

Dengue virus 2, complete genome

NCBI Reference Sequence: NC_001474.2

[FASTA Graphics](#)

[Go to:](#)

LOCUS NC_001474 10723 bp RNA linear VRL 11-JUL-2019

DEFINITION Dengue virus 2, complete genome.

ACCESSION NC_001474

VERSION NC_001474.2

DBLINK BioProject: [PRJNA485481](#)

KEYWORDS RefSeq.

SOURCE Dengue virus type 2

ORGANISM [Dengue virus type 2](#)

Viruses; Riboviria; Orthornavirae; Kitrinoviricota;

Flasuviricetes;

Amarillovirales; Flaviviridae; Flavivirus.

REFERENCE 1 (bases 1 to 10723)

AUTHORS Kinney,R.M., Butrapet,S., Chang,G.J., Tsuchiya,K.R.,
Roehrig,J.T.,

Bhamarapravati,N. and Gubler,D.J.

TITLE Construction of infectious cDNA clones for dengue 2 virus: strain
16681 and its attenuated vaccine derivative, strain PDK-53

JOURNAL Virology 230 (2), 300-308 (1997)

PUBMED [9143286](#)

REFERENCE 2 (bases 1 to 10723)

CONSRMT NCBI Genome Project

TITLE Direct Submission

JOURNAL Submitted (01-NOV-2007) National Center for Biotechnology
Information, NIH, Bethesda, MD 20894, USA

REFERENCE 3 (bases 1 to 10723)

AUTHORS Kinney,R.M., Butrapet,S., Chang,G.J., Tsuchiya,K.R.,
Roehrig,J.T.,

Bhamarapravati,N. and Gubler,D.J.

TITLE Direct Submission

JOURNAL Submitted (28-JAN-1997) Division of Vector-Borne Infectious
Diseases, National Center for Infectious Diseases, Centers for
Disease Control and Prevention, Public Health Service, U.S.
Department of Health and Human Services, P.O. Box 2087, Fort
Collins, CO 80522, USA

COMMENT REVIEWED [REFSEQ](#): This record has been curated by NCBI staff. The
reference sequence was derived from [U87411](#).

On Nov 1, 2007 this sequence version replaced [NC_001474.1](#).

The mature peptides were added by the NCBI staff following other
annotations for Dengue virus with the kind help of Dr. Vladimir
Yamshchikov (Southern Research Institute, Birmingham, AL USA).

COMPLETENESS: full length.

FEATURES	Location/Qualifiers
source	1..10723 /organism="Dengue virus type 2" /mol_type="genomic RNA" /strain="16681" /db_xref="taxon: 11060 " /country="Thailand" /collection_date="1964"
5'UTR	1..96
stem_loop	2..70 /note="stem-loop A (SLA) "
regulatory	71..80 /regulatory_class="other" /note="oligo U track spacer"
regulatory	81..96 /regulatory_class="promoter" /note="5' upstream AUG region (UAR) "
stem_loop	81..95 /note="stem-loop B (SLB) "
gene	97..10272 /gene="POLY" /locus_tag="DENV_gp1" /gene_synonym="polyprotein gene" /db_xref="GeneID: 1494449 "
CDS	97..10272 /gene="POLY" /locus_tag="DENV_gp1" /gene_synonym="polyprotein gene" /note="contains structural proteins, C-prM/M-E and non-structural proteins, NS1-NS2A/B-NS3-NS4A/B-NS5" /codon_start=1 /product="polyprotein" /protein_id=" NP_056776.2 " /db_xref="GeneID: 1494449 " /translation="MNNQRKKAKNTPFNMLKRERNRVSTVQQLTKRFSLGMLQGRGPL KLFMALVAFLRFLTIPPTAGILKRWGTIKSKAINVLRGFRKEIGRMLNILNRRRRSA GMIIMLIPTVMAFHLTTRNGEPHMIIVSRQEKGSLLFKTEDGVNMCTLMAMDLGELCE DTITYKCPLLRQNEPEDIDCWCNSTSTWVTYGTCTTMGEHRREKRSVALVPHVGMGLE TRTETWMSSEGAWKHVQRIETWILRHGFTMMAAILAYTIGTTTHFQRALIFILLTAVT PSMTMRCIGMSNRDFVEGVSGGSWVDIVLEHGSCVTTMAKNKPTLDFELIKTEAKQPA TLRKYCIEAKLTNTTTSRCPTQGEPSLNEEQDKRFVCKHSMVDRGWGNGCGLFGKGG IVTCAMFRCKKNMEGKVVPENLEYTIVITPHSGEEHAVGNDTGKHGKEIKITPQSSI TEAELTGYGTVTMECSPTGLDFNEMVLLQMENKAWLVHRQWFLDLPLPWLPGADTQG

