

Escherichia coli strain G1632 O antigen gene cluster, complete sequence

GenBank: GU299791.1

[FASTA Graphics](#)

[Go to:](#)

LOCUS GU299791 10301 bp DNA linear BCT 08-JUN-2010

DEFINITION Escherichia coli strain G1632 O antigen gene cluster, complete sequence.

ACCESSION GU299791

VERSION GU299791.1

KEYWORDS .

SOURCE Escherichia coli

ORGANISM [Escherichia coli](#)
Bacteria; Proteobacteria; Gammaproteobacteria; Enterobacterales; Enterobacteriaceae; Escherichia.

REFERENCE 1 (bases 1 to 10301)

AUTHORS Li,D., Liu,B., Chen,M., Guo,D., Guo,X., Liu,F., Feng,L. and Wang,L.

TITLE A multiplex PCR method to detect 14 Escherichia coli serogroups associated with urinary tract infections

JOURNAL J. Microbiol. Methods 82 (1), 71-77 (2010)

PUBMED [20434495](#)

REFERENCE 2 (bases 1 to 10301)

AUTHORS Li,D., Liu,B., Chen,M., Guo,D., Guo,X., Liu,F., Feng,L. and Wang,L.

TITLE Direct Submission

JOURNAL Submitted (03-DEC-2009) TEDA School of Biological Sciences and Biotechnology, Nankai University, 23 Hongda Street, Tianjin 300457, P.R. China

FEATURES Location/Qualifiers

source 1..10301
/organism="Escherichia coli"
/mol_type="genomic DNA"
/strain="G1632"
/db_xref="taxon:[562](#)"
/note="serogroup: O1"

[misc_feature](#) 1..10301
/note="O antigen gene cluster"

[gene](#) 108..1193
/gene="rmlB"

[CDS](#) 108..1193
/gene="rmlB"
/note="dTDP-D-glucose 4,6-dehydratase"
/codon_start=1

```

/transl_table=11
/product="RmlB"
/protein_id="ADC54922.1"
/translation="MKILVTGGAGFIGSAVVRHIINNTQDSVVNVDKLTYAGNLESLA
DVSDSERYVFEHADICDAAAMARIFAQHQPDAVMHLAAESHVDRSITGPAAFIETNIV
GTYYLLEAARNYWSALDGDKKNSFRFHHISTDEVYGDLPHPDEVNNKEQLPLFTETTA
YAPSSPYSASKASSDHLVRAWKRTYGLPTIVTNCNNYGPYHFPEKLIPLVILNALEG
KALPIYGKGDQIRDWLYVEDHARALYTVVTEGQAGETYNIGGHNEKKNIDVVLITICDL
LDEIVPKEKSYREQITYVADRPGHDRRYAIDAEEKIGRELGWKPQETFESGIRKKTVEWY
LANAKWVDNVKSGAYQSWIEQNYEGRQ"

gene      1193..2092
/gene="rmlD"

CDS       1193..2092
/gene="rmlD"
/note="dTDP-6-deoxy-L-mannose-dehydrogenase"
/codon_start=1
/transl_table=11
/product="RmlD"
/protein_id="ADC54923.1"
/translation="MNILLFGKTGQVGWELQRALAPLGNLIALDVHSTDYCGDFSNPE
GVAETVKRIRPDVIVNAAAHTAVDKAESEPEFAQLLNATSVESIAKAANEVGAWVIHY
STDYVFPNGDTPWLEMDATAPLNVYGETKLAGEKALQEHC AKHLIFRTSWVYAGKN
NFAKTMLRLAKEREELAVINDQFGAPTGAELLADCTAHAIRVALNKP DVAGLYHLVAS
GTTTWYDYAALVFEEARNAGIPLALNKLNAVPTTAYPTPARRPHNSRLNTEKFQQNFA
LVLPDWQVGVKRMLNELFTTTAI"

gene      2150..3028
/gene="rmlA"

CDS       2150..3028
/gene="rmlA"
/note="glucose-1-phosphate thymidyltransferase"
/codon_start=1
/transl_table=11
/product="RmlA"
/protein_id="ADC54924.1"
/translation="MKTRKGII LAGGSGTRLYPVTMVSKQLLP IYDKPMIYYPLSTL
MLAGIRDILIIISTPQDTPRFQQLLGVSQWGLNLQYKVQPSPDGLAQAFIIGEEFIGG
DDCALVLGDNIFYGHDL PKLMDAAVNKESGATVFAYHVNDPERYGVVEFDKNGTAISL
EEKPLQPKSNYAVTGLYFYDNDVVEMAKNLKPSARGELEITDINRIYMEQGRLSVAMM
GRGYAWLDTGTHQSLIEASNFIATIEERQGLKVCPEE IAYRKGFVDAEQVKVLAEPL
KKNAYGQYLLKMIKGY"

gene      3033..3581
/gene="rmlC"

CDS       3033..3581
/gene="rmlC"

