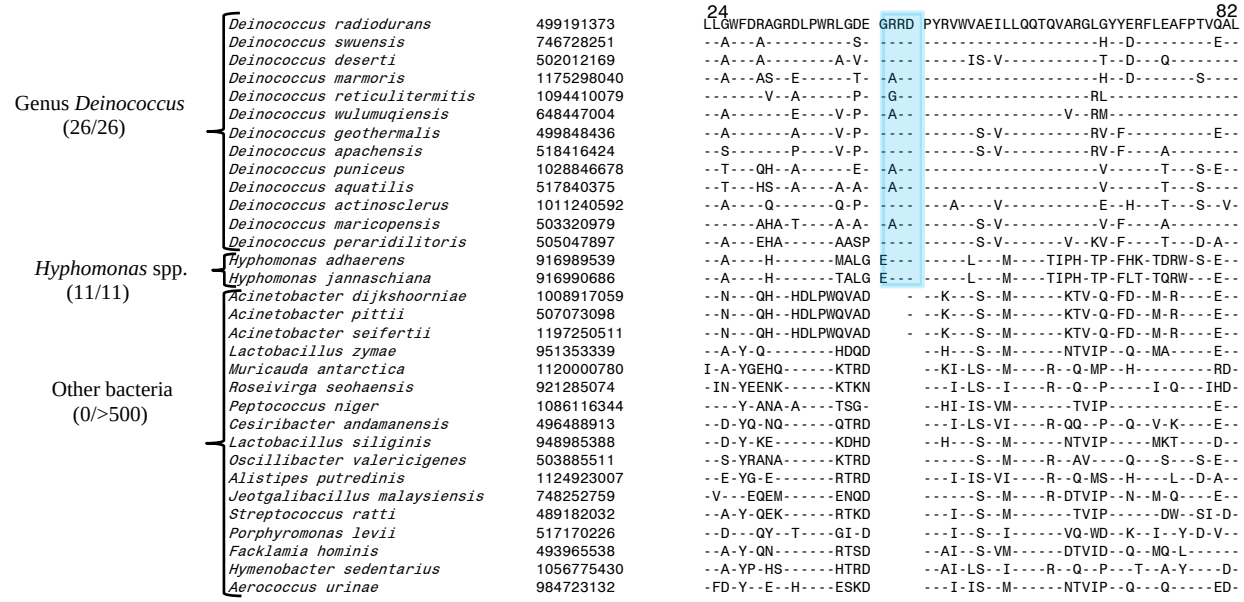

Figure S1. Partial sequence alignment of conserved region of 8-oxoguanine DNA glycosylase (MutY) protein showing a 4 amino acid insertion that is a distinctive characteristic from homologs of *Deinococcus* group of bacteria. This insert is also shared by *Hyphomonas* spp. and it has likely occurred independent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

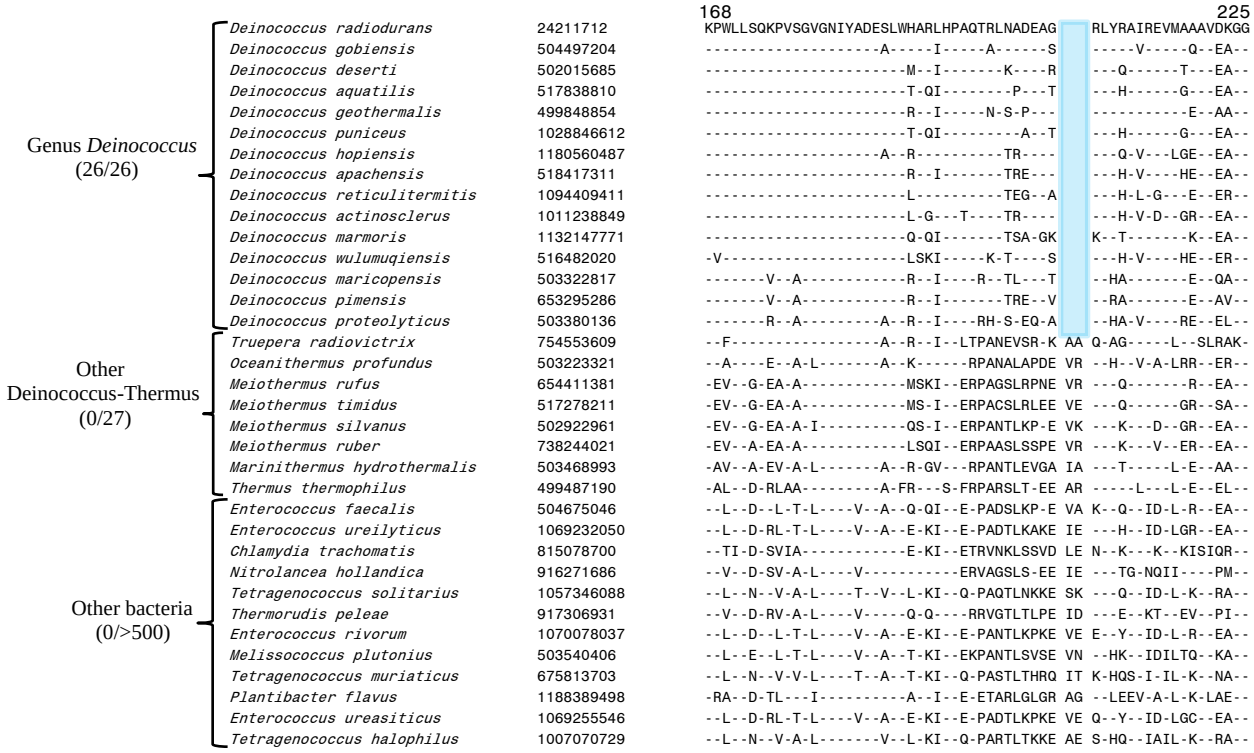

Figure S2. Partial sequence alignment of conserved region of formamidopyrimidine and 8-oxoguanine DNA glycosylase (MutM) protein showing a 2 amino acid deletion that is a distinctive molecular characteristics of *Deinococcus* spp.

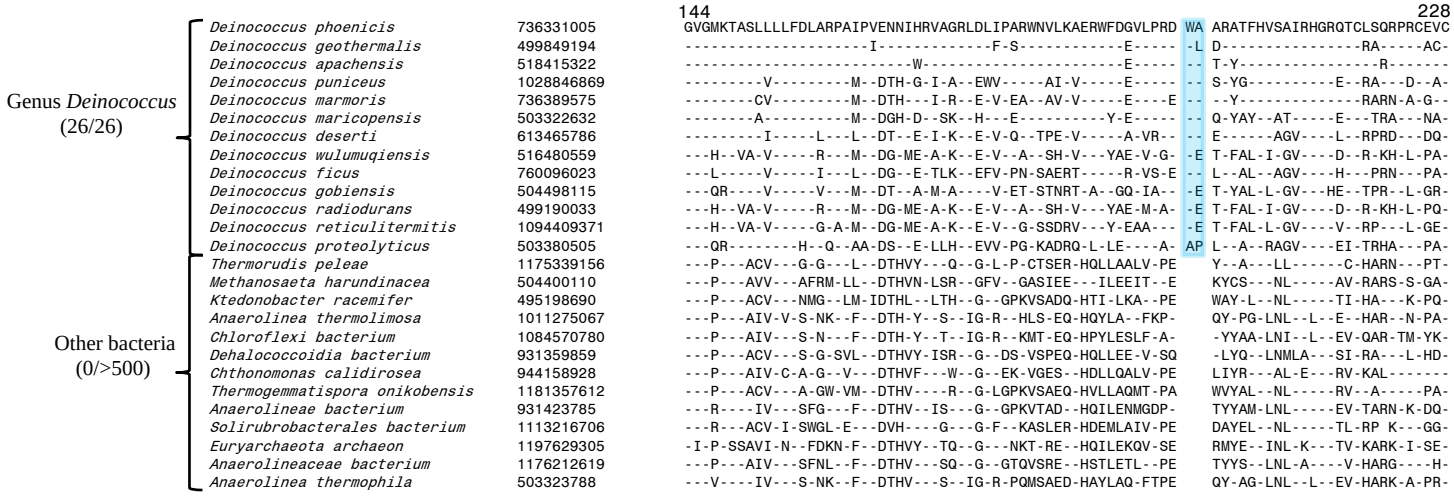

Figure S3. Partial sequence alignment of conserved region of Endonuclease III (Nth) protein showing a 2 amino acid insertion that is specific for all *Deinococcus* group of bacteria.

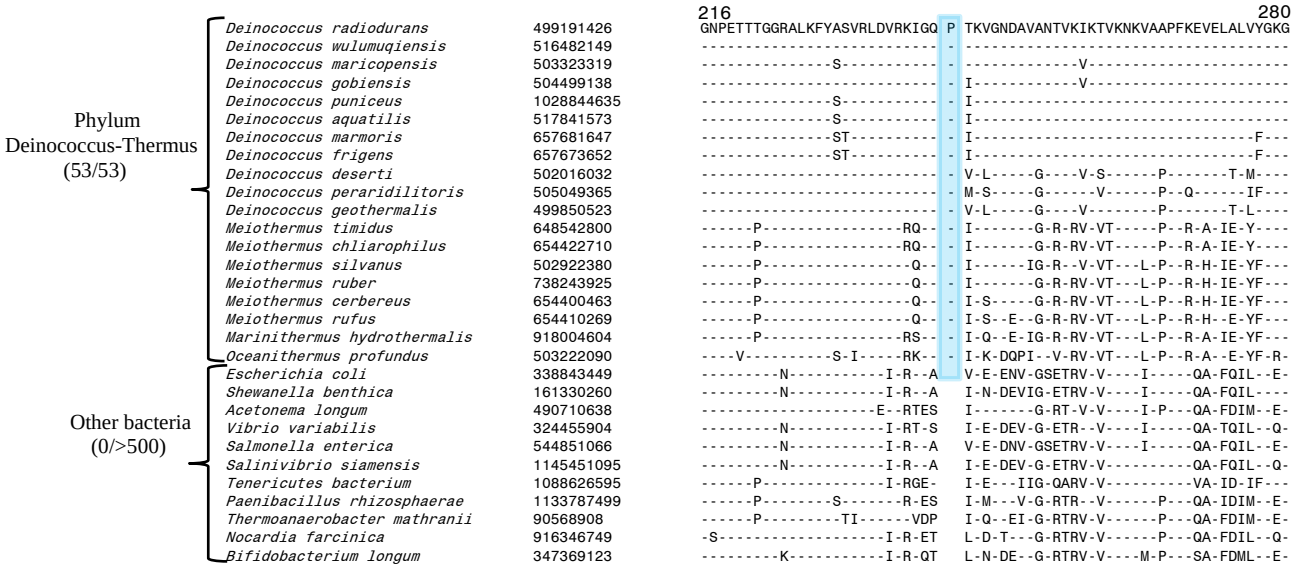

Figure S4. Partial sequence alignment of conserved region of DNA recombination protein RecA showing a 1 amino acid insertion that is specific for all bacteria of Deinococcus-Thermus phylum.