SNWIKETLVTFKNPHAKKQDVVVLGSQEGAMHTALTGATEIQMSSGNLLFTGHLKCR
LRMDKLQLKGMSYSMCTGKFKVVKEIAETQHGTIVIRVQYEGDGSCKIPFEIMBLEK
RHLVGRLLITVNPITVEKDSFVNIEAEPFPGDSYIIIGVEPGQLKLNWFKKGSSIGQMF
ETMRGAKRMAILGDTAWDFGSLGGVFTSIGKALHQVFGAIYGAAFSGVSWTMKILIG
VIITWIGMNSRSTSLSVTLVLVGIVTLYLGVMVQADSGCVVSWKNKELKCGSGIFITD
NVHTWTEQYKFQPESPSKLASAIQKAHEEGICGIRSVTRLENLMWKQITPELNHILSE
NEVKLTIMTGDIGIMQAGKRSRQPTELKYSWKTWGKAKMLSTESHNQTFLLIDGPE
TAECPTNRAWNSLEVEDYGFVFTTNIWLKLKEKQDVFCDSKLSAAIKDNRAVHAD
MGYWIESALNDTWKIEKASFIEVKNCHWPKSHTLWSNGVLESEMIIPKNLAGPVSQHN
YRPGYHTQITGPWHLGKLEMDFDGCDGTTVVVTEDCGNRGPRLRTTASGKLITEWCC
RSCTLPPLRYRGEDGCWYGMEIRPLKEKEENLVNSLVTAGHGQVDNFSGLVGLMALFL
EEMLRTRVGTKHAILLVAVSFVTLITGNMSFRDLGRVMVMVGATMTDDIGMGTYLAL
LAAFVVRPTFAAGLLLRKLTSKELMMTTIGIVLLSQSTIPETILELTDALALGMMVLK
MVRNMEKYQLAVTIMAILCVPNAVILQNAWKVSCITLAVVSVSPLLLTSSQKTDWIP
LALTIKGLNPTAIFLTTLSTRSKKRSWPLNEAIMAVGMVSILASSLLKNDIPMTGPLV
AGGLLTVCYVLTGRSADLELERAADVWEDQAEISGSSPILSITISEDGSMSEKNEEE
EQTLTILIRTGLLVISGLFPVSIPITAAAWYLWEVKKQRAGVLWDVSPPPMGKAELE
DGAYRIKQKGILGYSQIGAGVYKEGTFHTMWHVTRGAVLMHKGKRIEPSWADVKKDLI
SYGGGWKLEGEWKEGEEVQVLALPGKNPRAVQTKPGLFKTNAGTIGAVSLDFSPGTS
GSPIIDKKGKVVGLYGNGVVTRSGAYVSAIAQTEKSIEDNPEIEDDIFRKRRLTIMDL
HPGAGKTKRYLPAIVREAIKRGLRTLILAPTRVVAEMEEALRGLPIRYQTPAIRAEH
TGREIVDLMCHATFTMRLLSPVRVPNYNLIIMDEAHFTDPASIAARGYISTRVEMGEA
AGIFMTATPPGSRDPFPQSNAPIIDEEREIPERSWNSGHEWVTDGKGTWVWFVPSIKA
GNDIAACLRKNGKKVIQLSRKTFDSEYVKTRTNDWDFVVTDDISEMGANFKAERVIDP
RRCMKPVILTDGEERVILAGPMPVTHSSAAQRRGRIGRNPKNENDQYIYMGEPLENDE
DCAHWKEAKMLLDNINTPEGIIPSMFEPEREKVDAIDGEYRLRGEARKTFVDLMRRGD
LPVWLAYRVAAEGINYADRRWCFDGVKNNQILEENVEVEIWTKEGERKKLKPRWLDAR
IYSDPLALKEFKEFAAGRKSLLTNLITEMGRLPTFMTQKARDALDNLAVLHTAEAGGR
AYNHALSELPETLETLTLLTLLATVTGGIFLFLMSGRGIGKMTLGMCCIIITASILLWY
AQIQPHWIAASIILEFFLIVLLIPEPEKQRTPDQDNQLTYYVIAILTVVAATMANEMGF
LEKTKKDLGLGSIATQQPESNILDIDLRPASAWTLYAVATTFTVTPMLRHSIENSSVNV
SLTAIANQATVLMGLGKGWPLSKMDIGVPLLAIGCYSQVNPITLTAALFLLVAHYAII
GPGQLQAKATREAQKRAAAGIMKNPTVDGITVIDLDPIPYDPKFQQLGQVMLLVLCVT
QVLMMRITWALCEALTATGPISLWEGNPGRFWNTTIAVSMANIFRGSYLAGAGLLF
SIMKNTTNTRRGTNIGETLGEKWKSRNLALGKSEFQIYKKSQIEVDRTLAKGKIKR
GETDHHAVSRGSAKLRWFVERNMVTPEGKVVDLGCGRGGSYYCGGLKNVREVKGLTK
GGPGHEEPIPMSTYGNLVRQLQSGVDVFFIPPEKCDTLCDIGESSNPPTVEAGRTL
VLNLVENWLNNTQFCIKVLNPMPSVIEKMEALQRKYGGALVRNPLSRNSTHEMYWV
SNASGNIVSSVNMISRLINRFTMRYKKATYEPDVDLGSSTRNIGIESEIPNLDIIGK
RIEKIKQEHETSWHYDQDHPYKTHAYHGSYETKQTSASSMVNGVRLTKPVDVPM
VTQMAMTDTTFFGQQRVFKEKVDTRTQEPKEGTTKLMKITAEWLWELGKKKTPRMCT
REEFTRKVRSNAALGAIFTDENKWSAREAVEDSRFVELVDKERNLHLEGKCECTCVYN
MMGKREKKLGEFGKAKGSRAIYWMWLGARFLEFEALGFLNEDHWFSSRENSLSGVEGEG
LHKLGYILRDVSKKEGGAMYADDTAGWDTRITLEDLKNEEMVTNHMEGEHKKLAEAI

