499191160	-----D-----D-----G--	LDT	-----L-----E-----I--
	<i>Deinococcus ficus</i>	653260146	-----NDE-----G-----	--Y	-----L-----N-E-----Q--I--
	<i>Deinococcus geothermalis</i>	752549754	-----SDE-----A-----A--	-DH	-G--Y--L-----A-V-----
	<i>Deinococcus apachensis</i>	518414545	-----DE-----A-----A--	-DY	-G--Y--L-----V-V-----VT--
	<i>Deinococcus gobiensis</i>	504497482	-----DA-----G--R-----	ADY	-S-----L-----KG-E-----I--
	<i>Deinococcus marmoris</i>	1132142816	-----DA-----G--R-----	--H	-E-VL--L-----R-Q-----T--I--
	<i>Deinococcus murrayi</i>	653256327	-----A-ND-----A-G-L-----	-DM	--Y--L-V-----V-V-----Q--L--
	<i>Deinococcus swuensis</i>	746725257	-----SDA-----G--R-----A--	--H	--V--L-----VN-Q-----S--I--
	<i>Deinococcus grandis</i>	972319274	-----A-DA-----D-----A-G--	A-H	-----L-----E-----VT--I--
	<i>Deinococcus actinosclerus</i>	1011239200	-----A-DA-----D-----A-G--	AD-	-----L-----E-----VT--I--
	<i>Deinococcus frigens</i>	657675717	-----A-DA-----D-----R-----	--H	-E-ML--L-----Q-V-----A--
	<i>Deinococcus reticulitermitis</i>	1094409482	-----SDH-----G-----A-G--	A-H	--A--L-----V-E-----A--L--
	<i>Deinococcus aquatilis</i>	517838003	-----DA-----G--R-----	ADT	-T-----L-----R-E-----VT--I--
	<i>Deinococcus proteolyticus</i>	503379980	-----A-DS-MAG--R--A--	-DH	G-A--L-----R-E-----T--K--
	<i>Deinococcus maricopensis</i>	503322439	-----NDE-----TD-GA--A-GAA	-DT	A-YAY-C-L-----V-V-----V--I--
	<i>Deinococcus hopiensis</i>	1180562188	-----A-SNA--AHFD--V-A--	VGD	QQ-AY-C-L-----V-V-----D-E--K--
	<i>Deinococcus phoenicis</i>	597706091	-----A-SDA--AGFD-RV--A--A	-RE	QH-AY-C-L-----V-V-----D-E--K--
	<i>Deinococcus pimensis</i>	771654655	-----D--AG--R-S-A-GGG		T--Y-C-L-----V-E-R-----T--D--
	<i>Meiothermus silvanus</i>	502923533	-----A-GPEDI-LFE-RI--GM-	AP	PYVL-Y-----EE--L-G-----Q--D--
	<i>Marinithermus hydrothermalis</i>	503469121	-----A-NLE-V--FEAR-E-A-GR-	GP	EY-V-Y-----EE-F-V-G-----T--E--
	<i>Meiothermus timidus</i>	517277018	-----A-GQQDIV-FEARV--A-G--	GP	NY-L-Y-----I--L-Q--V-V-G-----T--D--
	<i>Meiothermus chliarophilus</i>	654421759	-----A-GPQDIADFETRA--A-G--	GP	DY-L-Y-----F-Q--L-V-G-----T--D--
	<i>Thermus scotoductus</i>	518380761	-----A-NF--KAFE-RIG-A-GRE	GP	AY-V-H-V-----E--V-V-G-----D-E--E--
	<i>Thermus thermophilus</i>	504442433	-----A-NF--KAFE-RIG-A-GRE	GP	-Y-V-H-V-----E--V-VYG--D-E--E--
	<i>Thermus parvatiensis</i>	982899939	-----A-SFE--KAFE-RIG-A-GRE	GP	AY-V-H-V-----E--V-V-G-----D-E--E--
	<i>Thermus brockianus</i>	1103713965	-----A-NHE--QAFE-RIE-A-GRK	GP	VY-V-H-V-----EE-V-V-G-----D-E--E--
	<i>Oceanithermus profundus</i>	503222790	-----A-GP--IAAFE-RV--A-GTE	PPLEYAL	-Y-----I--L-EG-R-V-G-----E--
	<i>Tropheryma whipplei</i>	755157225	-----SL-Q--S-Y--TKKICPEG	-QC-	-VC-L--VG-S-R-AN-Y-IS--D-AI--DI-
	<i>Streptomyces tsukubensis</i>	750632199	-----A-EE--AA-A-RI--DVGT-	--H	-LC-L-V--A--T-EK-K-VR--D--DI-
	<i>Streptomyces griseoluteus</i>	663177559	-----A-DA--AA-S-RV--DVGT-	--HYLC	-L-V--A--T-EH-R-TR--D--A--DI-
	<i>Actinomyces provencensis</i>	1151012413	-----D--SIE--KA-EDRVHDTGR-	-LAM	-C-A--A-D-L-V--R-Q--D--D--D--
	<i>Xylanimonas cellulosilytica</i>	502642750	-----SV-----D-DARV--D-GAG	-VGYLA	-V--AIA-L-EH-R-TR--D--T--D--
	<i>Rathayibacter tritici</i>	1181002749	-----S-E-----C--TVA-ADR-	IAWLT	-L--AIS-H-EQ-R-VT--D--I--D--
	<i>Propionibacterium acidifaciens</i>	546156869	-----D--SV-----MARTVEA-GAE	PVWLC	-V--A-D-Q-V--A-AT--D--DI-
	<i>Brachybacterium paraconglomeratum</i>	498235416	-----SLE-----C-HA-AE-SA-	VR	-LN-L--AI--R-EN-Q-VT--D--T--D--
	<i>Microbacterium resistens</i>	1055601479	-----SVE-----AA-TQAAAGR-	VAWLT	-L--AI--R-E--V-TS--D--I--
	<i>Microbacterium indicum</i>	656171461	-----SP-----A-CVRA-EAAGR-	VRWLT	-L--AI--R-E--V-TS--D--I--

Figure S13. Partial sequence alignment of conserved region of NAD (+)-dependent DNA ligase (LigA) protein showing a 3 amino acid insertion that is uniquely shared by the *Deinococcus* group of bacteria. *Deinococcus pimensis* does not contain this insertion.