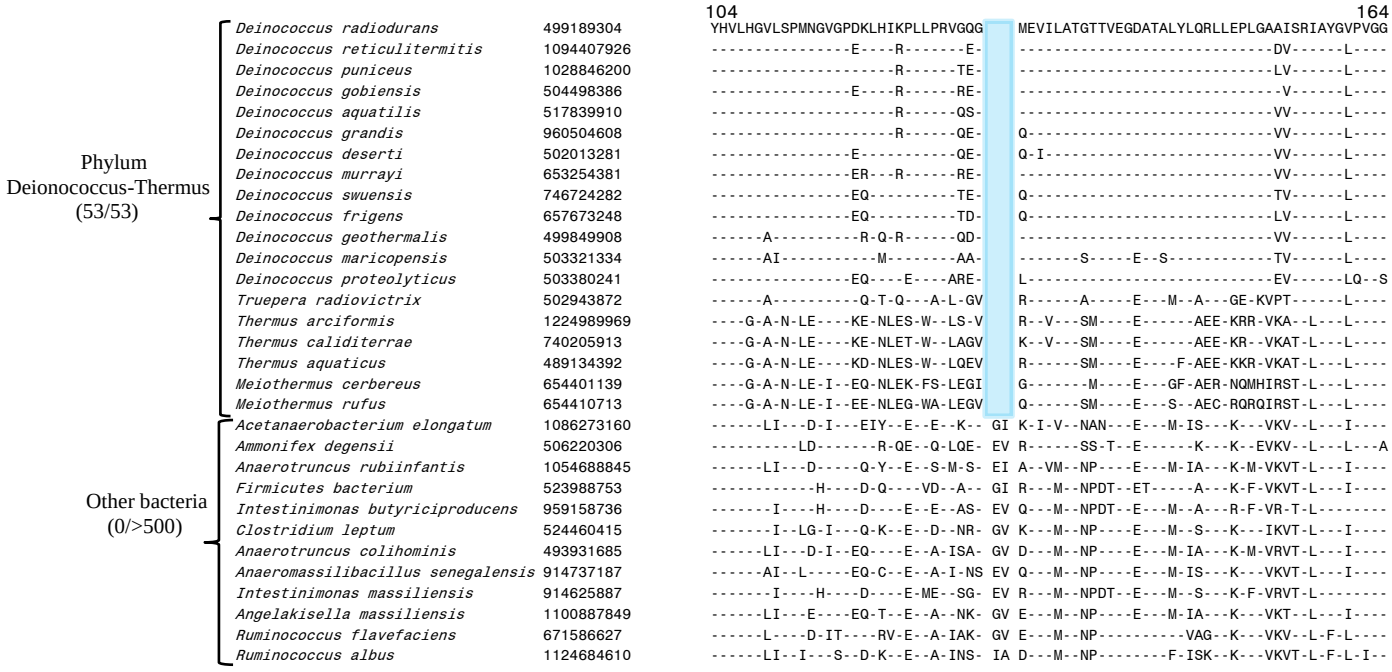

Figure S5. Partial sequence alignment of conserved region of DNA helicase recombination protein RecR showing a 2 amino acid deletion that is a distinctive molecular characteristic of the phylum Deinococcus-Thermus.

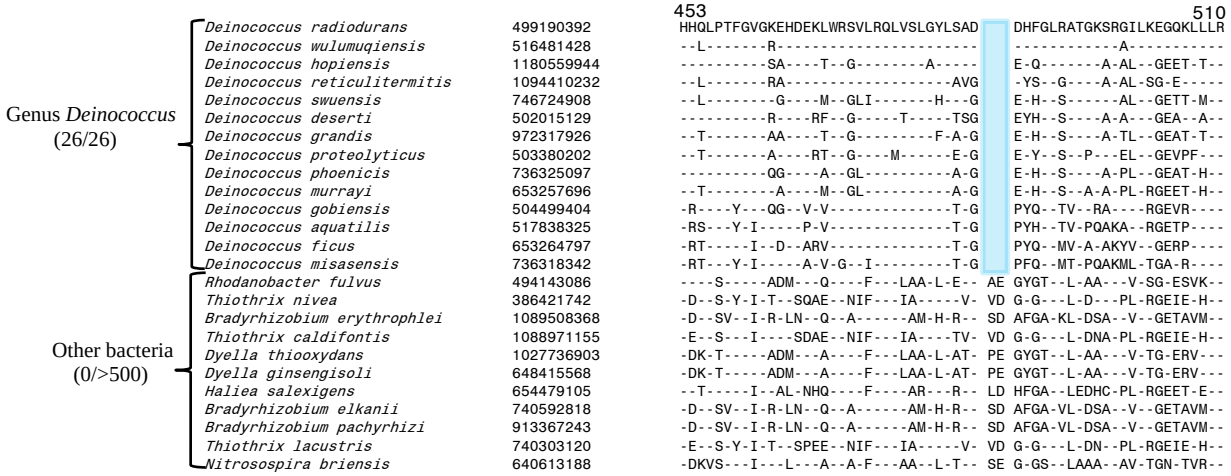

Figure S6. Partial sequence alignment of conserved region of DNA helicase RecQ protein showing a 2 amino acid deletion that is uniquely shared by all *Deinococcus* group of bacteria.

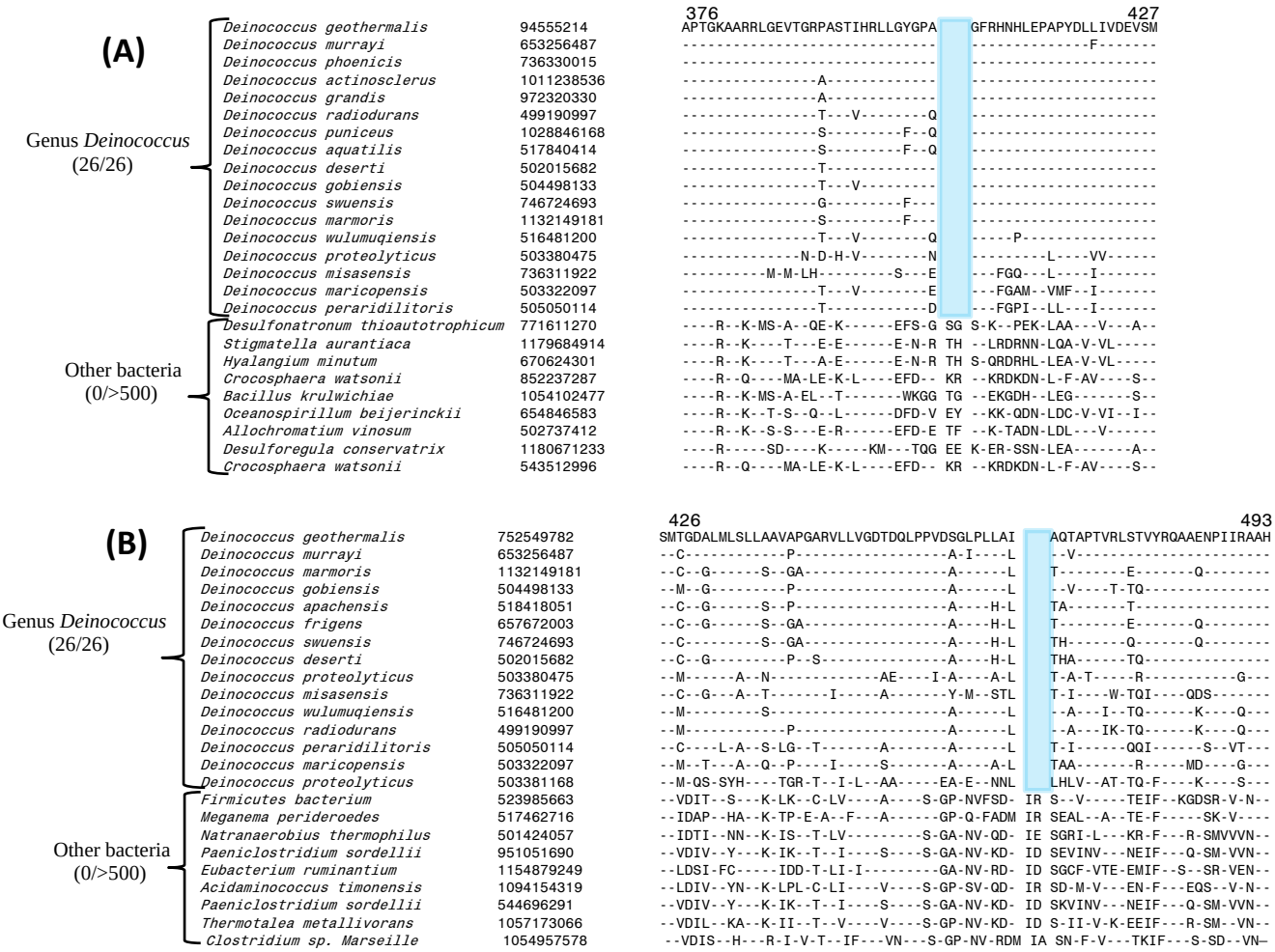

Figure S7. Partial sequence alignments of two conserved regions of helicase RecD protein showing two 2 amino acid deletions that are specific for all *Deinococcus* group of bacteria.