KLTYQNKVVRVQRPTPRGTVMDIISRDRQSGQVGTYGLNTFTNMEAQLIRQMEGEG
VFKSIQHLTITEEIAVQNWLARVGRERLSRMAISGDDCVVKPLDDRFASALTALNDMG
KIRKDIQQWEPSRGWNDWTQVPFCSHHFHELIMKDGRVLVVP CRNQDELIGRARISQG
AGWSLRETACLGKSYAQMWSLMYFHRDLRLAANAICSAVPSHWVPTSRTTWSIHAKH
EWMTTEDMLTVWNRVWIQENPW MEDKTPVESWEEIPYLGKREDQWCGSLIGLTSRATW
AKNIQAAINQVRSLIGNEEYTDYMP SMKRFRREEEEEAGVLW"

mat_peptide 97..438
/gene="POLY"
/locus_tag="DENV_gp1"
/gene_synonym="polyprotein gene"
/product="anchored capsid protein ancC"
/protein_id="NP_739581.2"
/db_xref="VBRC:35917"

mat_peptide 97..396
/gene="POLY"
/locus_tag="DENV_gp1"
/gene_synonym="polyprotein gene"
/product="capsid protein C"
/protein_id="NP_739591.2"
/db_xref="VBRC:35918"

mat_peptide 439..936
/gene="POLY"
/locus_tag="DENV_gp1"
/gene_synonym="polyprotein gene"
/product="membrane glycoprotein precursor prM"
/protein_id="NP_739582.2"
/db_xref="VBRC:35919"

mat_peptide 439..711
/gene="POLY"
/locus_tag="DENV_gp1"
/gene_synonym="polyprotein gene"
/product="protein pr"
/note="peptide pr"
/protein_id="YP_009164954.1"

mat_peptide 712..936
/gene="POLY"
/locus_tag="DENV_gp1"
/gene_synonym="polyprotein gene"
/product="membrane glycoprotein M"
/protein_id="NP_739592.2"
/db_xref="VBRC:35920"

mat_peptide 937..2421
/gene="POLY"
/locus_tag="DENV_gp1"

```

        /gene_synonym="polyprotein gene"
        /product="envelope protein E"
        /protein_id="NP_739583.2"
        /db_xref="VBRC:35921"
mat_peptide    2422..3477
        /gene="POLY"
        /locus_tag="DENV_gp1"
        /gene_synonym="polyprotein gene"
        /product="nonstructural protein NS1"
        /protein_id="NP_739584.2"
        /db_xref="VBRC:35922"
mat_peptide    3478..4131
        /gene="POLY"
        /locus_tag="DENV_gp1"
        /gene_synonym="polyprotein gene"
        /product="nonstructural protein NS2A"
        /protein_id="NP_739585.2"
        /db_xref="VBRC:35923"
mat_peptide    4132..4521
        /gene="POLY"
        /locus_tag="DENV_gp1"
        /gene_synonym="polyprotein gene"
        /product="nonstructural protein NS2B"
        /protein_id="NP_739586.2"
        /db_xref="VBRC:35924"
mat_peptide    4522..6375
        /gene="POLY"
        /locus_tag="DENV_gp1"
        /gene_synonym="polyprotein gene"
        /product="nonstructural protein NS3"
        /note="RNA-helicase; protease; ATPase; component of
        capping enzyme (RNA triphosphatase)"
        /protein_id="NP_739587.2"
        /db_xref="VBRC:35925"
mat_peptide    6376..6756
        /gene="POLY"
        /locus_tag="DENV_gp1"
        /gene_synonym="polyprotein gene"
        /product="nonstructural protein NS4A"
        /protein_id="NP_739588.2"
        /db_xref="VBRC:35926"
mat_peptide    6757..6825
        /gene="POLY"
        /locus_tag="DENV_gp1"