```

```

/feature "note" "dTDP-6-deoxy-D-glucose-3,5-epimerase"
/feature "codon_start" 1
/feature "transl_table" 11
/feature "product" "RmlC"
/feature "protein_id" "ADC54925.1"
/feature "translation" "MNVIKTEIPDVLIFEPKVFGDERGFFFESFNQKVFEAVGRKVE
FVQDNHSSKSSKGVLRLGLHYQLEPYAQGKLVRCVVGEVFDVAVDIRKSSSTFGKWVGVN
LSAENKRQLWIPEGYAHGFLVLSETAEFLYKTTNYYHPQSDRGIKWDDPSINISWPVD
SQVLLSAKDNKHPPLTKIEMYS"
gene 3625..4851
/feature "gene" "wzx"
CDS 3625..4851
/feature "gene" "wzx"
/feature "note" "O antigen flippase"
/feature "codon_start" 1
/feature "transl_table" 11
/feature "product" "Wzx"
/feature "protein_id" "ADC54926.1"
/feature "translation" "MSKSEIRNVIHNAGYMMITQIALYVAPLFILSYLLKTLGVAQFG
NYALILSIVAYLQIITDYGFSFSASRAISQNREDKEYISKIYLSTMTIKLAICAFLL
LLMLFLNLLPVQAEKQGILYGYLLVIGNTFQPQWFFQGIEKLKIIALSINVISRCAAC
LLVFIYVRNSEDLQKALLVQSLPLVISAIGLNIFILKYINIIFPEKKLFKVILKEGKD
FFLASLYSVILNNSGIFLLGIFTNPVIVGVYAAAEKIVKAVLSLFTPLTQAIYPYNCR
KFSLSVFDGIEAAKKTGIPIIILAFIAAVIVAITLPVAIDYLNFPKETIFVQGILSAW
IFFGVLNNVFGIQILSASGRSKIYSRMVFSALITLLITLLLQFCNATGVACAILLG
EMFLSILLKRYKKII"
gene 4861..5988
/feature "gene" "mnaA"
CDS 4861..5988
/feature "gene" "mnaA"
/feature "note" "UDP-N-acetyl glucosamine-2-epimerase"
/feature "codon_start" 1
/feature "transl_table" 11
/feature "product" "MnaA"
/feature "protein_id" "ADC54927.1"
/feature "translation" "MKKLLLVFGTRPEAIKMASIIELLKKDCRFEYKICVTGQHKEML
DQVMQVFDVKPDYNLRIMQPGQTLVSVATNILSRLSEVLIIIEKPDIIIVHGDTTTTLA
ATLAGYYHQIKVCHVEAGLRTGDIYSPWPEEGNRKVTGALACIHFAPTERSKDNLLRE
GVKVNNIFVTGNTVIDSLFIAKDIIDNDPNIKNALHNKFNFLDKSRRVVLITGHRREN
FGKGFEDICFAIKELAFIYPNVDFIYPVHLNPNVMEPVHRILDNICNIYLIPLDYLP
FVYLMNESYLILTDGGIQEEAPSLGKPVLMRDTTERPEAVEAGTVVLVGTSGIKIV
NKVTELLNNADIYNAMSLHNPYGDGTAAQKILNVLAQELI"
gene 6003..7067
/feature "gene" "wekM"