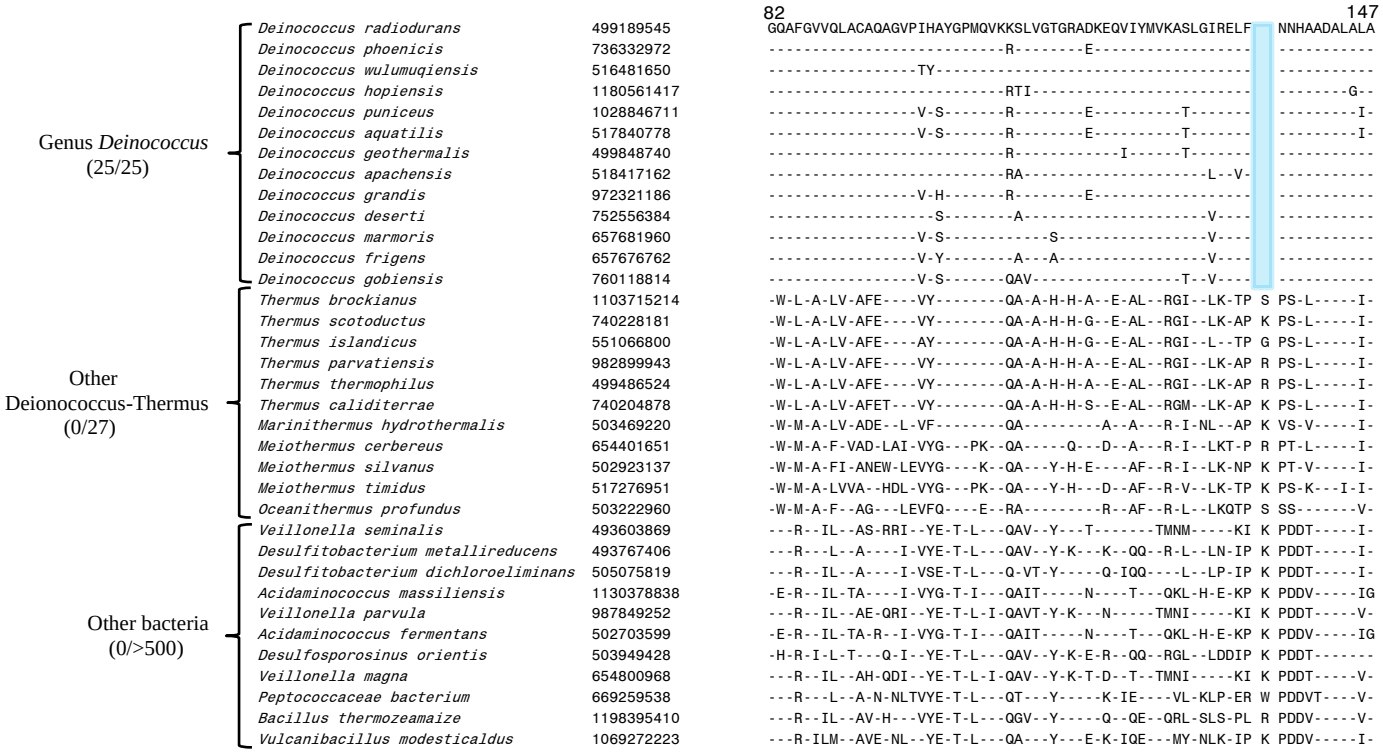

Figure S8. Partial sequence alignment of conserved region of crossover junction endodeoxyribonuclease RuvC protein showing a 2 amino acid deletion that is a distinctive molecular characteristic of *Deinococcus* spp.

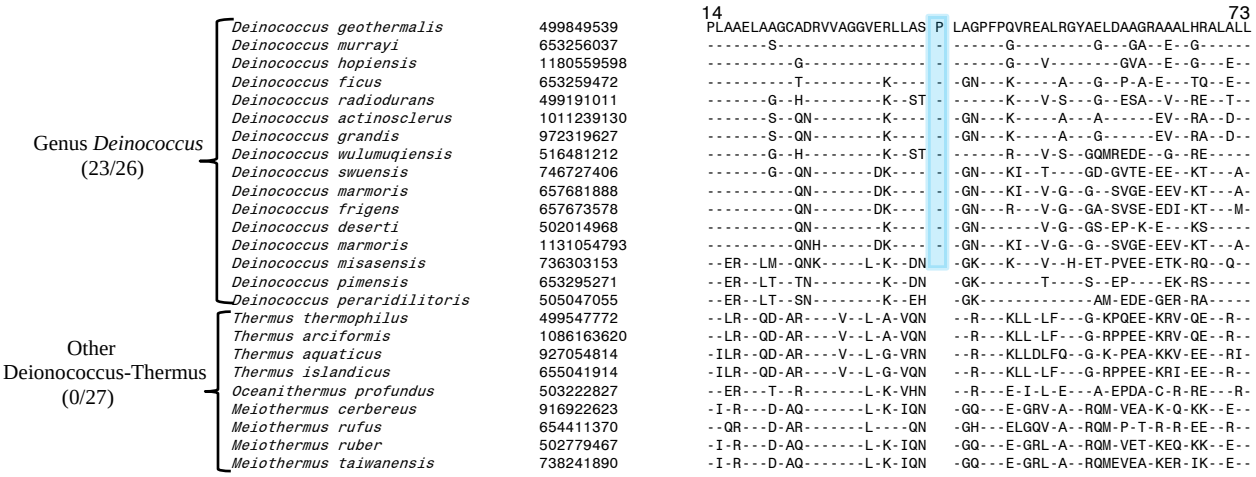

Figure S9. Partial sequence alignment of a conserved region of DNA helicase RecG protein showing a 1 amino acid insertion that is specific for the *Deinococcus* group of bacteria. Three *Deinococcus spp.* do not contain this insertion.

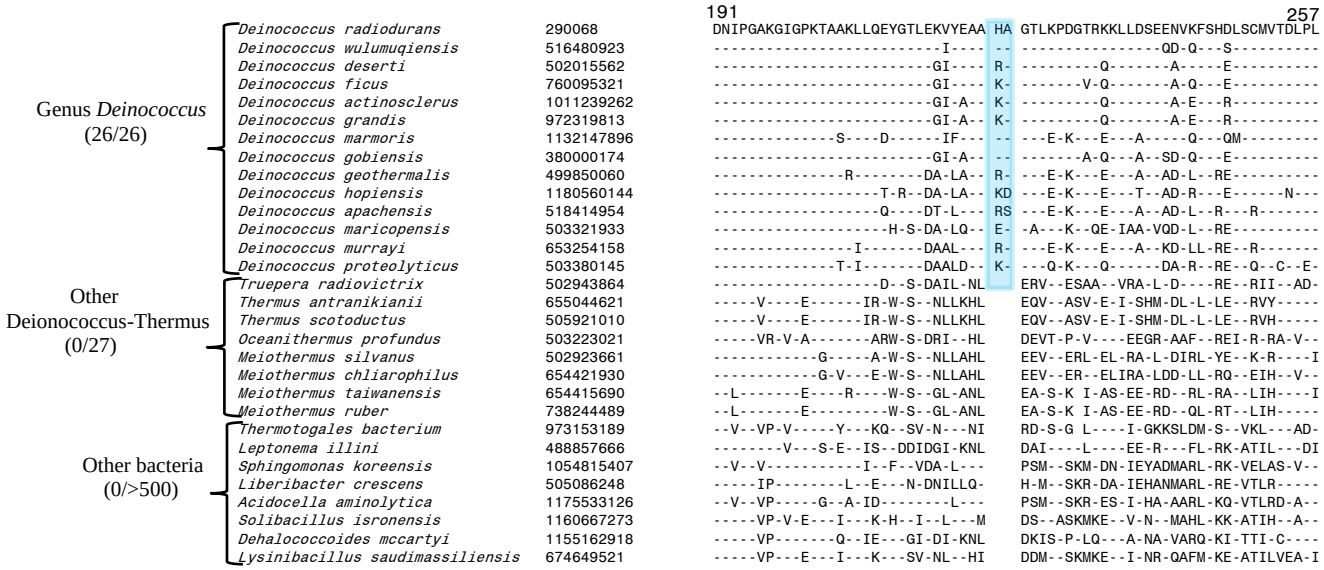

Figure S10. Partial sequence alignment of a conserved region of DNA polymerase I (PolA) protein showing a 2 amino acid insertion that is specific for all *Deinococcus* group of bacteria.

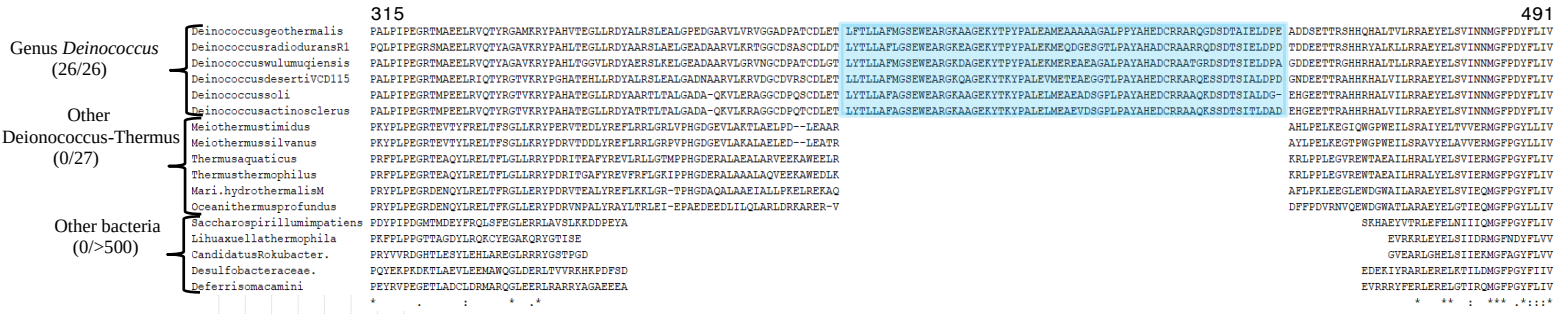

Figure S11. Partial sequence alignment of conserved region of DNA polymerase III alpha (DnaE) protein showing a 65 amino acid insertion that is uniquely shared by all *Deinococcus* group of bacteria.