```

```

        /gene_synonym="polyprotein gene"
        /product="protein 2K"
        /protein_id="NP_739593.2"
        /db_xref="VBRC:35927"
mat_peptide    6826..7569
        /gene="POLY"
        /locus_tag="DENV_gp1"
        /gene_synonym="polyprotein gene"
        /product="nonstructural protein NS4B"
        /protein_id="NP_739589.2"
        /db_xref="VBRC:35928"
mat_peptide    7570..10269
        /gene="POLY"
        /locus_tag="DENV_gp1"
        /gene_synonym="polyprotein gene"
        /product="RNA-dependent RNA polymerase NS5"
        /note="methyltransferase component of capping enzyme;
nonstructural protein NS5"
        /protein_id="NP_739590.2"
        /db_xref="VBRC:35929"
stem_loop     116..132
        /note="capsid region hairpin (CHP)"
regulatory     134..144
        /regulatory_class="other"
        /note="5' conserved sequence (CS); also called cyclization
sequence"
3'UTR         10273..10723
ncRNA         10299..10723
        /ncRNA_class="lncRNA"
        /product="sfRNA1"
        /note="subgenomic flavivirus RNA"
stem_loop     10303..10368
        /note="flaviviral nuclease-resistant RNA 1 (fNR1); also
called stem-loop 1 or xrRNA1"
ncRNA         10372..10723
        /ncRNA_class="lncRNA"
        /product="sfRNA2"
        /note="subgenomic flavivirus RNA"
stem_loop     10376..10441
        /note="flaviviral nuclease-resistant RNA 2 (fNR2); also
called stem-loop 2 or xrRNA2"
ncRNA         10449..10723
        /ncRNA_class="lncRNA"
        /product="sfRNA3"

```

```

                                /note="subgenomic flavivirus RNA"
stem_loop      10453..10534
                                /note="dumbbell 1 (DBI); also called xrRNA3"
ncRNA          10536..10723
                                /ncRNA_class="lncRNA"
                                /product="sfRNA4"
                                /note="subgenomic flavivirus RNA"
stem_loop      10540..10621
                                /note="dumbbell 2 (DBII); also called xrRNA4"
regulatory     10618..10628
                                /regulatory_class="other"
                                /note="3' conserved sequence (CS); also called cyclization
                                sequence"
stem_loop      10631..10644
                                /note="short hairpin (sHP)"
regulatory     10642..10658
                                /regulatory_class="promoter"
                                /note="3' upstream AUG region (UAR)"
stem_loop      10645..10723
                                /note="3' stem-loop (3'SL)"

```

ORIGIN

```

1 agttgttagt ctacgtggac cgacaaagac agattctttg agggagctaa gctcaacgta
61 gttctaacag ttttttaatt agagagcaga tctctgatga ataaccaacg gaaaaaggcg
121 aaaaacacgc ctttcaatat gctgaaacgc gagagaaacc gcgtgtcgac tgtgcaacag
181 ctgacaaaga gattctcact tggaatgctg cagggacgag gaccattaaa actgttcatg
241 gccctggtgg cgttccttcg tttcctaaca atcccaccaa cagcagggat attgaagaga
301 tggggaacaa ttaaaaaatc aaaagctatt aatgttttga gaggggttcag gaaagagatt
361 ggaaggatgc tgaacatctt gaataggaga cgcagatctg caggcatgat cattatgctg
421 attccaacag tgatggcggt ccatttaacc acacgtaacg gagaaccaca catgatcgtc
481 agcagacaag agaaagggaa aagtcttctg tttaaaacag aggatggcgt gaacatgtgt
541 accctcatgg ccatggacct tgggtgaattg tgtgaagaca caatcacgta caagtgtccc
601 cttctcaggc agaatgagcc agaagacata gactgttggt gcaactctac gtccacgtgg
661 gtaacttatg ggacgtgtac caccatggga gaacatagaa gagaaaaaag atcagtggca
721 ctcgttccac atgtgggaat gggactggag acacgaactg aaacatggat gtcacagaa
781 ggggcctgga aacatgtcca gagaattgaa acttgatctt tgagacatcc aggcttcacc
841 atgatggcag caatctggc atacaccata ggaacgacac atttccaaag agcctgatt
901 ttcattctac tgacagctgt cactccttca atgacaatgc gttgcatagg aatgtcaaat
961 agagactttg tggaaggggt ttcaggagga agctgggttg acatagtctt agaacatgga
1021 agctgtgtga cgacgatggc aaaaaacaaa ccaacattgg attttgaact gataaaaaca
1081 gaagccaaac agcctgccac cctaaggaag tactgtatag aggcaaagct aaccaacaca
1141 acaacagaat ctgctgccc aacacaaggg gaaccagcc taaatgaaga gcaggacaaa
1201 aggttcgtct gcaaactc catggtagac agaggatggg gaaatggatg tggactatct
1261 ggaaagggag gcattgtgac ctgtgctatg ttcagatgca aaaagaacat ggaaggaaaa
1321 gttgtgcaac cagaaaactt ggaatacacc attgtgataa cacctcactc aggggaagag