```

[CDS](#)

6003..7067
/gene="wekM"
/note="glycosyltransferase"
/codon_start=1
/transl_table=[11](#)
/product="WekM"
/protein_id="[ADC54928.1](#)"
/translation="MLLIIADYPNEMNMREGAMQRIDAIDSLIRDRKRVYLNISFKKH
LVRNSSSFNNVIVENLNAI IHRNIIKQYMQKSTTIYVHSVYNLLKVITLIDLKKTILD
IHGVVPEELLADNKKLLSKVYNMVEKKGVLGCKKLIHVSTEMQKHYEAKYGVNLAERS
IVLPIFEYKNITQSQNKWTENKIRSIYLGGLQTWQNIDKMIQVCDDTVINNEAGKYEF
NFFIPQSNLEGFIDKYSCLKLHNINANASTLSRDEVIPFLKECHIGFVLRDDIIVNRVA
CPTKLVEYLECGVVPVLSPLIGDFYSMGYQYITTEEMANRSISLLDLEKMAAHNLQI
LTSYQKRITYKAQKELIAQLC"

[gene](#)

7119..8123
/gene="wzy"

[CDS](#)

7119..8123
/gene="wzy"
/note="O antigen polymerase"
/codon_start=1
/transl_table=[11](#)
/product="Wzy"
/protein_id="[ADC54929.1](#)"
/translation="MRIKYKDNGYIILCFLLCFILSYLVLLKSDYFPADFLPYTEIYDG
TYGEINNIEPAFLYLTRLFHYLNFPYIFFAMLVCALCLSWKIKYARKIIKDSYIYFLF
YVYVSFYVFLHEMTQLRIAIAVTMCYVSVYYYFYKNCVKHALPMMVLAILFHYSALLL
FMSLFIYSYRGLLIVIIGFVICMSFLNVYADTIALYLPNEKIVNYLYSISSSLDNRND
LAIFNLNNIIFLSIFILIFYLSRYIKLNDNEAKFIKYVQCSGILAFCIFFLASGVPVI
AYRTAELLRIFYPMALVLILSHIKNNNMRYFIAVIVILSGLMLFITLRAVSIVGQGL
"

[gene](#)

8125..9084
/gene="wekN"

[CDS](#)

8125..9084
/gene="wekN"
/note="glycosyltransferase"
/codon_start=1
/transl_table=[11](#)
/product="WekN"
/protein_id="[ADC54930.1](#)"
/translation="MNVAILLSTYNGEKYLEEQDLSLLLQSYQDFVVYIRDDGSSDRT
VNIINQYVMKDNRFINVGNSENLGCAASFINLLRNASADIYMFCDQDDYWLPNKLQRA
VDYFSAIDPLQPTLYHCDLSVVDEKLNIIQNSFLQHQKMSAYDSMRKNNLFIQNFVVG
CSCAVNASLAEFVLSRIGEQHVKMIAMHDWWLAVTAKLFGRIFHDNTQTILYRQHQGN
VLGAKSSGMMRFIRLGLNGQGISRVVSFRKKVCAQNKLLLDVYDKDLNLEQKKSIRLV

```

                                IEGLKENSSIADLLKCFYHGSYMQGFKRNLALIYSVLYTKKRR"
gene                            9094..10158
                                /gene="wekO"
CDS                             9094..10158
                                /gene="wekO"
                                /note="glycosyltransferase"
                                /codon_start=1
                                /transl_table=11
                                /product="WekO"
                                /protein_id="ADC54931.1"
                                /translation="MKKIAIIGTVGIPASYGGFETLVENLTRYNSSGVEYNVFCSSFH
                                YKSHQKKHNGARLIYIPLKANGWQSIAYDIISLAYSIFLKPDVILILGVSGCSFLPFF
                                KLLTRAKFITNIDGLEWRRDKWNSKVRFKLFSEKIAVQYSDVITDNEAISEYVFNE
                                YNKDSRVIAYGGDHAWLNTEDVFTTRNYKSDYYLSVCRIEPENNVELILKTFSKLKYK
                                IKFIGNWNWNGSEFGKKLRLHYSNYPNIEMIDPIYDLQQLFHLRNNCIGYIHGHSAGGTN
                                PSLVEAMHFSKPIFAYDCKFNRYTTENEACYFSNESDLAEKIIMHCELSLGVSGTKMK
                                EIANQKYTWRRIAEMYEDCY"