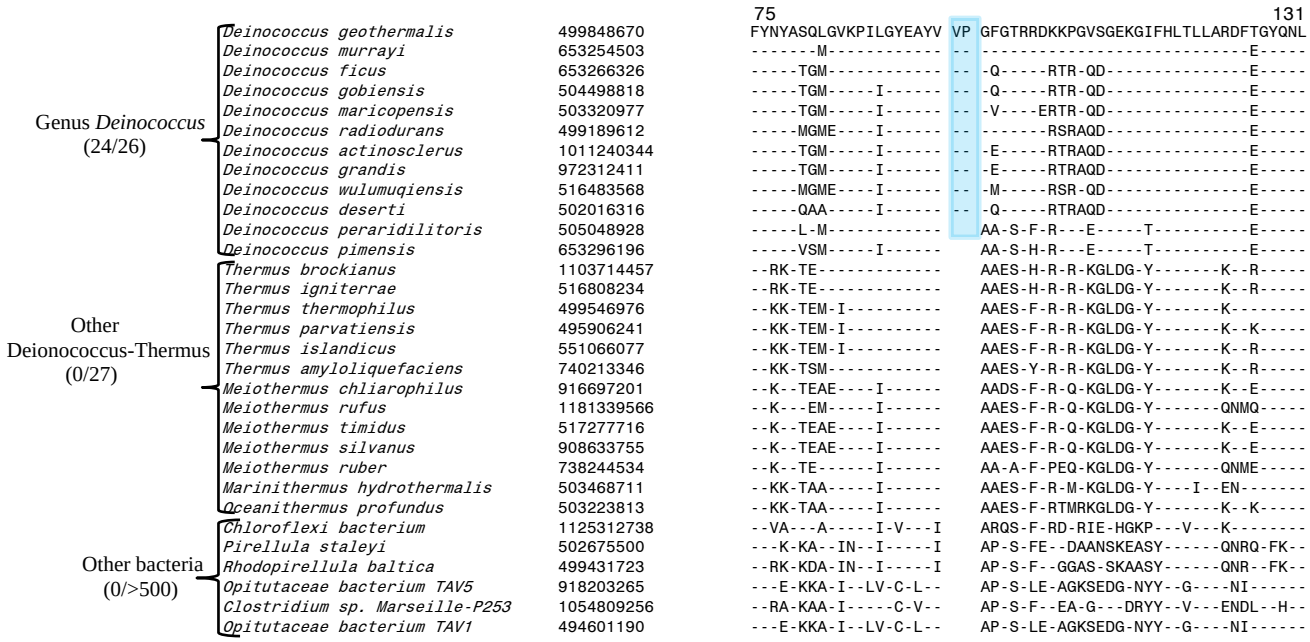

Figure S12. Partial sequence alignment of conserved region of DNA polymerase III alpha (DnaE) showing a 2 amino acid insertion that is a distinctive characteristics from homologs of *Deinococcus* group of bacteria. Two *Deinococcus* spp. do not contain this CSI.

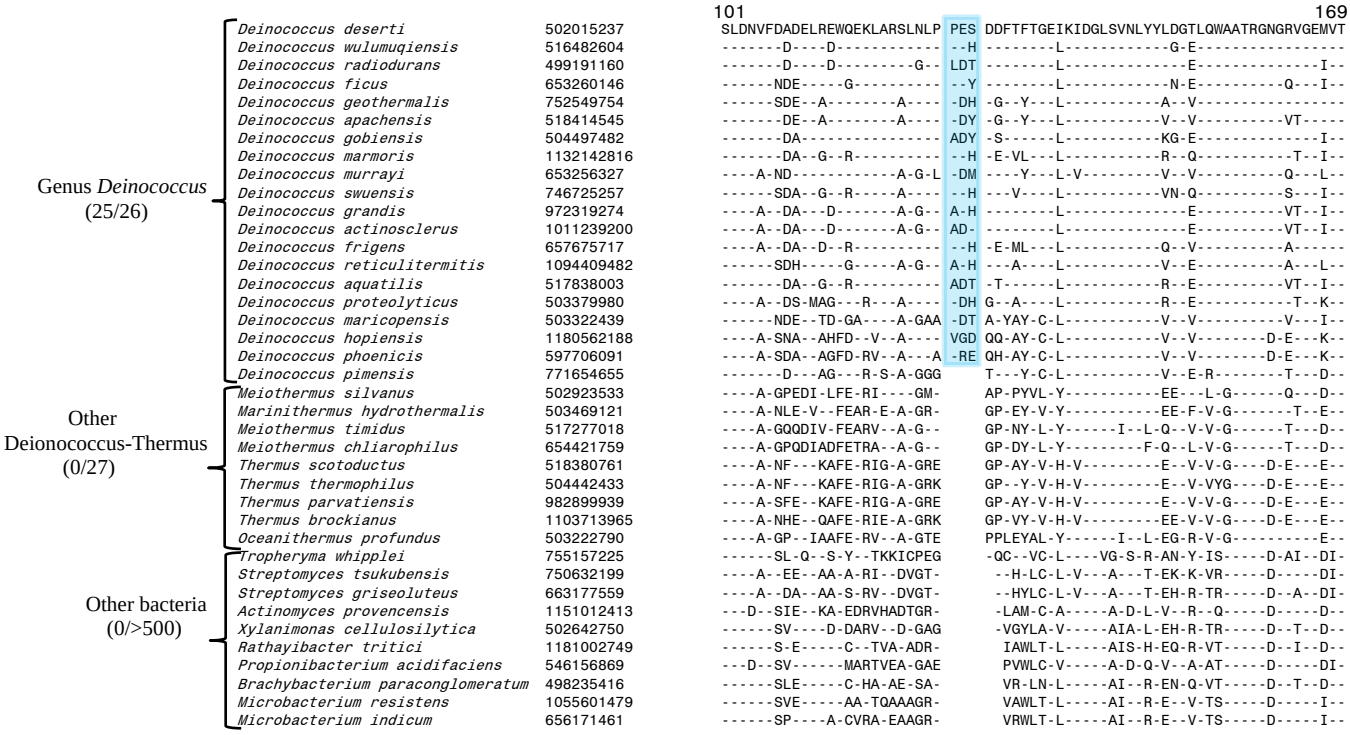

Figure S13. Partial sequence alignment of conserved region of NAD (+)-dependent DNA ligase (LigA) protein showing a 3 amino acid insertion that is uniquely shared by the *Deinococcus* group of bacteria. *Deinococcus pimensis* does not contain this insertion.

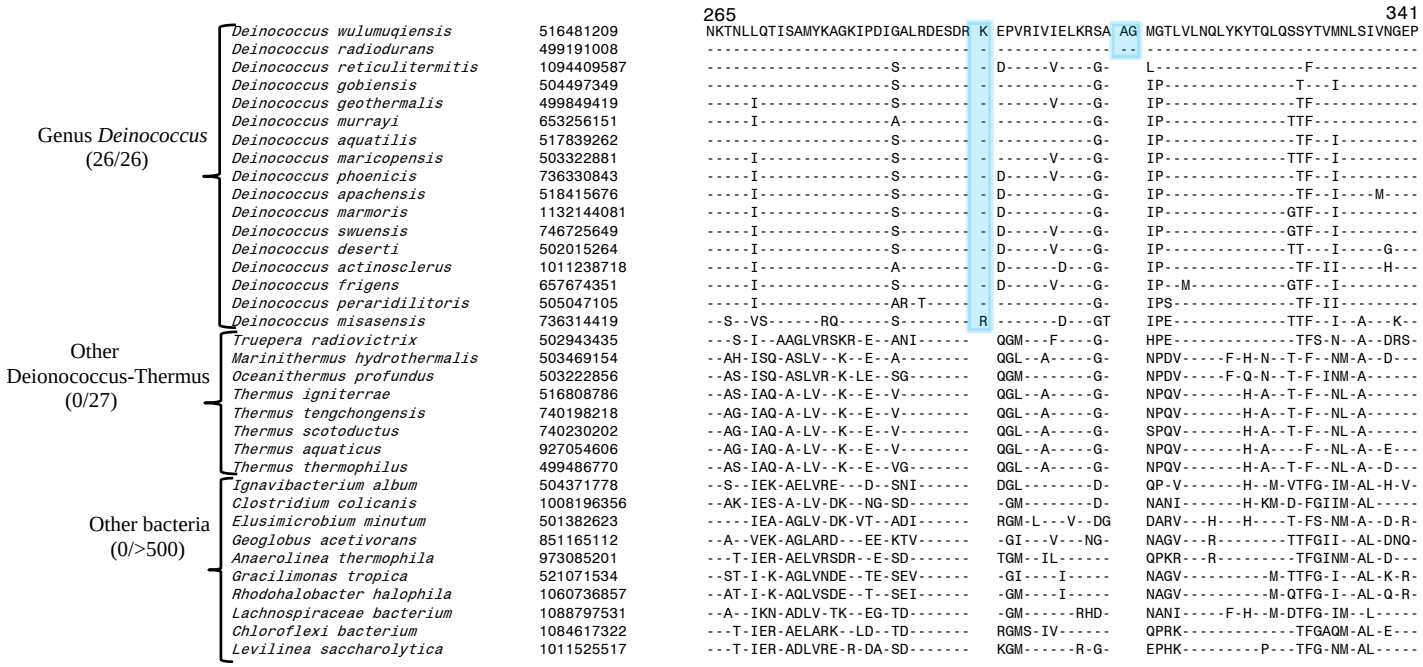

Figure S14. Partial sequence alignment of conserved region of DNA gyrase A (GyrA) protein showing a 1 amino acid insertion that is uniquely shared by all *Deinococcus* group of bacteria. This sequence alignment also contains a 2 amino acid insertion which is only specific for *Deinococcus radiodurans*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