```

1381 catgcagtcg gaaatgacac aggaaaacat ggcaaggaaa tcaaaataac accacagagt
1441 tccatcacag aagcagaatt gacaggttat ggcaactgtca caatggagtg ctctccaaga
1501 acgggcctcg acttcaatga gatggtgttg ctgcagatgg aaaataaaagc ttggctggtg
1561 cacaggcaat ggttcctaga cctgccgtta ccatggttgc cgggagcgga cacacaaggg
1621 tcaaattgga tacagaaaga gacatttggtc actttcaaaa atccccatgc gaagaaacag
1681 gatgttgttg ttttaggatc ccaagaaggg gccatgcaca cagcacttac aggggccaca
1741 gaaatccaaa tgtcatcagg aaacttactc ttcacaggac atctcaagtg caggctgaga
1801 atggacaagc tacagctcaa aggaatgtca tactctatgt gcacaggaaa gtttaaagtt
1861 gtgaaggaaa tagcagaaac acaacatgga acaatagtta tcagagtgc aatatgaaggg
1921 gacggctctc catgcaagat cccttttgag ataatggatt tggaaaaaag acatgtctta
1981 ggtcgcttga ttacagtcaa cccaattgtg acagaaaaag atagcccagt caacatagaa
2041 gcagaacctc cattcggaga cagctacatc atcataggag tagagccggg acaactgaag
2101 ctcaactggt ttaagaaagg aagttctatc ggccaaatgt ttgagacaac aatgaggggg
2161 gcgaagagaa tggccatttt aggtgacaca gcctgggatt ttggatcctt gggaggagtg
2221 tttacatcta taggaaaggc tctccaccaa gtctttggag caatctatgg agctgccttc
2281 agtggggttt catggactat gaaaatcctc ataggagtca ttatcacatg gataggaatg
2341 aattcacgca gcacctcact gtctgtgaca ctagtattgg tgggaattgt gacactgtat
2401 ttgggagtca tgggtcaggc cgatagtggg tgcgttgtga gctggaaaaa caaagaactg
2461 aaatgtggca gtgggatttt catcacagac aacgtgcaca catggacaga acaatacaag
2521 ttccaaccag aatccccttc aaaactagct tcagctatcc agaaagccca tgaagagggc
2581 atttgtggaa tccgctcagt aacaagactg gagaatctga tgtggaaaca aataacacca
2641 gaattgaatc acattctatc agaaaatgag gtgaagttaa ctattatgac aggagacatc
2701 aaaggaatca tgcaggcagg aaaacgatct ctgcggcctc agcccactga gctgaagtat
2761 tcatggaaaa catggggcaa agcaaaaatg ctctctacag agtctcataa ccagaccttt
2821 ctcatgtgatg gccccgaaac agcagaatgc cccaacacaa atagagcttg gaattcgttg
2881 gaagttgaag actatggctt tggagtattc accaccaata tatggctaaa attgaaagaa
2941 aaacaggatg tattctgcga ctcaaaactc atgtcagcgg ccataaaaga caacagagcc
3001 gtccatgccg atatgggtta ttggatagaa agtgcaactca atgacacatg gaagatagag
3061 aaagcctctt tcattgaagt taaaaactgc cactggccaa aatcacacac cctctggagc
3121 aatggagtgc tagaaagtga gatgataatt ccaaagaatc tcgctggacc agtgtctcaa
3181 cacaactata gaccaggcta ccatacacia ataacaggac catggcatct aggttaagctt
3241 gagatggact ttgatttctg tgatggaaca acagtggtag tgactgagga ctgcggaaat
3301 agaggacctt ctttgagaac aaccactgcc tctggaaaac tcataacaga atggtgctgc
3361 cgatcttgca cattaccacc gctaagatac agaggtgagg atgggtgctg gtacgggatg
3421 gaaatcagac cattgaagga gaaagaagag aatttgggtca actccttggt cacagctgga
3481 catgggcagg tcgacaactt ttcactagga gtcttgggaa tggcattggt cctggaggaa
3541 atgcttagga cccgagtagg aacgaaacat gcaatactac tagttgcagt ttcttttgtg
3601 acattgatca cagggaacat gtccctttaga gacctgggaa gagtgatggt tatggtaggc
3661 gccactatga cggatgacat aggtatgggc gtgacttatc ttgccctact agcagccttc
3721 aaagtcagac caacttttgc agctggacta ctcttgagaa agctgacctc caaggaattg
3781 atgatgacta ctataggaat tgtactcctc tcccagagca ccataccaga gaccattctt
3841 gagttgactg atgcgttagc cttaggcatt atggctcctc aaatgggtgag aaatatggaa
3901 aagtatcaat tggcagtgc tatcatggct atcttgtgcg tcccaaagc agtgatatta
3961 caaaacgcat ggaaagtgag ttgcacaata ttggcagtgg tgtccgtttc cccactgctc