		265		341
	<i>Deinococcus wulumuqiensis</i>	516481209	NKTNLLQTISAMYKAGKIPDIGALRDESDR K	EPVRIVIELKRSA AG MGTLLVNLQYKYTLQSSYTVMNLSTVNGEP
	<i>Deinococcus radiodurans</i>	499191008	-----S-----	-----F-----
	<i>Deinococcus reticulitermitis</i>	1094409587	-----S-----	-----F-----
	<i>Deinococcus gobiensis</i>	504497349	-----S-----	-----T-----I-----
	<i>Deinococcus geothermophilis</i>	499849419	-----I-----S-----	-----V-----G-----IP-----TF-----
	<i>Deinococcus murrayi</i>	653256151	-----I-----A-----	-----G-----IP-----TTF-----
	<i>Deinococcus aquatilis</i>	517839262	-----S-----	-----G-----IP-----TF-----I-----
	<i>Deinococcus maricopensis</i>	503322881	-----I-----S-----	-----V-----G-----IP-----TTF-----I-----
	<i>Deinococcus phoenicis</i>	736330843	-----I-----S-----	-----D-----V-----G-----IP-----TF-----I-----
	<i>Deinococcus apachensis</i>	518415676	-----I-----S-----	-----D-----G-----IP-----TF-----I-----M-----
	<i>Deinococcus marmoris</i>	1132144081	-----I-----S-----	-----D-----G-----IP-----GTF-----I-----
	<i>Deinococcus swuensis</i>	746725649	-----I-----S-----	-----D-----V-----G-----IP-----GTF-----I-----
	<i>Deinococcus deserti</i>	502015264	-----I-----S-----	-----D-----V-----G-----IP-----TT-----I-----G-----
	<i>Deinococcus actinoscleris</i>	1011238718	-----I-----A-----	-----D-----D-----G-----IP-----TF-----II-----H-----
	<i>Deinococcus frigens</i>	657674351	-----I-----S-----	-----D-----V-----G-----IP-----M-----GTF-----I-----
	<i>Deinococcus peraridilitoris</i>	505047105	-----I-----AR-T-----	-----G-----IPS-----TF-----II-----
	<i>Deinococcus misasensis</i>	736314419	--S-VS-----RQ-----S-----	-----R-----D-----GT-----IPE-----TTF-----I-----A-----K-----
	<i>Truepera radiovictrix</i>	502943435	--S-I-----AAGLVRSKR-E-ANI-----	-----QGM-----F-----G-----HPE-----TFS-N-A-A-DRS-
	<i>Marinithermus hydrothermalis</i>	503469154	--AH-ISQ-ASLV-K-E-A-----	-----QGL-A-A-G-----NPDV-----F-H-N--T-F--NM-A--D--
	<i>Oceanithermus profundus</i>	503222856	--AS-ISQ-ASLVR-K-LE-SG-----	-----QGM-----G-----NPDV-----F-Q-N--T-F--INM-A-----
	<i>Thermus igniterrae</i>	516808786	--AS-IAQ-A-LV-K-E-V-----	-----QGL-A-A-G-----NPQV-----H-A--T-F--NL-A-----
	<i>Thermus tengchongensis</i>	740198218	--AG-IAQ-A-LV-K-E-V-----	-----QGL-A-A-G-----NPQV-----H-A--T-F--NL-A-----
	<i>Thermus scotoductus</i>	740230202	--AG-IAQ-A-LV-K-E-V-----	-----QGL-A-A-G-----SPQV-----H-A--T-F--NL-A-----
	<i>Thermus aquaticus</i>	927054606	--AG-IAQ-A-LV-K-E-V-----	-----QGL-A-A-G-----NPQV-----H-A--F--NL-A-E--
	<i>Thermus thermophilus</i>	499486770	--AS-IAQ-A-LV-K-E-VG-----	-----QGL-A-A-G-----NPQV-----H-A--T-F--NL-A-D--
	<i>Ignavibacterium album</i>	504371778	--S-IEK-AELVRE--D-SNI-----	-----DGL-----D-----QP-V-----H-M-VTFG-IM-AL-H-V-
	<i>Clostridium colicanis</i>	1008196356	--AK-IES-A-LV-DK-NG-SD-----	-----GM-----D-----NANI-----H-KM-D-FGIIM-AL--
	<i>Elusimicrobium minutum</i>	501382623	-----IEA-AGLV-DK-VT-ADI-----	-----RGM-L--V--DG-----DARV--H--H--T-FS-NM-A--D-R-
	<i>Geoglobus acetivorans</i>	851165112	--A-VEK-AGLARD--EE-KTV-----	-----GI--V--NG-----NAGV--R-----TTFGII--AL-DNQ-
	<i>Anaerolinea thermophila</i>	973085201	--T-IER-AELVRSR--E-SD-----	-----TGM--IL-----QPKR--R-----TFGINM-AL-D--
	<i>Gracilimonas tropica</i>	521071534	--ST-I-K-AQLVNDE--TE-SEV-----	-----GI--I-----NAGV-----M-TTFG-I--AL-K-R-
	<i>Rhodohalobacter halophila</i>	1060736857	--AT-I-K-AQLVSDE--T-SEI-----	-----GM--I-----NAGV-----M-QTFG-I--AL-Q-R-
	<i>Lachnospiraceae bacterium</i>	1088797531	--A-IKN-ADLV-TK--EG-TD-----	-----GM-----RHD-----NANI-----F-H--M-DTFG-IM--L--
	<i>Chloroflexi bacterium</i>	1084617322	--T-IER-AELARK--LD--TD-----	-----RGMS-IV-----QPRK-----TFGAQM-AL-E--
	<i>Levilinea saccharolytica</i>	1011525517	--T-IER-ADLVRE-R-DA-SD-----	-----KGM-----R-G-----EPHK-----P--TFG-NM-AL----

Figure S14. Partial sequence alignment of conserved region of DNA gyrase A (GyrA) protein showing a 1 amino acid insertion that is uniquely shared by all *Deinococcus* group of bacteria. This sequence alignment also contains a 2 amino acid insertion which is only specific for *Deinococcus radiodurans* and *Deinococcus wulumuqiensis*.