```

ORIGIN

```

1 attggtagct gtaagccaag ggcggtagcg tgcattaata cctctattaa tcaaactgag
61 agccgcttat ttcacagcat gctctgaagt aatatggaat aaattaagtg aagatacttg
121 ttactggggg cgcaggattt attggttctg ctgtagttcg tcacattata aataatacgc
181 aggatagtgt tgttaatgtc gataaattaa cgtacgccgg aaacctggaa tcaattgctg
241 atgtttctga ctctgaacgc tatgtttttg aacatgcgga tatttgcgat gctgctgcaa
301 tggcgcggat ttttgctcag catcagccgg atgcagtgat gcacctggct gctgaaagcc
361 atgtggatcg ttcaattaca ggccctgcgg cattttattga aaccaatatt gttggtactt
421 atgtcctttt ggaagcggtc cgcaattact ggtctgctct tgatggcgac aagaaaaata
481 gcttccgttt tcatcatatt tctactgacg aagtctatgg tgatttgcct catcctgacg
541 aagtaaataa taaagaacaa ttaccctctt ttactgagac gacagcttac gcgcctagta
601 gtccttattc cgcacaaaaa gcatccagcg atcatttagt ccgcgcgtgg aaacgtacct
661 atggtttacc gactattgtg actaactgtt cgaataacta cggtccttat cactttccgg
721 aaaaattgat tccactagta attccttaatg ctctggaagg taaggcatta cctatttatg
781 gcaaagggga tcaaattcgt gactggctgt atgttgaaga tcatgcgcgt gcgttatata
841 ccgtagttac tgaaggtcaa gcgggtgaaa cctataacat tggcggacac aacgaaaaga
901 aaaacatcga tgttgtgctg actatttgtg atttgttggg cgagatagtc ccgaaagaga
961 aatcttatcg tgagcaaatt acttatgttg ctgatcgccc agggcatgat cgccgttatg
1021 cgattgatgc tgagaagatt ggtcgcgaaat tgggatggaa accacaggaa acgtttgaga
1081 gtgggattcg taaaacgggtg gaatgggtatt tggctaatac aaaatgggtt gataatgtga
1141 aaagtgggtc ctatcaatcg tggattgaac agaactatga gggccgccag taatgaatat
1201 cctccttttt ggcaaaacag ggcaggtagg ttgggaacta cagcgtgctc tggcacctct
1261 gggtaatttg attgctcttg atgttcactc cactgattac tgtggtgatt ttagtaacct
1321 tgaaggtgtg gctgaaacag taaaagaat tcgacctgat gttattgtta atgctgcggc
1381 tcacaccgca gtagataagg ctgagtcaga acccgaattt gcacaattac tcaatgcgac
1441 tagcgttgaa tcaattgcaa aagcggcaaa tgaagttggg gcttgggtaa ttcattactc
1501 aactgactac gtattccctg gaaatggcga cagcccatgg ctggagatgg atgcaaccgc