4021 ttaacatcct cacagcaaaa aacagattgg ataccattag cattgacgat caaaggctctc
4081 aatccaacag ctatTTTTtct aacaaccctc tcaagaacca gcaagaaaag gagctggcca
4141 ttaaattgagg ctatcatggc agtcgggatg gtgagcattt tagccagttc tctcctaaaa
4201 aatgatattc ccatgacagg accatttagtg gctggagggc tctcactgt gtgctacgtg
4261 ctactggac gatcggccga tttggaactg gagagagcag ccgatgtcaa atgggaagac
4321 caggcagaga tatcaggaag cagtccaatc ctgtcaataa caatatcaga agatggtagc
4381 atgtcgataa aaaatgaaga ggaagaacaa aactgacca tactcattag aacaggattg
4441 ctgggtgatct caggactttt tctgtatca ataccaatca cggcagcagc atgggtacctg
4501 tgggaagtga agaaacaacg ggccggagta ttgtgggatg ttccttcacc cccacctatg
4561 ggaaaggctg aactggaaga tggagcctat agaattaagc aaaaagggat tcttgatat
4621 tccagatcg gagccggagt ttacaaagaa ggaacattcc atacaatgtg gcatgtcaca
4681 cgtggcgctg ttctaatac taaaggaaag aggattgaac catcatgggc ggacgtcaag
4741 aaagacctaa tatcatatgg aggaggctgg aagttagaag gagaatggaa ggaaggagaa
4801 gaagtccagg tattggcact ggagcctgga aaaaatccaa gagccgtcca aacgaaacct
4861 ggtcttttca aaaccaacgc cggaacaata ggtgctgtat ctctggactt ttctcctgga
4921 acgtcaggat ctccaattat cgacaaaaaa ggaaaagttg tgggtcttta tggtaatggt
4981 gttgttacaa ggagtggagc atatgtgagt gctatagccc agactgaaaa aagcattgaa
5041 gacaaccag agatcgaaga tgacattttc cgaaagagaa gactgaccat catggacctc
5101 caccaggag cgggaaagac gaagagatac cttccggcca tagtcagaga agctataaaa
5161 cggggtttga gaacattaat cttggccccc actagagttg tggcagctga aatggaggaa
5221 gcccttagag gacttccaat aagataccag accccagcca tcagagctga gcacaccggg
5281 cgggagattg tggacctaat gtgtcatgcc acatttacca tgaggctgct atcaccagtt
5341 agagtgccaa actacaacct gattatcatg gacgaagccc atttcacaga ccagcaagt
5401 atagcagcta gaggatacat ctcaactcga gtggagatgg gtgaggcagc tgggattttt
5461 atgacagcca ctccccggg aagcagagac ccatttcctc agagcaatgc accaatcata
5521 gatgaagaaa gagaaatccc tgaacgttcg tgggaattccg gacatgaatg ggtcacggat
5581 tttaaaggga agactgtttg gttcgttcca agtataaaaag caggaaatga tatagcagct
5641 tgcttagga aaaatggaaa gaaagtgata caactcagta ggaagacctt tgattctgag
5701 tatgtcaaga ctagaaccaa tgattgggac ttcgtgggta caactgacat ttcagaaatg
5761 ggtgccaat tcaaggctga gaggggtata gacccagac gctgcatgaa accagtcata
5821 ctaacagatg gtgaagagcg ggtgattctg gcaggacctg tgccagtac cactctagt
5881 gcagcacaaa gaagaggag aataggaaga aatccaaaa atgagaatga ccagtacata
5941 tacatggggg aacctctgga aaatgatgaa gactgtgcac actggaaaga agctaaaatg
6001 ctctagata acatcaacac gccagaagga atcattccta gcatgttcga accagagcgt
6061 gaaaagggtg atgccattga tggcgaatac cgcttgagag gagaagcaag gaaaaccttt
6121 gtagacttaa tgagaagagg agacctacca gtctggttg cctacagagt ggcagctgaa
6181 ggcacaaact acgcagacag aagggtggtg tttgatggag tcaagaacaa ccaaatccta
6241 gaagaaaacg tggaagtga aatctggaca aaagaagggg aaaggaagaa attgaaaccc
6301 agatggttg atgctaggat ctattctgac cactggcgc taaaagaatt taaggattt
6361 gcagccgga gaaagtctct gacctgaac ctaatcacag aaatgggtag gctcccaacc
6421 ttcatgactc agaaggcaag agacgcactg gacaacttag cagtgtgca cagggtgag
6481 gcaggtggaa gggcgtaaa ccatgctctc agtgaactgc cggagaccct ggagacattg
6541 cttttactga cacttctggc tacagtcacg ggagggatct ttttattctt gatgagcgga
6601 aggggcatag ggaagatgac cctgggaatg tgctgcataa tcacggctag catctccta