		27	99
	<i>Deinococcus deserti</i>	502015605	YTADDISVLEGM DAVRK R PGMVY Q GGTGIDGYHQLL TEIIDNGID ELAGFATEVHVIMHADGSATV TDDGRG
	<i>Deinococcus reticulitermitis</i>	1094409537	-N-Q-----A-----S-I-E-----
	<i>Deinococcus grandis</i>	972320201	---A-----N---I---L---A---N---
	<i>Deinococcus actinosclerus</i>	1011238675	---A-----N---I---L---A---N---
	<i>Deinococcus geothermalis</i>	499848956	---S-I-K-LE-----A-----N---
	<i>Deinococcus puniceus</i>	1177843460	---A---K-LE-----A-----N---
	<i>Deinococcus radiodurans</i>	499190011	-N-Q-----G-IQIVL-----
	<i>Deinococcus gobiensis</i>	504497181	---H-TM-----V-----RIT-----S---
	<i>Deinococcus aquatilis</i>	517840584	---A---I-K-LE-----A-----N---
	<i>Deinococcus wulumuqiensis</i>	516480581	-N-Q-----N-IEIVL---A---N---
	<i>Deinococcus ficus</i>	916700316	---A-Q-----A-T-VL---T---N---
	<i>Deinococcus swuensis</i>	746727776	---A---K-LE-----V---A---T---D-I-----N---
	<i>Deinococcus marmoris</i>	657680678	---A---K-LE-----V---A---T---D-I-----N---
	<i>Deinococcus apachensis</i>	518414744	-D-SS-I-K-LE-----V---A---T---D-I-----N---
	<i>Deinococcus maricopensis</i>	503321958	---Q-I-K-LE-----DTIQ-----I-N---
	<i>Deinococcus phoenicis</i>	736328517	-N-SS-I-K-LE-----V---A---G---D-----N---
	<i>Deinococcus proteolyticus</i>	503380341	---S-I-K-LE-----A-----N-IT-T-E-----N---
	<i>Deinococcus murrayi</i>	653253899	-D-SS-I-K-LE-----A---G---D-----N---
	<i>Deinococcus hopiensis</i>	1180559004	-D-SS-I-K-LE-----A---G---D-----N---
	<i>Deinococcus pimensis</i>	653297875	-N-SS-T-K-LE-----V---A-----T-TF-E-A---N---
	<i>Deinococcus peraridilitoris</i>	505049945	-N-SS-T-K-LE-----M---A---Y-N-T-TF---A-V---N---
	<i>Deinococcus misasensis</i>	736317881	-N-SN-R---LE---E---I-----V---A-----D-T-TL-K---VS---N---
	<i>Truepera radiovictrix</i>	502942889	---S-K-K-LEG---A---V---A---H-DT-E-VLNP---A-N---
	<i>Enterococcus faecium</i>	816126482	-D-SQ-Q---LE-----I-S-SSE-L-H-VW-V-S---V---KI---IEK-N-I-I----
	<i>Juglans regia</i>	1098851128	-GS-Q-Q-Q-L-P-----I-S-PR-L-H-VY-L-AV-AQ---SKID-L---VSI-N---
	<i>Marinithermus hydrothermalis</i>	503468403	-D-SS-K-K-LEG---A-I-A---T---S-L-AV-A---Y-N-IK-TL-----S-E-N---
	<i>Thermoleophilum album</i>	1093218931	-S-Q-T---LE-----I-S---R-L-H-IY-VV-SV-A---CD-IEIVI-P-AV---N---
	<i>Lactobacillus sharpeae</i>	938894560	-D-SQ-Q---LE-----I-S-VQ-L-H-VW-----A---TIN-VEP-N-I-----
	<i>Clostridium botulinum</i>	409742686	-DESQ-Q---LE-----I-S-SLR-L-H-VY-V-S---A---C-HIE-FI-K-N-I-V----
	<i>Clostridium butyricum</i>	940832684	-DESQ-Q---LE-----I-S-SLR-L-H-VY-V-S---A---C-HIE-FI-K-N-I-V----
	<i>Enterococcus faecium</i>	695584429	-D-SQ-Q---LE-----I-S-SSE-L-H-VW-V-S---V---KI---IEK-N-I-I----
	<i>Emiliana huxleyi</i>	551625470	-G-EQ-T---LEP-----I-S-SR-L-H-VF-VV-SV-A---W---N-TI-S-AIS-S----
	<i>bacterium F16</i>	1202073469	-SGE-K---LE---S-I-D-EA-F-H-VS-VV-S---A---YC-KIE-INE---LS-Q----
	<i>Hassallia byssoidea</i>	746979532	-S-Q-Q---LEP-----I-T-PK-L-H-VY-VV-SV-A---YC-H-E-EIN---V-----
	<i>Lactobacillus equigenens</i>	949563033	-D-SQ-Q---LE-----I-S-TVQ-L-H-VW-V---A---IN-TVE-N-I---N---
	<i>Vitrella brassicaformis</i>	873225880	---Q-T---LEP-----I-S-VT---H-VW-VV-AV-A---HCNHI-INL-T---VS-S-N---
	<i>Gossypium hirsutum</i>	1029128219	-NSEQ-Q---L-P-----I-S-PR-L-H-VY-L-AV-AQ---QID-VL-S---VSI-N---
	<i>Planktothrix agardhii</i>	653002254	-S-Q-Q---LE-----I-S-PR-L-H-VY-VV-A---A---YC-HIEIDFN-N-V-----

Figure S15. Partial sequence alignment of conserved region of DNA gyrase subunit B (GyrB) protein showing a 1 amino acid insertion that is specific for all *Deinococcus* group of bacteria.