```

1561 accgctaaat gtttacggtg aaaccaagtt agctggagaa aaagcattac aagagcattg
1621 tgcgaagcac ctaattttcc gtaccagctg ggtctatgca ggtaaaggaa ataatttcgc
1681 caaaacgatg ttgcgtctgg caaaagagcg tgaagaacta gccgttatta atgatcagtt
1741 tgggtgcgcca acaggtgctg aactgctggc tgattgtacg gcacatgcc a ttcgtgtcgc
1801 actgaataaa ccggatgtcg caggcttgta ccatttggtg gccagtggta ccacaacctg
1861 gtacgattat gctgcgctgg tttttgaaga ggcgcgcaat gcaggcattc ctcttgcaact
1921 caacaagctc aacgcagtac caacaactgc ctatcctaca ccagctcgtc gtccacataa
1981 ctctcgcctt aatacagaaa aatttcagca gaattttgcg cttgtattgc ctgactggca
2041 ggttggtgtg aaacgcatgc tcaacgaatt atttacgact acagcaattt aatagttttt
2101 gcatcttggt cgtgatgggt gagcaagatg aattaaaagg aatgatgaaa tgaaaacgcg
2161 taaaggtatt attttagcgg gtggttctgg tactcgtctt tatcctgtga ctatggctgt
2221 cagtaaacag ctattaccta tatatgataa accgatgatc tattatccgc tttctacact
2281 gatgttagcg ggtattcgcg atattctgat tattagtacg ccacaggata ctctcgtttt
2341 tcaacaactg ctgggtgtcg gtagccagtg gggcctgaat cttcagtaca aagtgcgaacc
2401 gagtccggat ggtcttgctg aggcatttat tatcggtgaa gagtttattg gtgggtgatga
2461 ttgtgctttg gtacttggtg ataatatctt ctacggtcac gacctgccta agttaatgga
2521 tgccgctggt aacaaagaaa gtgggtgcaac ggtatttgcc tatcacgtta atgatcctga
2581 acgctatggt gtcgttgagt ttgataaaaa cggtagcgcg atcagcctgg aagaaaaacc
2641 gctacaacca aaaagtaatt atgcggtaac cgggctttat ttttatgata acgacgttgt
2701 cgaaatggcg aaaaatctta agccttctgc ccgcggtgaa ctggaaatta ccgatattaa
2761 ccgtatctat atggaacaag ggcgtttatc tgttgccatg atggggcgtg gttatgctg
2821 gttagacacg gggacacatc agagcctgat tgaggcaagc aactttattg caacaattga
2881 agagcgtcag gggctgaaag tttcctgccc ggaagaaatt gcttaccgta aagggtttgt
2941 tgatgctgag cagggtgaaag tattagctga acctctgaaa aaaaatgctt atggctcagta
3001 tctgctgaaa atgattaaag gttattaata aaatgaacgt aattaaaaca gaaattcctg
3061 atgtactgat ttttgaaccg aaagtttttg gtgatgagcg tggtttcttt tttgagagct
3121 ttaaccagaa ggtttttgag gaagctgtag gccgcaaagt tgaatttggt caggataacc
3181 attcgaagtc tagtaaaggt gttttacgcg ggctgcatta tcagttggaa ccttatgcac
3241 aaggaaaatt ggtgcgttgc gttgtcgggt agttttttga cgtagctggt gatattcgta
3301 aatcgatcgc gacttttggt aaatgggttg gggatgaatt atctgctgag aataagcggc
3361 aattgtggat tctgagggga tatgcacatg gttttttagt gctgagtgag acggcggagt
3421 ttttgtataa gacgacaaat tattatcatc ctacagagtga tagaggata aaatgggatg
3481 atccaagcat caatatttca tggccagtcg attcacaagt gctgctatca gctaaagata
3541 ataagcatcc tccattaaca aagattgaaa tgtatagtta agatcacgat aaatcttgga
3601 aggggttgcaa aattgaataa aatagtgtgagc aaaagtgaaa taaggaacgt aatccacaat
3661 gctggctata tgatgattac tcagatagct ttatatgttg caccattatt tatactgagt
3721 tatctgttaa aaacactggg ggttgacacag tttggtaatt atgccttaat actatcaatc
3781 gttgcatatt tacagattat aacggattat ggtttttctt ttagtgcaag tcgtgcgacg
3841 tcacagaata gagaggacaa agaataata tcaaaaattt atctgtcaac tatgactatc
3901 aagttggcga tatgcgcttt ctatttctta ttgctcatgc tatttttaaa tcttttgctt
3961 gtgcaagctg aattaaaaca aggaatatta tatggatata ttcttgtaat aggaaatact
4021 ttccaaccac aatggttttt ccaaggatgc gaaaaattaa aaatcatagc ccttttctaat
4081 gttatatcaa gatgcgccgc gtgtttactt gtatttatct atgtgaggaa tagcgaggat
4141 ttacaaaaag cacttttagt acagtcactt ccattagtaa tttctgcatg tggattaaat