6661 tggtagcgac aaatacagcc aactggata gcagcttcaa taatactgga gttttttctc
6721 atagttttgc ttattccaga acctgaaaaa cagagaacac cccaagacaa ccaactgacc
6781 tacgttgtca tagccatcct cacagtgggtg gccgcaacca tggcaaacga gatgggtttc
6841 ctagaaaaaa cgaagaaaga tctcggattg ggaagcattg caaccagca acccgagagc
6901 aacatcctgg acatagatct acgtcctgca tcagcatgga cgctgtatgc cgtggccaca
6961 acatttggtta caccaatggt gagacatagc attgaaaatt cctcagtga tgtgtcccta
7021 acagctatag ccaaccaagc cacagtgtta atgggtctcg ggaaaggatg gccattgtca
7081 aagatggaca tcggagttcc ccttctcgcc attggatgct actcacaagt caaccccata
7141 actctcacag cagctctttt cttattggta gcacattatg ccatcatagg gccaggactc
7201 caagcaaaag caaccagaga agctcagaaa agagcagcgg cgggcatcat gaaaaacca
7261 actgtcgatg gaataacagt gattgaccta gatccaatac cttatgatcc aaagtttgaa
7321 aagcagttgg gacaagtaat gctcctagtc ctctgcgtga ctcaagtatt gatgatgagg
7381 actacatggg ctctgtgtga ggctttaacc ttagctaccg ggcccatctc cacattgtgg
7441 gaaggaaatc cagggaggtt ttggaacact accattgcgg tgtcaatggc taacattttt
7501 agagggagtt acttgcccg agctggactt ctcttttcta ttatgaagaa cacaaccaac
7561 acaagaaggg gaactggcaa cataggagag acgcttgag agaaatggaa aagccgattg
7621 aacgcattgg gaaaaagtga attccagatc tacaagaaaa gtggaatcca ggaagtggat
7681 agaaccttag caaaagaagg cattaaaaga ggagaaacgg accatcacgc tgtgtcgcga
7741 ggctcagcaa aactgagatg gttcgttgag agaaacatgg tcacaccaga agggaaagta
7801 gtggacctcg gttgtggcag aggaggctgg tcatactatt gtggaggact aaagaatgta
7861 agagaagtca aaggcctaac aaaaggagga ccaggacacg aagaacccat ccccatgtca
7921 acatatgggt ggaatctagt gcgtcttcaa agtggagttg acgttttctt catcccgcca
7981 gaaaagtgtg acacattatt gtgtgacata ggggagtcac caccaaatcc cacagtggaa
8041 gcaggacgaa cactcagagt ccttaactta gtagaaaatt ggttgaacaa caacactcaa
8101 ttttgcataa aggttctcaa cccatatatg cctcagtca tagaaaaaat ggaagcacta
8161 caaaggaaat atggaggagc cttagttagg aatccactct caggaactc cacacatgag
8221 atgtactggg tatccaatgc ttccgggaac atagtgtcat cagtgaacat gatttcaagg
8281 atgttgatca acagatttac aatgagatac aagaaagcca cttacgagcc ggatgttgac
8341 ctcggaagcg gaaccgtaa catcgggatt gaaagtgaga taccaaacct agatataatt
8401 gggaaaagaa tagaaaaaat aaagcaagag catgaaacat catggcacta tgaccaagac
8461 caccataca aaacgtgggc ataccatggt agctatgaaa caaacagac tggatcagca
8521 tcatccatgg tcaacggagt ggtcaggctg ctgacaaaac cttgggacgt cgtcccatg
8581 gtgacacaga tggcaatgac agacacgact ccatttgac aacagcgcgt ttttaagag
8641 aaagtggaca cgagaacca agaaccgaaa gaaggcacga agaaactaat gaaaataaca
8701 gcagagtggc tttggaaaga attaggaag aaaaagacac ccaggatgtg caccagagaa
8761 gaattcacia gaaaggtgag aagcaatgca gccttggggg ccatattcac tgatgagaac
8821 aagtggaaat cggcacgtga ggctgttgaa gatagtaggt tttgggagct ggttgacaag
8881 gaaaggaatc tccatcttga aggaaagtgt gaaacatgtg tgtacaacat gatgggaaaa
8941 agagagaaga agctagggga attcggcaag gcaaaaggca gcagagccat atggtacatg
9001 tggcttgag cagcttctt agagtttgaa gccctaggat tcttaaatga agatcactgg
9061 ttctccagag agaactccct gagtggagtg gaaggagaag ggctgcacia gctaggttac
9121 attctaagag acgtgagcaa gaaagaggga ggagcaatgt atgccgatga caccgcagga
9181 tgggatacaa gaatcacact agaagaccta aaaaatgaag aaatggtaac aaaccacatg
9241 gaaggagaac acaagaaact agccgaggcc attttcaaac taacgtacca aaacaaggtg