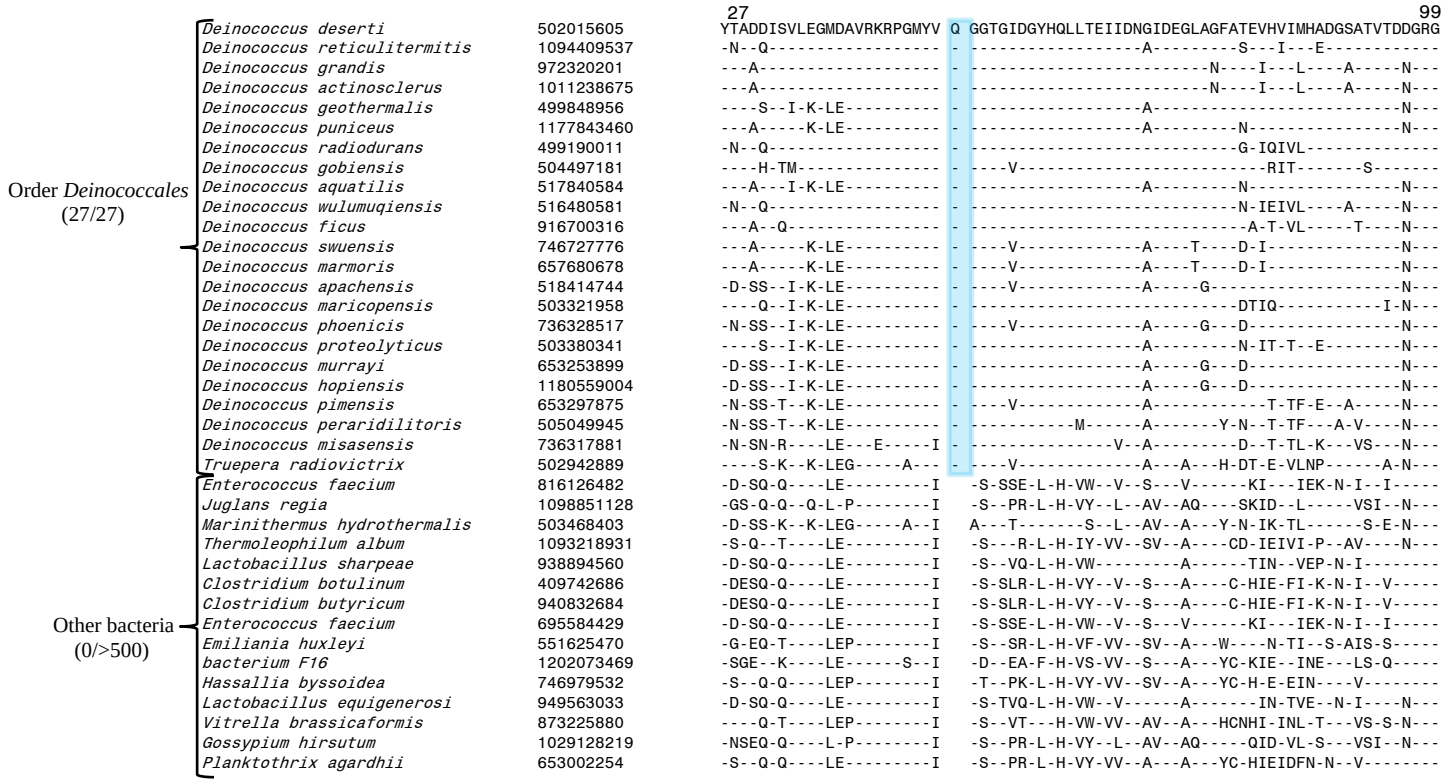

Figure S15. Partial sequence alignment of conserved region of DNA gyrase subunit B (GyrB) protein showing a 1 amino acid insertion that is specific for all *Deinococcus* group of bacteria.

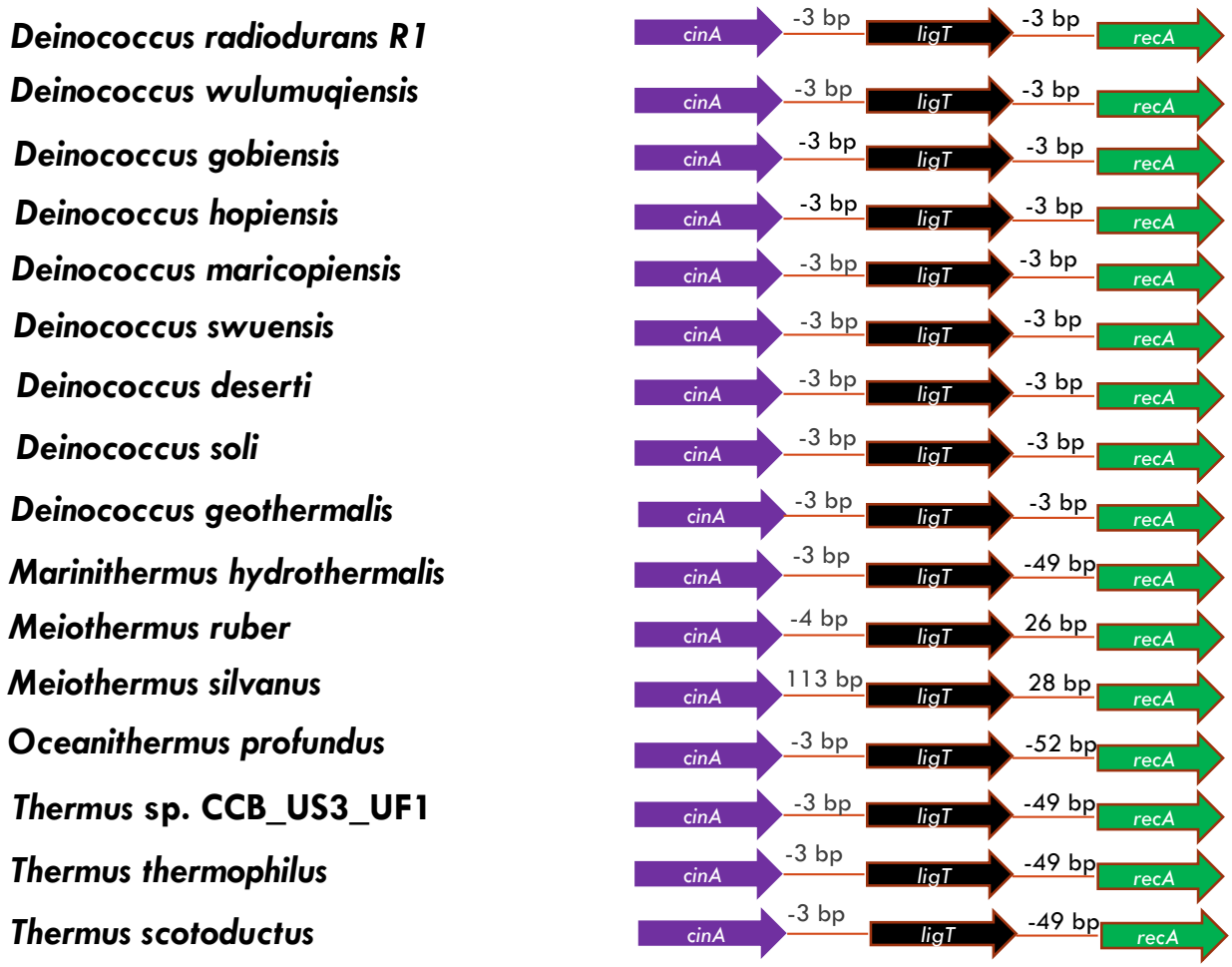

Figure S16. Diagrammatic representation of genomic neighborhood analysis result of DNA recombination protein RecA for representative Deinococcus-Thermus spp. Gene of RecA protein is present in a genetic linkage with genes of LigT and CinA proteins throughout all Deinococcus-Thermus spp. The intergenic 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)

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                                  109        CXXC    131 175      CXXC  191 197             CXXC          229
Deinococcus radiodurans           RLLYARVGTPYCPICGRKIEKQ FSFNSPYGACGDCAGIG SEFMRERLEELMELRPCPTCGGTRYKPEILAV
Deinococcus maricopensis          RLLYARVGTPYCPICGRKIERQ FSFNSPYGACGDCAGLG SEYMREKLEELMELQPCPTCGGTRYKPEILAV
Deinococcus gobiensis             RLLYARVGTPYCPICGRKIEKQ FSFNNPYGACPDCAGLG SDFMREKLEELMELRPCPTCGGTRYKPEILAV
Deinococcus phoenicis             RLLYARVGTPYCPICGRKIEKQ FSFNNPYGACPDCAGLG SEFMREKLEELMELRPCPTCGGTRYKPEILAV
Deinococcus geothermalis          RLLYARVGTPYCPICGRKIEKQ FSFNSPYGACSDCAGLG SDFMREKLEELMELRPCPTCGGTRYKPEILAV
Deinococcus deserti               RLLYARVGTPYCPVCGRKIEKQ FSFNSPYGACGDCAGLG SEFMREKLEELMELQPCPTCGGTRYKPEILAV
Deinococcus grandis               RLLYARVGTPYCPVCGRKIEKQ FSFNSPYGACGDCAGLG SDFMREKLEELMELQPCPTCGGTRYKPEILAV
Mycobacterium sp.1465703.0        RLLYARAGTPHCPICGERIARQ FSFNSPYGACPECSGLG SEQMKERYEGFMRDVPCPVCEGTRLKPEILAV
Modestobacter marinus             RLLYARAGQPHCPNCGKPISRQ FSFNSPFGACPECTGIG SEFMKDKYEGYMRDVPCPVCHGTRLKPEILAV
Eggerthella lenta                 RLLFARVGVPHCPECGRVIKKQ FSFNAPYGACPDCLGIG SDAQREKLASYFAIVPCPTCGGKRLKPEILAV
Meiothermus timidus               RLLFARVGTAFCPHCGRPIERQ FSFNAPYGACPDCSGLG SEGLREALEAYMTLQPCPACSGTRYKKEVLSV
Meiothermus cerbereus             RLLFARVGTAYCPHCGRPIERQ FSFNAPYGACPDCSGLG SESLREALEAYMTLKACPACGGTRYKREVLSV
Meiothermus ruber                 RLLFARVGTAYCPHCGRPIERQ FSFNAPYGACPDCSGLG SEGLRETLEAYMTLKACPACGGTRYKREVLSV
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The other two CXXC motifs in this protein are shown in Figure 8