4201 atattttatat tgaaatatat caatattatt tttccgaaa aaaaattatt taaggtaatt
 4261 ttaaaagaag gtaaggattt ttttcttgca tcactttatt ctgttattct caataatagt
 4321 ggcatttttc tattagggat ttttactaat cctgttattg ttggtgtata tgccgccgct
 4381 gaaaagatag tcaaggccgt attgtcgtta tttacaccac tgacgcaage tatatatcct
 4441 tataattgtc gtaagttttc actatccgta tttgacggca ttgaggcagc aaaaaaaact
 4501 ggtataccaa ttataatttt agcattttata gctgctgtta tcgttgcaat taccttacct
 4561 gttgcaatcg actatcttaa ttttccaaaa gaaacaattt ttgttagtca aatattaagt
 4621 gcatggatct tttttgggtg tcttaataat gtattcggca ttcagatatt gagtgcacat
 4681 ggaagaagta aaatatatag taggatggta ttcgtatcag cgcttataac attacttttg
 4741 attactctat tattgcagtt ttgtaacgcc actggagtgg catgtgcaat attattgggt
 4801 gaaatgttct tatcaatatt gttacttaag cgatataaaa aaataattta aggaatagtt
 4861 atgaagaagt tattattagt gttcgggtact aggctgaag caataaagat ggcctctatc
 4921 attgaattat taaaaaaga ttgtagattc gaatataaaa tatgtgtgac aggccaacat
 4981 aaagagatgc ttgatcaagt tatgcaagta tttgatgtta aacctgatta taatttacgg
 5041 attatgcagc ctgggcaaac attagtatct gtagcaacaa atatactctc acggttaagt
 5101 gaagttttta ttatagaaaa gccagatatt atacttgtgc atggggatac aacgactacc
 5161 cttgctgcta ctttagctgg gtattaccac caaataaaag tttgtcatgt ggaagcagga
 5221 ttaagaacag gggatattta ctctccttgg cctgaagagg gcaatcgtaa agttacaggg
 5281 gcattagcat gtattcattt cgccccaaca gagagatcaa aagataatct cctgaggggag
 5341 ggggtcaaag taaataatat atttgtaacg ggtaataaccg tcatcgactc tttattttatt
 5401 gcaaaagata tcatagataa tgaccctaata ataaagaacg ctttacataa taaatttaatt
 5461 tttcttgata aaagccgacg agtagtactt ataacaggtc atcgaagaga aaatttcggg
 5521 aaagggttttg aagatatatg ctttgcaata aaggaattag ctttcattta tccaatgta
 5581 gatttttattt atccgggtgca tcttaatccc aatgtaattg aaccagtaca tcgtatatta
 5641 gataatatat gtaatatatta ccttattgag cccttggtatt atttgccttt tgtttattta
 5701 atgaatgagt catattttaat attgactgat tcagggggga tacaagaaga agcgccctcg
 5761 ttaggtaaac cggttttggt tatgctgtat actactgaac gccctgaggc gggtgaggct
 5821 ggtactgttg tattagtggg gacttctaag ataaaaatag taaataaagt aacggagcta
 5881 ttaacaatg ctgatatcta caatgctatg tctctgttac ataatccata tggcgatgga
 5941 acagctgctc aaaaaattct taatgtgctc gcccaagagc taatttaatt taagctaaaa
 6001 atatgttatt aattattgct gattatccaa acgaaatgaa tatgcgcgag ggagctatgc
 6061 aacgaataga tgcgatagac tctctcattc gagatcgcaa gcgagtgtat ttgaatattt
 6121 cattcaaaaa gcatctagtt cgctcaataa gttcctttta taatgttata gttgaaaaatc
 6181 taaatgcaat tattcacaga aacatcataa aacagtacat gcaaaaatca acaactatat
 6241 atgttcattc tgtttataat ttattaaagg ttataacgct cattgatcta aaaaaacaa
 6301 ttcttgatat acatggtgtt gtaccggaag aacttttggc agataataaa aaattactta
 6361 gtaaagtata taacatggtg gaaaaaaaag gtgtccttgg atgcaaaaaa ttaatacacg
 6421 tcagtacaga aatgcaaaaa cactatgaag caaaatatgg agtaaacttg gctgaaaggt
 6481 caatagtgtc cccgattttt gaatataaaa atataacca atcgcaaaac aaatggacag
 6541 aaaataaaat acgaagtatc tatcttgagg gattacaaac atggcaaaat attgataaaa
 6601 tgattcaagt ttgtgatgac acagtataa acaatgaagc aggttaagtat gaattcaact
 6661 ttttcatccc acagagtaac ttggaagggt ttatagataa atattcgta aaattacata
 6721 atatcaatgc taatgcatct acgctatcac gtgatgaagt aattcccttt ctaaaagaat
 6781 gtcattattg ttttgtattg cgcgatgata taatagtaaa cagagttgagc tgcctacaa