9301 gtgcgtgtgc aaagaccaac accaagaggc acagtaatgg acatcatatc gagaagagac
9361 caaagaggta gtggacaagt tggcacctat ggactcaata ctttcaccaa tatggaagcc
9421 caactaatca gacagatgga gggagaagga gtctttaaaa gcattcagca cctaacaatc
9481 acagaagaaa tcgctgtgca aaactgggta gcaagagtgg ggcgcgaaaag gttatcaaga
9541 atggccatca gtggagatga ttgtgtttgtg aaaccttttag atgacagggt cgcaagcgct
9601 ttaacagctc taaatgacat gggaaagatt aggaaagaca tacaacaatg ggaaccttca
9661 agaggatgga atgattggac acaagtgcc ttctgttcac accatttcca tgagttaatc
9721 atgaaagacg gtcgcgtact cgttgttcca tgtagaaacc aagatgaact gattggcaga
9781 gcccgaatct cccaaggagc aggggtgtct ttgcgggaga cggcctgttt ggggaagtct
9841 tacgccccaa tgtggagctt gatgtacttc cacagacgcg acctcaggct ggcggcaaat
9901 gctattttgt cggcagtacc atcacattgg gttccaacaa gtggaacaac ctggtccata
9961 catgctaaac atgaatggat gacaacggaa gacatgctga cagtctggaa caggggtgtg
10021 attcaagaaa acccatggat ggaagacaaa actccagtgg aatcatggga ggaaatccca
10081 tacttgggga aaagagaaga ccaatggtgc ggctcattga ttgggttaac aagcagggcc
10141 acctgggcaa agaacatcca agcagcaata aatcaagtta gatcccttat aggcaatgaa
10201 gaatacacag attacatgcc atccatgaaa agattcagaa gagaagagga agaagcagga
10261 gttctgtggt agaaagcaaa actaacatga aacaaggcta gaagtcaggt cggattaagc
10321 catagtacgg aaaaaactat gctacctgtg agccccgtcc aaggacgtta aaagaagtca
10381 ggccatcata aatgccatag cttgagtaaa ctatgcagcc tgtagctcca cctgagaagg
10441 tgtaaaaaat ccgggaggcc acaaaccatg gaagctgtac gcatggcgta gtggactagc
10501 ggtagagga gacccctccc ttacaaatcg cagcaacaat gggggcccaa ggcgagatga
10561 agctgtagtc tcgctggaag gactagaggt tagaggagac cccccgaaa caaaaaacag
10621 catattgacg ctgggaaaga ccagagatcc tgctgtctcc tcagcatcat tccaggcaca
10681 gaacgccaga aaatggaatg gtgctgttga atcaacaggt tct

//