(B)

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                                  228                  CXXC          CXXC 272
Deinococcus radiodurans           DGEGGGFQHSHHVYGRAGQPCDRCGTPIEKIVLGQRGTHFCPVCQ
Deinococcus misasensis            DGNPAYFQFEHMAYAREGEPCQRCQQPIAKYWLAQRGTHHCPNCQ
Deinococcus peraridilitoris       NGESGWFQFRHNVYARKGKACARCGGTIEKIVLGQRGTHFCPECQ
Deinococcusmaricopensis           DGLSGLFQQQHNAYARDGEPCARCGTTITKSVLAQRGTHHCPACQ
Deinococcus geothermalis          DGAVGFFQGQHAVYGRTGQLCPRCGTPIQKMVLAQRGTHFCPACQ
Deinococcus frigens               DGVSGLFQHEHHVYGKGGQPCPRCGTDIVKTVLAQRGTHFCPKCQ
Deinococcus deserti               DGVSGLFQFSHRAYAREGQPCERCGTSIEKIVLGQRGTHFCPQCQ
Deinococcus soliChaetal.2016      DGLSGLFQHAHNVYGKGGEPCPRCGTPIEKSVVAQRGTHHCPQCQ
Deinococcus gobiensis             DGEQGGFQGRHQAYGRAGQPCARCGTPIAKIVLGQRGTHFCPQCQ
Deinococcus reticulitermitis      DGEPGGFQHAHRVYGKAGEPCARCGTPIQKVVLGQRGTHFCPQCQ
Deinococcus wulumuqiensis         DGEGGGYQTRHHAYGKTGQPCERCGTPIEKIVLGQRGTHFCPACQ
Marinithermus hydrothermalisDSM   DGALGRFQVQHKVYGRPGAPCVRCGTPILKAVVAGRGTHFCPRCQ
Thermus thermophile               DGLPGGFQTRHAVYGREGLPCPACGRPVERRVVAGRGTHFCPTCQ
Thermus scotoductus               DGLPGSFQMRHAVYGRTGLPCPVCGTPIAKRVVAGRGTHFCPRCQ
Morganel lamorganii               DGKPGYFAQELFVYGKQGECCANCGQKIEVVKVGQRSTFFCPACQ
Streptococcus parasanguinisATCC   FGEDGTMQEEHQVYGKTGQPCLRCGTPIEKIQLGGRGTHFCPHCQ
Carnobacterium pleistocenium      LGEAGTFQMKLAVYGKKGIPCIRCGTPIEKIKVAQRGTHFCSNCQ
Enterococcus canis                LGEAGKFQLSLNVYGQTGNPCPRCGTPIQKIKVAQRGTHFCPNCQ
Enterococcus gallinarum           LGEAGHFQVSLHVYGQTGNPCVRCGTPIVKTKVAQRGTHYCPFCQ
                                   *  .       .* : *  *  *   :    :. *.*. *  **
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(C)

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                                  190          CXXC      229
Deinococcus radiodurans           NEAVMDLGATICVPKSPACDRCPVSAHCAAYQLGQPGDFP
Deinococcus deserti VCD115        NEALMDLGATICTPRSPRCSDCPVSKYCCAFAEGRPAAYP
Deinococcus wulumuqiensis         NEAVMDLGATVCVPKSPACDRCPVSAHCAAYRLGRPSDFP
Deinococcus hopiensis             NEAVMDLGATVCTPKVPKCPDCPVSLWCAAFQSGQPAAYP
Deinococcus geothermalis DSM1130  NEALMDLGATVCTPKAPQCGECPLRRWCAAFQLGDPAAFP
Deinococcus phoenicis             NEAVMDLGATVCTPKAPKCGACPVSAWCAALGSGEPAAFP
Deinococcus apachensis            NEAVMDLGATICTPRAPKCGECPVRAWCAAFASGHPAAFP
Deinococcus aquatilis             NEAVMDLGATICTPKAPRCAVCPLAAWCEARASGQPTAFP
Deinococcus marmoris              NEAVMDLGATVCTPKAPRCAECPLSAHCAAFKRGTPTAFP
Deinococcus swuensis              NEAVMDLGATVCTPRAPRCPECPLAARCAARASGTPAAFP
Thermus thermophilus              NQALMELGATVCLPKRPRCGACPLGAFCRG--KEAPGRYP
Meiothermus rufus                 NQALMELGATVCTPRKPNCPGCPLVTFCRG--QGQPERYP
Meiothermus ruber DSM1279         NQALMELGATVCTPQNPGCGGCPVAAFCQG--KASPAHYP
Meiothermus taiwanensis           NQALMELGATICTPQNPGCGGCPVAAFCRG--KASPGRYP
Meiothermus timidus               NQAMMELGATLCTPQKPACTSCPLARWCAG--QASPERYP
Lentisphaeria bacterium TMED266   NEALMELGATVCLPQNPSCDVCPLSTACQAKLLDDVSRFP
Nitrospina gracilis 3/ 211        NQSLMELGATLCLPQNPMCLLCPIVQHCEAHRQGEPEKFP
Rhodothermus marinus SG0.5JP17-1  NQALMELGATVCTPVQPRCSACPLRRACRAWAMGDPTAFP
Ardenticatena maritima            NQALMDVGAEICTPRSPRCLLCPVQTHCAAAAHQRQHDLP
Synechococcus sp.PCC8807          NQALMDLGATLCTAKTPACPRCPWQNHCTAYLKHQPTDFP
Geitlerinema sp.PCC7105           NQAFMDLGATLCTPQNPACLLCPWRESCQAYNLDLQSELP
Truepera radiovictrix DSM17093    NEALMELGALVCTARAPQCPRCPVQAHCGAYQQGAVARFP
                                  *::.*::**  *    * *  **    * .        *
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(D)

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                                    187                                                          CXXC 254
Deinococcus radioduransR1           PVDGNMERAAKRLELVPAAWNSHKVERWYAEVMPADWETRFALHISGVRHGRDTCRSKHPLCPQCPLR
Deinococcus geothermalis            PIENNIHRVAGRLDLFPSRWNVLKAERWFDEVLPRDWLDRATFHVSAIRHGRQTCRAQRPRCACCVLQ
Deinococcus marmoris                PVDTHIHRIARRLELVPEAWNAVKVERWFDEVLPREWAARYTFHVSAIRHGRQTCRARNPACGVCVLR
Deinococcus puniceus                PVDTHIGRIAARLEWVPARWNAIKVERWFDEVLPRDWASRYGFHVSAIRHGRETCRAQRPDCEACVLR
Deinococcus aquatilis               PVDTHIGRIAARLEWVPARWNAIKVERWFDEVLPRDWPSRYGFHVSAIRHGRETCRAQRPLCGECVLR
'Deinococcus soli'Chaetal.2014      PVEGNLDRLARRLEWVPDTWTGARVERWFDATVPRTTPDRLRLHVAGVRHGREVCLSRHPSCDACVLA
Deinococcus reticulitermitis        PVDGNMERAAKRLELVPAGWSSDRVERWYDEAAPRDWETRFALHLSGVRHGRVTCRPQRPLCGECVLR
Deinococcus wulumuqiensis           PVDGNMERAAKRLELVPAAWNSHKVERWYAEVVPGDWETRFALHISGVRHGRDTCRSKHPLCPACPLR
Deinococcus ficus                   PVDGNIERTLKRLEFVPPNWSAERTERWFDRVVSREWALRAALHVAGVRHGRHTCLPRNPRCPACPLL
Deinococcusd eserti                 PVDTNIERIAKRLELVPQRWTPEKVERWFDAVVRRDWAERATFHVAGVRHGRLTCRPRDPRCDQCVLR
Aminomonas paucivorans              PVDTHVARICRRLGWVPANLPPHRIQRVMEETVARER--FQGAHLNLIAHGRAVCRARSPRCPACVLV
Aminobacterium colombiense          PVDTHIHRFSKRIGWAHDRCKPEEIEGMLEQVVPEER--YLGGHINIITHGRNICLARQPRCDKCSVN
Acetomicrobium thermoterrenum       PVDTHVNRLCKRIGWVSPKSTPEETQKIMGSVIPSDL--YWSAHLDIISHGRNICVSRRPKCTICPLN
Actinobacteria bacterium            PVDTHVYRVGKRLGIIPTKASVEKAHALMDRLVPDDI--KYRLHVNLVDHGRRICVARKPKCPICCLN
Dehalococcoidia bacterium           PVDTHVYRVARRLGLVPPRVGAAEAHGLLESMLTPDE--VYPFHMSLIKHGRRICKAQRPLCPRCVLA
Chloroflexi bacterium               PVDTHVFRVARRLGLLHSKVSAEQAHEILENLIPAGQ--VYEFHLNMVEHGRKVCKAQRPRCHLCVLR
                                           *:: ::     *   *:           . .     *:  : ***  *  : * *  *
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(E)