6841 aattgggtga atatttagag tgtgggtgctg ttccagttgt gctctcccca cttatagggtg
6901 atttttattc gatgggatat caatacatta ctacagagga aatggctaac agaagtataa
6961 gtttgttgga tcttgaaaaa atggctgcac ataatttaca aattttgact tcttatcaga
7021 agagaaccta caaggcacag aaagaactta ttgctcaact gtgctgaatt ttttacatat
7081 ataaaattat gtaagcatat cgcgggtcag gtaattgtat gcgtatcaaa tataaagata
7141 acggttatat attatgtttt ctattatgtt tcattttgag ctacttagtt ttactcaaat
7201 ctgactactt tctgtctgat tttctgccat atacagaaat atacgatggg acatacggag
7261 aaatcaataa tattgagcct gcctttttat atttaacacg gttgtttcat tatttaaatt
7321 tcccctatat attttttgca atgttagttt gtgccttatg ttttaagttgg aaaataaaat
7381 atgcaagaaa aataattaaa gatagttata tataatttgtt cttgtatgta tatgtatcat
7441 tttatgtgtt tttgcatgaa atgactcaat tgcgcatagc aattgcagtc actatgtgct
7501 atgtgtcggg ttattattac ttttataaaa attgtgttaa acatgcactg ccatggatgg
7561 tgttggtctat tttgtttcat tacagcgcct tgcttttatt tatgtcatta tttatataca
7621 gttatagggg gttattaata gtaattatag ggtttgtaat atgtatgagc tttttaaacg
7681 tgtatgcaga tacaattgca ctatatttgc caaatgaaaa aatagtaaat tatttatata
7741 gtatttcatc atcatttagac aatagaaatg atttggcaat attcaacctg aataatataa
7801 tattttttatc aatattttatt ttgatctttt atcttagccg atatataaaa ttaaatgata
7861 atgaggcgaa gtttattaag tatgtgcaat gttcaggaat attagccttt tgtattttct
7921 ttctggctag tggagtcccg gtcattgctt atcgaaactgc agagttgctg cgaatatttt
7981 atccgatggc tttagtatta atcctttcgc atataaaaaa taataatatg cgttatttta
8041 ttgcagtcac tatagttatc ctttcaggct taatgttgtt tataacacta agggctgtat
8101 caatagttgg tcaaggatta taaaatgaat gttgctattt tgttgtctac gtataatggc
8161 gaaaaatatt tagaggaaca actggattca ttgctgcttc aaagttatca ggattttgta
8221 gtgtatatcc gtgatgacgg atcatctgat agaactgtaa atataataaa ccaatacgt
8281 atgaaagata acagatttat taacgtgggt aattcagaaa atcttggttg tgctgcttcg
8341 tttattaatt tattaagaaa tgcttcagcc gatattttata tgttttgatga ccaagatgat
8401 tattggcttc cgaataaatt acagcgtgct gtggattatt tttcggctat tgatccttta
8461 caacctacct tgtatcattg cgatctaagc gttgttgatg aaaaacttaa tattatacaa
8521 aattcatttt tgcagcatca gaaaatgtca gcgtatgatt caatgagaaa aaataatctt
8581 ttcatacaaa attttgttgt tgggtgttca tgtgctgtta atgcttact tgcggaattt
8641 gttctttcgc gaattggaga gcagcatgta aaaatgatag ctatgcatga ctggtgggta
8701 gccgtgactg caaaactttt tggtcgaatc cattttgata atactcaaac gattctttat
8761 cgacaacatc agggcaatgt attaggtgca aaatcatcag gtatgatgcg ttttattcga
8821 ttaggattaa atgggcaagg gatttcgcga gtagtatctt ttagaaaaaa agtttgtgcg
8881 caaataaagc ttctttttaga tgtctatgat aaagatttaa atcttgagca aaaaaaatct
8941 atcaggcttg taattgaggg ccttaaagag aactcttcaa ttgctgacct tttaaaatgt
9001 ttctatcatg gtagctatat gcaaggtttt aaacgtaatc ttgccttaat atattcagtt
9061 ctttacacaa aaaaaagaag atagtgtatc cttatgaaaa aaattgctat tatcggtact
9121 gttggcatac cagcatcata tggcggattt gaaacattag ttgaaaattt aacaagatac
9181 aattcctcgg gagttgaata taatgttttt tgttcacgtt ttactacaa atcccacaa
9241 aaaaaacata atggggcccg tttaattttat attccgctta aagccaatgg atggcagagc
9301 attgcgtatg acataatttc gttagcatat tctatttttt tgaagcctga tgtgattctg
9361 attttagggg tttctggttg ttcatttttg cctttcttca aactcttaac acgcgctaag
9421 tttattacta atattgatgg cctggaatgg cgaagagata aatggaattc aaaagtga