Deinococcus radiodurans R1

Deinococcus wulumuqiensis

Deinococcus gobiensis

Deinococcus hopiensis

Deinococcus maricopiensis

Deinococcus swuensis

Deinococcus deserti

Deinococcus soli

Deinococcus geothermalis

Marinithermus hydrothermalis

Meiothermus ruber

Meiothermus silvanus

Oceanithermus profundus

Thermus sp. CCB_US3_UF1

Thermus thermophilus

Thermus scotoductus

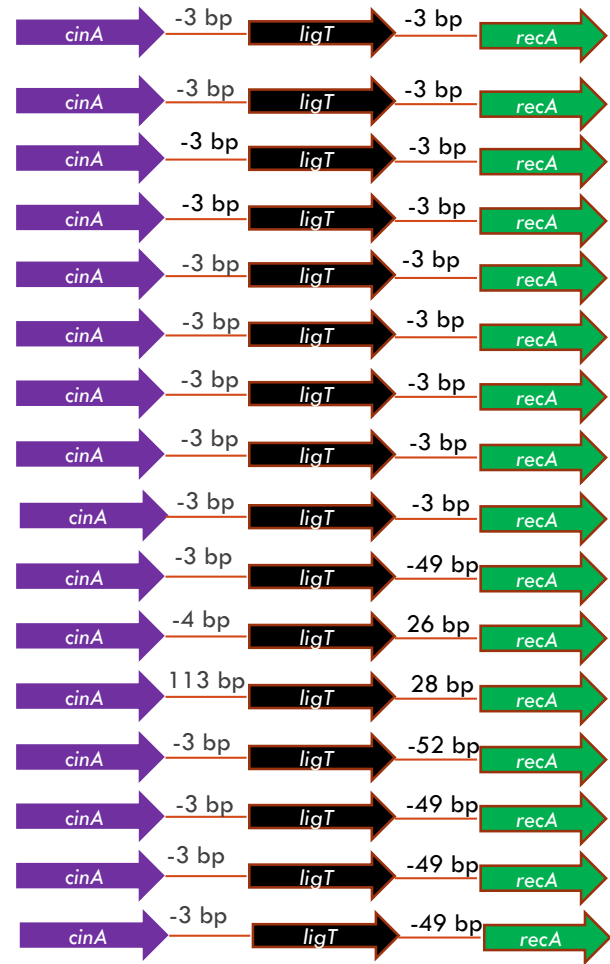


Figure S16. Diagrammatic representation of genomic neighborhood analysis result of DNA recombination protein RecA for representative *Deinococcus*-*Thermus* spp. Gene of RecA protein is present in a genetic linkage with genes of LigT and CinA proteins throughout all *Deinococcus*-*Thermus* spp. The intergenic distance among them is less than 200 bp and is present in the same direction. Genes of RecA, LigT and CinA proteins should be present in same operon among *Deinococcus*-*Thermus* phylum.

(A)

	109	CXXC	131	175	CXXC	191	197	CXXC	229
<i>Deinococcus radiodurans</i>	RLLYARVGTPY	CPIC	GRKIEKQ	FSFNSPYGAC	CGDCAGIG	SEFMRELEREEL	MELRP	CPTC	GGTRYKPEILAV
<i>Deinococcus maricopensis</i>	RLLYARVGTPY	CPIC	GRKIERQ	FSFNSPYGAC	CGDCAGLG	SEYMREKLEEL	MELQ	CPTC	GGTRYKPEILAV
<i>Deinococcus gobiensis</i>	RLLYARVGTPY	CPIC	GRKIEKQ	FSFNNPYGAC	PDCAAGLG	SDFMREKLEEL	MELRP	CPTC	GGTRYKPEILAV
<i>Deinococcus phoenicis</i>	RLLYARVGTPY	CPIC	GRKIEKQ	FSFNNPYGAC	PDCAAGLG	SEFMREKLEEL	MELRP	CPTC	GGTRYKPEILAV
<i>Deinococcus geothermalis</i>	RLLYARVGTPY	CPIC	GRKIEKQ	FSFNSPYGAC	SDCAAGLG	SDFMREKLEEL	MELRP	CPTC	GGTRYKPEILAV
<i>Deinococcus deserti</i>	RLLYARVGTPY	CPIC	GRKIEKQ	FSFNSPYGAC	CGDCAGLG	SEFMREKLEEL	MELQ	CPTC	GGTRYKPEILAV
<i>Deinococcus grandis</i>	RLLYARVGTPY	CPIC	GRKIEKQ	FSFNSPYGAC	CGDCAGLG	SDFMREKLEEL	MELQ	CPTC	GGTRYKPEILAV
<i>Mycobacterium sp.1465703.0</i>	RLLYARAGTPH	CPIC	GERIARQ	FSFNSPYGAC	PEC SGLG	SEQMKERYEG	FMRDVP	CPVC	EGTRLKPEILAV
<i>Modestobacter marinus</i>	RLLYARAGQPH	CPNCGK	PISRQ	FSFNSPFGAC	PECTGIG	SEFMKDKYEG	YMRDVP	CPVCHG	TRLKPEILAV
<i>Eggerthella lenta</i>	RLLFARVGVP	CPHCGR	VIKQ	FSFNAPYGAC	PDCLGIG	SDAQREKLAS	YFAIVP	CPTC	GGKRLKPEILAV
<i>Meiothermus timidus</i>	RLLFARVGTA	CPHCGR	PIERQ	FSFNAPYGAC	PD SGLG	SEGLREAL	EAYMTLQ	CPAC	SGTRYKKEVLSV
<i>Meiothermus cerbereus</i>	RLLFARVGTAY	CPHCGR	PIERQ	FSFNAPYGAC	PD SGLG	SESLREAL	EAYMTLK	AC	CPACGGTRYKREVLVS
<i>Meiothermus ruber</i>	RLLFARVGTAY	CPHCGR	PIERQ	FSFNAPYGAC	PD SGLG	SEGLRETLE	EAYMTLK	AC	CPACGGTRYKREVLVS
	***:*. * . ** ** . * : *	*** ** : ** *	*** ** : ** *	*** ** : ** *	*** ** : ** *	*** ** : ** *	*** ** : ** *	*** ** : ** *	*** ** : ** *

The other two CXXC motifs in this protein are shown in Figure 8

(B)