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                                734                                      773
                                CXXC                                CXXC
Deinococcus radiodurans         CLCCGKRT----QLQVDHIQSRYAGGTHDLDNLQLLCQVCNNLK
Deinococcus frigens             CLCCGSTT----RLQVDHIQPRYLGGSHDTENLQTLCGICNRLK
Phormidium ambiguum IAMM-71     CLCCGEDS--RNVLVIDHIIPRYHGGTHSLDNLQTLCRKCNNLK
Methanobacterium congolense     CLCCGEEK--KKLLEVDHINPRYFGGNNSIDNLQTLCRYCNTTK
Methanobacterium formicicum     CLCCGEDH--KQILEVDHVNPRYMGGKDSIENLQTLCIYCNTAK
Methanosaeta harundinacea       CLCCGTTK--RSFLQVDHIDPRYLGGSNNPENLQTLCGECNNKK
Chondromyces crocatus           CLACGSNR----TLQVDHIIPVYHAGSHEPDNLQTLCKRCNGLK
Sorangium cellulosum            CLACGTTR----NLNADHVVAVYVGGSNEVGNLQTLCRQCNILK
Pseudanabaena biceps PCC7429    CLCCGDH----RRLQVDHVFPFILGGQTSIDNSQTLCMRCNGFK
Desulfosporosinus sp.Tol-M      CRCCGRELGKGIKLEIDHIVPVKMGGQTTLENLQILCKTCNMEK
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(F)

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                                    137             CXXC                    CXXC 182
Deinococcus radioduransR1           SYKLLGLAGVIPQTARCARCGAPDPE----HPDPLGGQLLCSKCAALPPY
Deinococcus deserti VCD115          SYKLLGLAGMVPQTARCARCGQPDPA----HPDPLAGQLLCATCAALPAY
Deinococcus gobiensis I-0           SYKLLGLAGIVPQTARCARCGEDHPA----HPDPLGGQLLCGTCAALPPY
Deinococcus aquatilis               GFKLLGLAGFVAQTARCARCGADQPA----HPDPLAGQLLCGNCASLPAY
Deinococcus apachensis              SYKLLGLAGFVLQTARCARCGAPDPA----YPDPLGGQLLCGNCSSLPAY
Deinococcus geothermalis DSM1130    SYKLLGLAGFVPQTGRCARCGAAAPT----HPDPLGGQLLCGACASLPAY
Deinococcu sphoenicis               SYKLLGLAGFVPQTARCARCGTADPA----HPDPLGGQLLCVACASLPAY
Amycolatopsis pretoriensis          FLRAMSYEGWAPALTECARCGLPGPH---VAFSVPAGGSMCQDCRVPGSV
Streptomyces sp.AA4                 FLRAMAYAGWAPAITECARCGLPGPH---AAFNVAAGGSMCPDCRIAGSV
Amycolatopsis decaplanina           FLRAMAYAGWAPAITECARCGLPGPH---KAFSVSAGGSMCPDCRVPGCV
Herbidospora mongoliensis           FLRSLAVAGYAPALSECARCGAEAV----RAFAIVAGGVVCGTCRPSGAA
Nocardioides dokdonensis FR1436     LLRSLSVAGYAPSFDHCARCGEQGPH---RWFNPSMGGMLCSTCRLPGSA
Truepera radiovictrix DSM17093      GWRLLAQGGLAPRLARCARCGGPLEGSGEGRFDVAAGGLSCAACASGFRV
Deinococcus proteolyticus           SYKLLALAGFPQRTRMCARCGAADPQ----HPDPFGGELLCGRCSHQRAL
Deinococcus wulumuqiensis           SYKLLGLAGVIPQTARCARCGAPEPQ----HPDPLGGQLLCGKCAALPPH
                                      : :   *       *  *               *    *  *
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(G)

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                                    23                                CXXC        CXXC                                  109
Deinococcus radiodurans             KSAQRLAFHLFEQPREDIERLASALLEAKRDLHVCPICFNITDAEKCDVCADPSRDQRTICVVEEPGDVIALERSGEYRGLYHVLHG
Deinococcus wulumuqiensis           KSAQRLAFHLFEQPREDIERLASALLEAKRDLHVCPICFNITDAEKCDVCADTSRDQQTICVVEEPGDVIAIERSGEYRGLYHVLHG
Deinococcus frigens                 KSAQRLAFYLFEQPREDIERLAGSLLSAKRDLHSCPICFNITDAERCDVCSDPARDQAIICVVEEPGDVIAIERSGEYRGLYHVLHG
Deinococcus geothermalis DSM1130    KSAQRLAFYLFEQPREDIERLAGAILEAKRDLHTCPVCFNITDAERCDVCSDPTRDQSVICVVEEPGDVIAIERSGEYRGLYHVLHG
Deinococcus gobiensis I-0           KSAQRLAFHLFEQPREDIERLASALLSAKRDLHTCPICFNITDAETCDVCSDPSRDQNLIAVVEEPGDVIAIERSGEYRGLYHVLHG
Deinococcus murrayi                 KSAQRLAFHLFEQPREDIERLAGALLAAKSELHTCPVCFNITDAERCDVCSDPSRDQGVICVVEEPGDVIAIERSGEYRGLYHVLHG
Deinococcus apachensis              KSAQRLAFHLFEQPREDIERLAGALLEAKRDLHTCPICFNITDAERCDVCSDPSRDQNMICVVEEPGDVIAIERSGEYRGLYHVLHG
Deinococcus actinosclerus           KSAQRLAFHLFEQPREDIERLSRALLEAKRDLHTCPVCFNITDAERCDVCSDPSRDQGVICVVEEPGDVIAIERSGEYRGLYHVLHG
Deinococcus grandis                 KSAQRLAFHLFEQPREDIERLSRALLEAKRDLHTCPVCFNITDAERCDVCSDPSRDQGVICVVEEPGDVIAIERSGEYRGLYHVLHG
Butyricicoccus desmolans            KTAQRLAFHVLDLPKEDAERFADAIREAKARTFTCKRCQNLTDTETCPICADKSRDQKTICVVAEPRDVIAFERTKEYKGLYHVLHG
Cald anaerobius fijiensis DSM1791   KTAQRLAFYLLNSPREYVESLARAMVEAKNKLKYCSVCMNITDSDVCSICSDPVRDKSTICVVEDPRDVVAMEKTKNYKGLYHVLHG
Alkaliphilus transvaalensis         KTAQRLAFHVISLSQEEADQLSSAIISAKRNVKYCEICTNLTDMDTCSICKDKSRDASSICVVEDPRDVVAMEKTKEFRGFYHVLHG
Defluviitalea phaphyphila           KTAQRLAFHIINMPDENVENLSSAIMEAKKNIKYCSICCTLTDKEKCDICSDPKRDHKTIMVVEDPRDLVAYEKTKEYKGLYHVLHG
Thermoanaerobacterium thermosac     KTAQRLAFYILDMPKDDVINLSNAILEAKNNLKYCNKCYNFTDSDLCNICSDETRDSSTICVVSDPKDVVAMEKTREYRGLYHVLHG
Caldanaerobacter subterraneus       KTAQRLAFFIINMPLDEVRSLSQAIIEAKEKLRYCKICFNIADKEVCDICSDENRDHSTICVVSHPMDVVAMEKVKEYKGVYHVLHG
Thermoanaerobacter kivui            KTAQRLAFFIINMPLEEVKSLSQAIIEAKEKIRYCKICYNITDTEICNICSDKERDHSLICVVSHPMDVVAMEKTREYKGVYHVLHG
Ruminococcus callidus ATCC27760     KSAQRLAYSIISRPEEDVERFANALLSAKRDIHYCPCCQNLTEMELCSVCADEERDHSLICVVESPKDVTALERTGEYTGVYHVLHG
Truepera radiovictrix DSM17093      KSAQRLAFYLFNQPEEDVKSLAEALLNAKGNLRQCERCFNITDQEVCSVCRDPGREQGLICVVEAPADLLAIERSGEYSGLYHVLHG
                                    *:*****: ::.   :    :: ::  **     *  * .::: : * :* *  *:   * **  * *: * *:  :: *.******
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(H)

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                                                395   CXXC                                  442
Deinococcus radiodurans                         SEPCGNCDVCLNPPRVRDLTREAQMALSATIRTGNRFGAAHLTDVLLG
Deinococcus wulumuqiensis                       PGPCGNCDLCHTPPQVRDLTREAQMALSAAIRTGNRFGAAHLTDVLLG
Deinococcus actinosclerus                       HGPCGNCDTCLNPPQVRDMTREAQMALSAAIRTGNRFGAAHLTDVLLG
Deinococcus deserti VCD115                      REPCGNCDVCLSPPRVQDATREAQMALSAAIRTGNRFGAAHLTDVLLG
Deinococcus swuensis                            DEPCGNCDICLNPPRVRDATREAQMALSAAIRTGNRFGAAHLTDVLLG
Deinococcus marmoris                            NEPCGNCDICLNPPRVRDATREAQMALSAAIRTGNRFGAAHLTDILLG
Deinococcus murrayi                             PHPCGNCDVCLAPPRVRDATREAQMALSAAIRTGNRFGAAHLTDVLLG
Deinococcus phoenicis                           AEPCGNCDVCLNPPRVRDATREAQMALSAAIRTGNRFGAAHLTDVLLG
Deinococcus apachensis                          EKPCGNCDVCLNPPRVRDATREAQMALSAAVRTGNRFGAAHLTDVLLG
Rhodanobacter sp. Soil772                       PGPCGHCDNCVAPPKTWDATVPAQKALSAVYRTGQRFGSGHVIDVLRG
Nitrosomonas nitrosa                            PGRCGQCDNCLNPVDTWDATEAARMALSCVYRTGQRFGAGHLIDVLLG
Haliea salexigens                               PQACGNCDTCLEPVPTWDGTEAARMALSAVYRTGQRFGVNHLIDVLRG
Methylococcus capsulatusstr.Bat                 ERPCGNCDNCLNPVQTWDATEAARKALSCVYRSGQRFGAHYVIDLLLG
Methylobacter luteus                            AQPCGNCDTCLEPVVTWDGTLAAQQALSCIYRTEQRFGVNYLIDVLLG
Thioalkalivibrio sulfidiphilus                  PEPCGNCDTCLEPPETWDATVAAQKALSCVHRTGQRFGVNHVLDVLLG
Sulfurifustis variabilis                        PRPCGNCDTCLDPPETWDATVPAQKALSCVHRTGQRFGVSYLVDVLLG
Thermithiobacillus tepidarius                   PAPCGNCDTCLEPVETWDGTEAAQMALSCVYRTGQRFGVTHLIEVLQG
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(I)