9481 cgtttcttaa aattttcaga aaaaatcgca gttcaatatt cggatgtcgt tattacggat
9541 aatgaggcaa tttctgagta cgtttttaac gagtataata aagatagccg agttattgcc
9601 tatggagggg atcatgcatg gttaaatact gaggatgtat ttacaacaag aaattataaa
9661 agcgattact acctttctgt atgtcgtatc gaacccgaaa acaatgtaga attaatttta
9721 aaaacatttt caaagctaaa atataaaata aaattttattg gaaattggaa tggcagcgag
9781 tttggaaaga aacttaggct gcattattct aactatccaa atattgaaat gattgatccg
9841 atttatgatc ttcaacaatt atttcactta cgaaataatt gcataggata tatacatggt
9901 cattcggtg gaggaacaaa ccttcttta gtcgaggcaa tgcatttttag taaacctata
9961 tttgcatatg attgtaagtt taataggtac actactgaaa atgaagcatg ttatTTTTct
10021 aatgaatctg acctcgcaga gaaaatcata atgcattgtg agctatcatt aggtgtctct
10081 ggcacgaaaa tgaaagaaat tgctaaccag aaatacactt ggagacgaat agcagaaatg
10141 tatgaggatt gctattaact ctgttaaact tcaaattctt tacaatatat ggcatgacta
10201 taagcgcat t aattgttttt caagccgctc tcgcggtgac caccctga caggagtaaa
10261 caatgtccaa gcaacagatc ggcgtcgtcg gtatggcagt g

//