	228	CXXC	272
<i>Deinococcus radiodurans</i>	DGEGGGFQ	SHSHVYGRAGQP	CDRCGTPIEKIVLQGRGTHFC
<i>Deinococcus misasensis</i>	DGNPAYFQ	FEHMAAREGEP	CQRCQQPIAKYWLQGRGTHHCP
<i>Deinococcus peraridilitoris</i>	NGESGW	FQFRHNVYARKGKAC	CARGGTIEKIVLQGRGTHFC
<i>Deinococcus maricopensis</i>	DGLSGL	FQQGHNAYARDGEP	CARGCTTITKSVLAQGRGTHHCP
<i>Deinococcus geothermalis</i>	DGAVGF	FQGHAVYGRGTL	QGLCPRCGTPIQKMLVLAQGRGTHFC
<i>Deinococcus frigens</i>	DGVSGL	FQHEHHVYKGGQP	CPRCGTDIVKTIVLAQGRGTHFC
<i>Deinococcus deserti</i>	DGVSGL	FQSHRAYAREGQP	CERCSTIEKIVLQGRGTHFC
<i>Deinococcus soli</i> Chaetal.2016	DGLSGL	FQHAHNVYKGGEP	CPRCGTPIEKSVVAQGRGTHHCP
<i>Deinococcus gobiensis</i>	DGEQGG	FQGRHQAYGRAGQP	CARGCTPIAKIVLQGRGTHFC
<i>Deinococcus reticulitermitis</i>	DGEPGG	FQHAHRVYKAGEP	CARGCTPIQKVVLQGRGTHFC
<i>Deinococcus wulumuqiensis</i>	DGEGGG	YQTRHHAYGKTGQP	CERCCTPIEKIVLQGRGTHFC
<i>Marinithermus hydrothermalis</i> DSM	DGALGR	FQVQHKVYGRGAP	CVRCGTPIKAVVAGRGTHFC
<i>Thermus thermophile</i>	DGLPGG	FQTRHAVYGREGL	CPACGRPVERRRVAGRGTHFC
<i>Thermus scotoductus</i>	DGLPGS	FQMRHAVYGRGL	CPVCGTPIAKRVVAGRGTHFC
<i>Morganel lamorganii</i>	DGKPGY	FAQELFVYKQGECC	CANCGKIEVVKVQGRSTFFC
<i>Streptococcus parasanguinis</i> ATCC	FGEDGT	MQEEHQVYGKTGQP	CLRCGTPIEKIQLGGRGTHFC
<i>Carnobacterium pleistocenium</i>	LGEAGT	FQMKLAVYKKGIP	CIRCGTPIEKIKVAQRGTHFC
<i>Enterococcus canis</i>	LGEAGK	FQSLNVYGTGNP	CPRCGTPIQIKVAQRGTHFC
<i>Enterococcus gallinarum</i>	LGEAGH	FQVSLVYGTGNP	CVRCGTPIVTKVAQRGTHFC
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(C)

	190	CXXC	229
<i>Deinococcus radiodurans</i>	NEAVMDLGAT	ICVPKSPACDRCP	VSASHCAAYQLGQPGDFP
<i>Deinococcus deserti</i> VCD115	NEALMDLGAT	ICTPRSPRCS	DCPVSKYCAFAEGRPAAYP
<i>Deinococcus wulumuqiensis</i>	NEAVMDLGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Deinococcus hopiensis</i>	NEAVMDLGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Deinococcus geothermalis</i> DSM1130	NEALMDLGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Deinococcus phoenicis</i>	NEAVMDLGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Deinococcus apachensis</i>	NEAVMDLGAT	ICTPRAPKCGEC	CPVSAWCAALGSGEPAAFP
<i>Deinococcus aquatilis</i>	NEAVMDLGAT	ICTPRAPKCGEC	CPVSAWCAALGSGEPAAFP
<i>Deinococcus marmoris</i>	NEAVMDLGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Deinococcus swuensis</i>	NEAVMDLGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Thermus thermophilus</i>	NQALMELGAT	VCLPKRPRCGAC	PLGAFCRG--KEAPGRYP
<i>Meiothermus rufus</i>	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Meiothermus ruber</i> DSM1279	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Meiothermus taiwanensis</i>	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Meiothermus timidus</i>	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Lentisphaeria bacterium</i> TMED266	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Nitrospina gracilis</i> 3/ 211	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Rhodothermus marinus</i> SGO.5JP17-1	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Ardenicatenella maritima</i>	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Synechococcus</i> sp.PCC8807	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Geitlerinema</i> sp.PCC7105	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
<i>Truepera radiovictrix</i> DSM17093	NQALMELGAT	VCVPKSPACDRCP	VSASHCAAYRLGRPSDFP
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*Deinococcus radiodurans*R1
Deinococcus geothermalis
Deinococcus marmoris
Deinococcus puniceus
Deinococcus aquatilis
*'Deinococcus soli'*Chaetal.2014
Deinococcus reticulitermitis
Deinococcus wulumuqiensis
Deinococcus ficus
Deinococcusdeserti
Aminomonas paucivorans
Aminobacterium colombiense
Acetomicrobium thermoterrenum
Actinobacteria bacterium
Dehalococcoidia bacterium
Chloroflexi bacterium

	734		773
	CXXC		CXXC
<i>Deinococcus radiodurans</i>	CLCCGKRT---	QLQVDHIQSRYAGGTHDLNQLCL	CVCCNNLK
<i>Deinococcus frigens</i>	CLCCGGST---	RLQVDHIQPRYLGGSHDTENLQTL	CGTCNNRLK
<i>Phormidium ambiguum</i> IAMM-71	CLCCGEDS-	RNVLVIDHIIPRYHGGTHSLDNLQTL	CRKCNNLK
<i>Methanobacterium congolense</i>	CLCCGECK-	KKLLEVVDHINPRYVGGNNSIDNLQTL	CRQCNTTK
<i>Methanobacterium formicicum</i>	CLCCGEDH-	KQILEVDHVNPRYMGKKGSIDENLQTL	CIYCNTAK
<i>Methanoseta harundinacea</i>	CLCCGTGT-	RSFLQVDHIDIPRYLGGSNPNELQTL	CGCCNNKH
<i>Chondromyces crocatus</i>	CLACGSNR-	TLQVDHIIPVYHAGSHEPNLQTL	CKRCNGLK
<i>Sorangium cellulosum</i>	CLACGTR-	---NLNADHVAVVYVGGSEVGNLQTL	CROCNILK
<i>Pseudanabaena biceps</i> PCC7429	CLCCGDH---	RRLQVDHVFPFLGGQTSIDNSQTL	CMRCNGFK
<i>Desulfosporosinus</i> sp.Tol-M	CRCCGRELKGKIKLEIDHIVPMKGQST	LENLQIL	CKTCNNMEK
	*	*	*
	*	*	*