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                                                450                 CXXC        483
Deinococcus radiodurans                         RMEAGLASYRSHLHEGEPCPLCLQTVHEVPEGES
Deinococcus grandis                             RLEAGLASYRAHLHVGDDCPLCGQTVTVLPDAPR
Deinococcus deserti VCD115                      RLEAGLASHRAHLHVGDDCPLCGQTVRQLPSAPV
Deinococcus ficus                               RLEAGLASHRAHLHVGDDCPLCGQTVQRLPNAPV
Deinococcus gobiensis                           QIDAGVAAYRTHLHVGEPCPLCAQTVRTLPDTPP
Deinococcus geothermalis DSM1130                RLTAGLSAYRAHLHVGEPCPLCEQTVRVLPQASA
Deinococcus murrayi                             RARAGLAAYRSHLHLGEPCPLCGGAVQTLPPPAE
Meiothermus cerbereus                           KLQQGLGLYHAHLKQGEPCPLCGHPVENLPPPKP
Meiothermus ruber                               KLRQGIAHYHPHLKVGEPCPLCGHPVAALPPAQP
Meiothermus taiwanensis                         KLRQGIAHYHPHLKVGEPCPLCGHPVAALPPAQP
Thermus amyloliquefaciens                       ERRLGLLAYRDLLRPGEPCPLCGGVVHGLPPAPA
Thermus tengchongensis                          ERRLGLLAYRDLLRLGEPCPLCGSVVHGLPPVLE
Thermus arciformis                              ERRLGLLAYHDLLRPGEPCPLCGGVVHRVPERPS
Thermus oshimai                                 ERRQGVLAYRDLLQVGAPCPLCGGVVHALPEVPQ
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(J)

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                                                3     CXXC          CXXC          41
Deinococcus radiodurans                         KVKTNYICNSCGYQSAKPLGRCPNCQAWNSFEEEVPTAS
Deinococcus wulumuqiensis                       KLKTNYVCTSCGYQSAKPLGRCPNCQAWNSFEEEVPTAS
Deinococcus marmoris                            RVTTKYVCNSCGYTSAKPLGRCPNCQAWNSFEEEVPSVT
Deinococcus frigens                             RVTTKYVCNSCGYTSAKPLGRCPNCQAWNSFEEEVPSVT
Deinococcus deserti VCD115                      KVRVGYVCNSCGYQSAKPLGRCPNCQAWNSFEEETPAVA
Truepera radiovictrix DSM17093                  KVGTTYVCSECGTHSPVKMGRCPRCGTWGSMAAQAPAPA
Meiothermus Silvanus DSM9946                    RTSTQYRCTACGYKSVKALGRCPNCGAWDSFKEEAPEAP
Meiothermus rufus                               RASAQYRCVECGYQSVKPLGRCPGCGAWESLKEVAEARP
Meiothermus cerbereus                           RASIQYRCIECGYKSVKELGRCPNCGAWDSFKEEAPPPK
Oceanithermus profundus DSM14977                KPKSQYRCVECGYRAPKSLGRCPGCGAWGSFLEERSDGG
Marinithermus hydrothermalis DSM                MKKADYRCVECGYVTPKPLGRCPGCGAWDSFQRTVPDSP
Thermus filiformis                              MAKAQYRCVECGYRTPKPLGRCPGCGAWNSFKEEAPSPP
Thermus scotoductus                             MAKTSYTCVECGYRTPKPLGRCPACGAWESFQEVAPSPR
Lachnospiraceae bacterium JC7                   KITSKFYCKECGYESAKWLGQCPGCRAWNSFVEEPVAST
Oribacterium sp.C9                              KITSKFFCKECGYESAKWLGQCPGCRAWNSFVEEPVAGT
Butyrivibrio sp.WCD2001                         KIKTVFFCQSCGYESAKWMGQCPGCKEWNSFVEETIKPS
Lachnospiraceae bacterium P6A3                  KQTSVYFCQSCGYESAKWMGQCPGCHEWNTFVEEPVVKA
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(K)

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                                                388                CXXC                447
Deinococcus radiodurans                         IPQIMRVLPDKRPADAAPFEFPTHCPVCGHEAVRAEGDANTYCPNPACPAQSFERIRYFV
Deinococcus deserti VCD115                      IPQIMRVVTEKRPEKTTPFVFPTYCPECGHEVTRAEGDANTYCPNPACPAQRFERIRYFV
Deinococcus aquatilis                           IPQIMRVLVEKRPEGTQPYAFPTHCPQCGHEAVRTEGDANTYCPNPACPAQQFERIRYFV
Deinococcus geothermalis                        IPQIMRVVLEKRPPDAAPYRFPTHCPECGHEVVRAEGDANTYCPNPACPAQQFERLRYFV
Deinococcus grandis                             IPQIMRVLTEKRPADAQPFEFPTHCPECVHEVTRAEGDANTYCPNPACPSQAFERIRYFV
Deinococcus soli Chaetal.2016                   IPQIMRVLTDRRPDGAQPFEFPTHCPECGHEVTRAEGDANTYCPNPACPSQAFERIRYFV
Deinococcus gobiensisI -O                       IPQIMRVLPEKRPEGTVPFAFPEHCPVCGHGAVRAEGDANTYCPNPACPAQNFERIRYFV
Deinococcus reticulitermitis                    IPQIMRVILDKRPEGAEPFAFPTHCPVCGHEATRAEGDANTYCPNPACPAQRFERIRYFV
Deinococcus wulumuqiensis                       IPQIMGVVLDRRPADAAPFEFPTHCPVCGHVAVRAEGDANTYCPNPACPAQSFERLRYFV
Truepera radiovictrix DSM17093                  IPEVIRVLTEARTAELPPYVFPETCPACGEALIE--DGANVRCVNLACPAQVLARLSHYA
Meiothermus ruber H328                          IPEVLRVVTEAPRGH-APVEWPTHCPECGTALEL--SGKIHLCPNPLCPAKAFEAIRHFA
Meiothermus cerbereus                           IPEVLRVVTEAPRGH-EPVEWPSHCPECGVELLL--SGKIHLCPNPLCPAKAFESIRHFA
Oceanithermus profundus DSM14977                IPEILRVIKEKRTGKEEPIVFPYHCPECGANLVE--DGKIHRCPNPLCPAKAFQQLRHWA
Marinithermus hydrothermalis DSM                IPEVLRVLKEERTGTERPLVFPDACPACGHALVL--EGKIHRCPNPLCPAQAFERIRHYA
Thermus filiformis                              IPEVLRVLKERRTGKERPIRWPEACPECGHRLVK--EGKVHRCPNPLCPAKRFEAIRHYA
Thermus igniterrae                              IPEVLRVLKERRTGEERPIRWPERCPECGFRLVQ--EGKVHRCPNPLCPAKRFEAIRHYA
Thermus oshimai JL-2                            IPEVLRVLKERRTGAERPIRWPETCPECGHALVK--EGKVHRCPNPLCPAKRFEAIRHYA
Thermus scotoductus                             IPEVLRVLKEKRTGEERPIRWPETCPECGHRLVK--EGKVHRCPNPLCPAKRFEAIRHYA
Thermus thermophiles JL-18                      IPEILRVLKERRTGEERPVRWPETCPECGHRLLK--EGKVHRCPNPLCPAKRFEAIRHFA
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(L)

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                                                58          CXXC                  115
Deinococcus radiodurans                         MTANCTG-PAPKPCGECESCLAVRAGSHPDVMEIDAASNNSVDDVRDLREKVGLAAMRG
Deinococcus swuensis                            MTANCTG-PAPKPCGECDSCLSVRAGSHPDVMEIDAASNNSVDDVRDLRELVGLAAMRG
Deinococcus frigens                             MTANCTG-PAPKPCGECESCLSVRAGSHPDVMEIDAASNNSVDDVRDLRELVGLAAMRG
Deinococcus geothermalis DSM1130                MTANCTG-PSPKPCGECESCLAVRNGSHPDVLEIDAASNNSVDDVRDLREKVGLAAMRG
Deinococcus sp.Leaf326                          MTANCQS-EGPKPCGECESCLAVRAGSHPDVMEIDAASNNSVDDVRDLREKVGLAAMRG
Deinococcus reticulitermitis                    MTANCSA-PGPKPCGECESCLSVRAGSHPDVLEIDAASNNGVDDVRDLREKVGLAAMRG
Deinococcus puniceus                            MTANCTG-PLPKPCGECESCLSVRSGNHPDVLEIDAASNNSVDDVRDLREKVGLAAMRG
Deinococcus deserti VCD115                      MTANCSG-PLPKPCGECESCLSVRAGSHPDVLEIDAASNNSVDDVRDLREKVSLAAMRG
Oceanithermus profundus DSM14977                MSVGCAAEPENRPCGECENCRMVREDRHPDVVEIDAASNNSVEDVRELRERILLAPLVA
Truepera radiovictrix DSM17093                  MAVNCEG-E-DRPCGACESCLLVRRGAHPDVTELDAASNNSVEDIRDLREKVRLASLRG
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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