	137	CXXC		CXXC	182
<i>Deinococcus radiodurans</i> R1	SYKLLGLAGVIPQTAR	CARCG	GAPDPPE ---	HPDPLGGQLL	CSKCAALPPY
<i>Deinococcus deserti</i> VCD115	SYKLLGLAGIMVPTGAR	CARCG	GAPDPA ---	HPDPLAGQLL	CTACAALPAY
<i>Deinococcus gobiensis</i> I-O	SYKLLGLAGIVPTGAR	CARCG	GEDHPA ---	HPDPLGGQLL	CGTCAALPPY
<i>Deinococcus aquatilis</i>	GFKLLGLAGVQOTAR	CARCG	ADQPA ---	HPDPLAGQLL	CGNCASLPAY
<i>Deinococcus apachensis</i>	SYKLLGLAGFVLQOTAR	CARCG	GAPDPA ---	YPDPLGGQLL	CGNCSSLPAY
<i>Deinococcus geothermalis</i> DSM1130	SYKLLGLAGFVPTQTR	CARCG	GAAPT ---	HPDPLGGQLL	CGACASLPAY
<i>Deinococcus sphenocis</i>	SYKLLGLAGFVPTGAR	CARCG	GADTAPDA ---	HPDPLGGQLL	CVAGASLPAY
<i>Amycolatopsis pretoriensis</i>	FLRAMSYEGWAPALTE	CAR	GLPGPH ---	VAFSPVAGGSM	CGDQCRVPGSV
<i>Streptomyces</i> sp. A44	FLRAMSYAGWAPAAITE	CAR	GLPGPH ---	AAFNVAAGGSM	CGDQCRVAGSV
<i>Amycolatopsis decaplanina</i>	FLRAMSYAGWAPAAITE	CAR	GLPGPH ---	KAFSVAGGSM	CGDQCRVPGCV
<i>Herbidospora mongoliensis</i>	FLRSLAVAGYAPALTE	CARCG	GAEEV ---	RAFAIVAGGVV	CGTCRPSGAA
<i>Nocardioides dokdonensis</i> FR1436	LLRSLSVAGYAPSFQDH	CARCG	EGGPH ---	RWFNPMSGML	CGTCRLPGSA
<i>Truepera radiovictrix</i> DSM17093	GWRLLAQGGLLAPLAR	CARCG	GLEGGGRFDV	AVAGGLS	CGACASGFRV
<i>Deinococcus proteolyticus</i>	SYKLLLAGLAFQPTRM	CARCG	GAADPQ ---	HPDPFVAGGL	CGAGCSHORAL
<i>Deinococcus wulumuqiensis</i>	SYKLLGLAGIVPTQAR	CARCG	GAPEPQ ---	HPDPLGGQLL	CGKCAALPH

	23	XXXX	XXXX	109
<i>Deinococcus radiodurans</i>	KSAQRLAFHLFEQFPREDIERLASALLEAKRDLHV	CPICGFNI	TDAEKCDVCA	ADPSRDQRTICVVEEPGDVIAIERSGEYRGLYVHLHG
<i>Deinococcus wulumuqiensis</i>	KSAQRLAFHLFEQFPREDIERLASALLEAKRDLHV	CPICGFNI	TDAEKCDVCA	ADTSRDQQTICVVEEPGDVIAIERSGEYRGLYVHLHG
<i>Deinococcus frigens</i>	KSAQRLAFYLFEQFPREDIERLAGSLLSAKRDLHS	CPICGFNI	TDAEKCDVCS	DPDPDQAQIICVVEEPGDVIAIERSGEYRGLYVHLHG
<i>Deinococcus geothermalis</i> DSM1130	KSAQRLAFYLFEQFPREDIERLAGLLEAKRDLHT	CPVCGFNI	TDAEKCDVCS	DPDTRDQSVICVVEEPGDVIAIERSGEYRGLYVHLHG
<i>Deinococcus gobiensis</i> I-0	KSAQRLAFHLFEQFPREDIERLASALLAKRDLHT	CPICGFNI	TDAEKCDVCS	DPSPRDQNIIVAEVVEPGDVIAIERSGEYRGLYVHLHG
<i>Deinococcus murrayi</i>	KSAQRLAFHLFEQFPREDIERLAGALLAAKSELHT	CPVCGFNI	TDAEKCDVCS	DPSPRDQGVICVVEEPGDVIAIERSGEYRGLYVHLHG
<i>Deinococcus apachensis</i>	KSAQRLAFHLFEQFPREDIERLAGALLEAKRDLHT	CPICGFNI	TDAEKCDVCS	DPDRDNQMICVVEEPGDVIAIERSGEYRGLYVHLHG
<i>Deinococcus actinosclerulus</i>	KSAQRLAFHLFEQFPREDIERLSRALLEAKRDLHT	CPVCGFNI	TDAEKCDVCS	DPSPRDQGVICVVEEPGDVIAIERSGEYRGLYVHLHG
<i>Deinococcus grandis</i>	KSAQRLAFHLFEQFPREDIERLSRALLEAKRDLHT	CPVCGFNI	TDAEKCDVCS	DPDRDQGVICVVEEPGDVIAIERSGEYRGLYVHLHG
<i>Butyrivibrio desmolans</i>	KTAQRLAFHVLDLPKDEARFDATREAKARTFT	CKCRQNL	TDTECPIC	ADKSRDQKTCVVAEPDRIAFERTKYEKGLYVHLHG
<i>Caldanaerobius fijiensis</i> DSM1791	KTAQRLAFYLLNSPREYVESLARAMVEAKNNKLY	CSVCMNI	TDSDVCSIC	SDKSRDQKSTICVVEDPRDVMAMEKTKNYKGLYVHLHG
<i>Alkaliphilus transvaalensis</i>	KTAQRLAFHVLSLSEAEADLSSAIIASAKRVKY	CICTNL	TDMDTCSIC	KKSRDASSICVVEEDPRDVMAMEKTRFGFVYVHLHG
<i>Defluviitalea phaphyphila</i>	KTAQRLAFHIIIMPNDENLNSATMEAKNNIKY	CSKCTGL	TDKEKCDICS	DPKPRDKHTIMVVEDPRDLVAYEKTKEKGLYVHLHG
<i>Thermoanaerobacterium thermosac</i>	KTAQRLAFYILMDPKDDVNLNSALTEAKNNLK	CNIOYNT	DSDLNCSIC	DETRDSITCVVSDPKDVMAMEKTRREYKGLYVHLHG
<i>Caldanaerobacter subterraneus</i>	KTAQRLAFFIINMPLDEVRSLSOATIEAEKELRY	CKGIFNI	ADKEVCDICS	SDENRHDSTICVSSHMPDVMVAMEKTRKEYGYYVHLHG
<i>Thermoanaerobacter kivui</i>	KTAQRLAFFIINMPLLEVKLSQATIEAEKIRHY	CKICGFNI	TDTEINCSIC	SDKRDHSLICVSSHMPDVMVAMEKTRKEYGYYVHLHG
<i>Ruminococcus callidus</i> ATCC27760	KSAQRLAYSIISRPEDVERFANALLSAKRDTHY	CPQCNL	TEMLCSVC	ADEERDHSICVVESPKDVALTERTGEYTGYYVHLHG
<i>Truepera radiovictrix</i> DSM17093	KSAQRLAFYLFNQPEEDVKSLAEALLNAKNLRQ	CERCGFNI	TDQEVCSVC	DRPGEQGLICVVEAPADLLAIERSGEYSLYVHLHG

(H)

<i>Deinococcus radiodurans</i>	395	CXXC	442
<i>Deinococcus wulumuqiensis</i>	SEPCGN	CDVCLNPPRVRLTREAQMALSA	IRTGNRFGAAHLTDVLLG
<i>Deinococcus actinosclerus</i>	PGPCGN	CDLCHTPPQVRDLTREAQMALSA	AIRTGNRFGAAHLTDVLLG
<i>Deinococcus deserti</i> VCD115	HGPCGN	CDTCLNPPQVRDMTREAQMALSA	AIRTGNRFGAAHLTDVLLG
<i>Deinococcus swuensis</i>	REPCGN	CDVCLSPPRVQDATREAQMALSA	AIRTGNRFGAAHLTDVLLG
<i>Deinococcus marmoris</i>	DEPCGN	CDTCLNPPRVRDATREAQMALSA	AIRTGNRFGAAHLTDVLLG
<i>Deinococcus murrayi</i>	NEPCGN	CDTCLNPPRVRDATREAQMALSA	AIRTGNRFGAAHLTDILLG
<i>Deinococcus phenicis</i>	PHPCGN	CDVCLAPPRVRDATREAQMALSA	AIRTGNRFGAAHLTDVLLG
<i>Deinococcus apachensis</i>	AEPCGN	CDVCLNPPRVRDATREAQMALSA	AIRTGNRFGAAHLTDVLLG
<i>Rhodanobacter</i> sp. Soil772	EKPCGN	CDVCLNPPRVRDATREAQMALSA	AVYRTGNRFGAAHLTDVLLG
<i>Nitrosomonas nitrosa</i>	PGPCGH	CDNCVAPPKTDATVPAQKALSA	VYRTGQRFSGHVIDVLRG
<i>Haliea salexigens</i>	PGRCGH	CDNCLNPVDTWDATEAARMALSC	VYRTGQRFAGAGHLIDVLLG
<i>Methylococcus capsulatus</i> str.Bat	PQACGN	CDTCLNPPVTDWGTAAARMALSA	VYRTGQRFVGNHLIDVLRG
<i>Methylobacter luteus</i>	ERPCGN	CDNCLNPVQTDWDATEAARKALSC	VYRTGQRFGAHYVIDLLG
<i>Thioalkalivibrio sulfidiphilus</i>	AQPCGN	CDTCLNPPVTDWGTAAQKALSC	IVYRTGQRFVGNVYIDVLLG
<i>Sulfurifustis variabilis</i>	PEPCGN	CDTCLNPPETWDATVAAQKALSC	VHRTGQRFVGNHVDVLLG
<i>Thermithiobacillus tepidarius</i>	PRPCGN	CDTCLDPPETWDATVPAQKALSC	VHRTGQRFVGSYLDVLLG
	PAPCGN	CDTCLNPPVTDWGTAAQMALSC	VYRTGQRFVTHLIEVLQG
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(I)

<i>Deinococcus radiodurans</i>	450	CXXC	483
<i>Deinococcus grandis</i>	RMEAGLAS	YRSHLHEGEP	CPLCLQTVHEVP
<i>Deinococcus deserti</i> VCD115	RLEAGLAS	YRAHLHVGGD	CPLCGGTVTLPDAPR
<i>Deinococcus ficus</i>	RLEAGLAS	YRAHLHVGGD	CPLCGGTVRLPSAPV
<i>Deinococcus gobiensis</i>	RLEAGLAS	YRAHLHVGGD	CPLCGGTVQRLPNAPV
<i>Deinococcus geothermali</i> s DSM1130	QIDAGVA	AYRTHLVGEP	CPLCAQTVRTLPTDTP
<i>Deinococcus murrayi</i>	RLTAGL	SAYRAHLHVGE	CPLCEQTVRVLQASA
<i>Meiothermus cerbereus</i>	RARAGLA	AYRSHLHLGEP	CPLCGGAVQTLPPPAE
<i>Meiothermus ruber</i>	KLQOGL	GLYHAHLKQGE	CPLCGHPVENLPPPKP
<i>Meiothermus taiwanensis</i>	KLRQGI	AHYHPLKVGEP	CPLCGHPVAALPPAQ
<i>Thermus amyloliquefaciens</i>	KLRQGI	AHYHPLKVGEP	CPLCGHPVAALPPAQ
<i>Thermus tengchongensis</i>	ERRLGL	LAYRDLLRPGEP	CPLCGGVVHGLPPAPA
<i>Thermus arciformis</i>	ERRLGL	LAYRDLLRPGEP	CPLCGGVVHGLPPVLE
<i>Thermus oshimai</i>	ERRLGL	LAYRDLLRPGEP	CPLCGGVVHVRPERPS
	ERRQGV	LAYRDLLQVGAP	CPLCGGVVHALPEVPQ
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(J)

<i>Deinococcus radiodurans</i>	3	CXXC	CXXC	41
<i>Deinococcus wulumuqiensis</i>	KVKTN	YICNSCGYQSAKPLGRCPN	CQAWNSFEE	EVPTAS
<i>Deinococcus marmoris</i>	KLKTN	YVCTSCGYQSAKPLGRCPN	CQAWNSFEE	EVPTAS
<i>Deinococcus frigans</i>	RVTTK	YVNCNSCGYTSAPKPLGRCPN	CQAWNSFEE	EVPSVT
<i>Deinococcus deserti</i> VCD115	RVTTK	YVNCNSCGYTSAPKPLGRCPN	CQAWNSFEE	EVPSVT
<i>Truepera radiovictrix</i> DSM17093	KVRVG	YVCNSCGYQSAKPLGRCPN	CQAWNSFEE	ETPAVA
<i>Meiothermus Silvanus</i> DSM9946	KVGTT	YVCSECGTHSPVKMGRCPR	CGTWGMAAQ	APAPA
<i>Meiothermus rufus</i>	RTSTQ	YRCTACGYKSVKALGRCPN	CQAWNSFEE	APAP
<i>Meiothermus cerbereus</i>	RASAY	RCVECGYQSVKPLGRCPG	CQAWNSFEE	APAP
<i>Oceanithermus profundus</i> DSM14977	RASIQ	YRCIECGYKSVKELGRCPN	CQAWNSFEE	APAP
<i>Marinithermus hydrothermalis</i> DSM	KPKSQ	YRCVECGYRAPKSLGRCPG	CQAWNSFEE	ERSDGG
<i>Thermus filiformis</i>	MKKAD	YRCVECGYVTPKPLGRCPG	CQAWNSFEE	VPDPS
<i>Thermus scotoductus</i>	MAKAQ	YRCVECGYRTPKPLGRCPG	CQAWNSFEE	APSP
<i>Lachnospiraceae bacterium</i> JC7	MAKTS	YTCVECGYRTPKPLGRCPG	CQAWNSFEE	VPSP
<i>Oribacterium</i> sp.C9	KITSK	FFCKECGYESAKWLGQC	PGCRAWNSFEE	VPVAGT
<i>Butyrivibrio</i> sp.WCD2001	KIKTV	FFCQSCGYESAKWLGQC	PGCRAWNSFEE	VPVAGT
<i>Lachnospiraceae bacterium</i> P6A3	KQTSV	YFCQSCGYESAKWLGQC	PGCHEWNTFEE	VPVKA
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(K)

Deinococcus radiodurans	388	CXXC	447
Deinococcus deserti VCD115	IPQIMRVLPDKRPDAAPFEFP	THCPVGGHEAVRAEGDANTYCPNPACPAQSFERIRYFV	
Deinococcus aquatilis	IPQIMRVVTEKRPEKTTTFVF	PTYPECGGHEVTRAEGDANTYCPNPACPAQRFERIRYFV	
Deinococcus geothermalis	IPQIMRVLVEKRPEGTQPYAF	PTHCPQGGHEAVRTEGDANTYCPNPACPAQQFERIRYFV	
Deinococcus grandis	IPQIMRVVLEKRPPDAAPYRF	PTHCPQGGHEVVRAEGDANTYCPNPACPAQQFERIRYFV	
Deinococcus soli Chaetal.2016	IPQIMRVLTDRRPDAQPFEP	PTHCPQGGHEVTRAEGDANTYCPNPACPSQAIFERIRYFV	
Deinococcus gobiensisI -0	IPQIMRVLPEKRPEGTVPFA	FEHCPVGGHGAARAEGDANTYCPNPACPAQNFERIRYFV	
Deinococcus reticulitermitis	IPQIMRVLDKRPEGAEPFAFP	THCPVGGHEATRAEGDANTYCPNPACPAQRFERIRYFV	
Deinococcus wulumuqiensis	IPQIMGVVLDRRPDAAPFEFP	THCPVGGHVAVRAEGDANTYCPNPACPAQSFERIRYFV	
Truepera radiovictrix DSM17093	IPEVIRVLTEARTAELPPYVF	PETCPACGEALIE--DGANVRCVNLACPAQVLARLSHYA	
Meiothermus ruber H328	IPEVLRVVTAPRGH-APVEW	PTHCPQGGTALIE--SGKIHLCNPPLCPAKAFEAIRHFA	
Meiothermus cerbereus	IPEVLRVVTAPRGH-EPVEW	PSHCPQGGVELLL--SGKIHLCNPPLCPAKAFESIRHFA	
Oceanithermus profundus DSM14977	IPEILRVIKEKRTGKEEPIVF	PYHCPQGGANLVE--DGKIHRCNPPLCPAKAFQQLRHWA	
Marinithermus hydrothermalis DSM	IPEVLRVLKEERTGTERTPLV	FPDACPACGHALVL--EGKIHRCNPPLCPAQAFERIRHYA	
Thermus filiformis	IPEVLRVLKEERTGKERPIRW	PEACPECGHRLVK--EGKVHRCNPPLCPAKRFEAIRHYA	
Thermus igniterrae	IPEVLRVLKEERTGEERPIRW	PERCPQGGFRLVQ--EGKVHRCNPPLCPAKRFEAIRHYA	
Thermus oshimai JL-2	IPEVLRVLKEERTGAERPIRW	PETCPQGGHALVK--EGKVHRCNPPLCPAKRFEAIRHYA	
Thermus scotoductus	IPEVLRVLKEKRTGEERPIRW	PETCPQGGHRLVK--EGKVHRCNPPLCPAKRFEAIRHYA	
Thermus thermophiles JL-18	IPEILRVLKEERTGEERPVRW	PETCPQGGHRLVK--EGKVHRCNPPLCPAKRFEAIRHFA	
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(L)

Deinococcus radiodurans	58	CXXC	115
Deinococcus swuensis	MTANCTG-PAPKP	CGECESCLAVRAGSHPDVMEIDAASNNVDDVVDLREKVGLAAMRG	
Deinococcus frigens	MTANCTG-PAPKP	CGECDSCLSVRAGSHPDVMEIDAASNNVDDVVDLRELVLGAAMRG	
Deinococcus geothermalis DSM1130	MTANCTG-PAPKP	CGECESCLSVRAGSHPDVMEIDAASNNVDDVVDLRELVLGAAMRG	
Deinococcus sp.Leaf326	MTANCTG-PSPKP	CGECESCLAVRNGSHPDVLEIDAASNNVDDVVDLREKVGLAAMRG	
Deinococcus reticulitermitis	MTANCQS-EGPKP	CGECESCLAVRAGSHPDVMEIDAASNNVDDVVDLREKVGLAAMRG	
Deinococcus puniceus	MTANCSA-PGPKP	CGECESCLSVRAGSHPDVLEIDAASNNVDDVVDLREKVGLAAMRG	
Deinococcus deserti VCD115	MTANCTG-PLPKP	CGECESCLSVRSGNHPDVLEIDAASNNVDDVVDLREKVGLAAMRG	
Oceanithermus profundus DSM14977	MTANCSG-PLPKP	CGECESCLSVRAGSHPDVLEIDAASNNVDDVVDLREKVS LAAMRG	
Truepera radiovictrix DSM17093	MSVGCAAEPENRP	CGECENCRMVREDRHPDVVEIDAASNNVDDVVDLREKVG LAAMRG	
	MAVNCEG-E-DRP	CGACESCLLVRRGAHPDVTEIDAASNNVDDVVDLREKVG LAAMRG	
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Figure S17. Sequence alignment showing the presence of CXXC motifs (highlighted) in different DNA Repair proteins. (A) UvrA protein; (B) MutM protein; (C) MutY protein; (D) Nth protein; (E) Rad25 protein; (F) RecO protein; (G) RecR protein; (H) RecQ protein; (I) SbcC protein; (J) RadA protein; (K) LigA protein; (L) DnaX