Untitled

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## These exercises were from r-exercises web page.

library(rentrez)

## Warning: package 'rentrez' was built under R version 3.4.1

library(seqinr)

Print all the available data bases which you can access through rentrez package.

print(entrez\_dbs())

## [1] "pubmed" "protein" "nuccore"   
## [4] "nucleotide" "nucgss" "nucest"   
## [7] "structure" "sparcle" "genome"   
## [10] "annotinfo" "assembly" "bioproject"   
## [13] "biosample" "blastdbinfo" "books"   
## [16] "cdd" "clinvar" "clone"   
## [19] "gap" "gapplus" "grasp"   
## [22] "dbvar" "gene" "gds"   
## [25] "geoprofiles" "homologene" "medgen"   
## [28] "mesh" "ncbisearch" "nlmcatalog"   
## [31] "omim" "orgtrack" "pmc"   
## [34] "popset" "probe" "proteinclusters"  
## [37] "pcassay" "biosystems" "pccompound"   
## [40] "pcsubstance" "pubmedhealth" "seqannot"   
## [43] "snp" "sra" "taxonomy"   
## [46] "biocollections" "unigene" "gencoll"   
## [49] "gtr"

Print all the searchable terms in a database.

print(entrez\_db\_searchable("nuccore"))

## Searchable fields for database 'nuccore'  
## ALL All terms from all searchable fields   
## UID Unique number assigned to each sequence   
## FILT Limits the records   
## WORD Free text associated with record   
## TITL Words in definition line   
## KYWD Nonstandardized terms provided by submitter   
## AUTH Author(s) of publication   
## JOUR Journal abbreviation of publication   
## VOL Volume number of publication   
## ISS Issue number of publication   
## PAGE Page number(s) of publication   
## ORGN Scientific and common names of organism, and all higher levels of taxonomy   
## ACCN Accession number of sequence   
## PACC Does not include retired secondary accessions   
## GENE Name of gene associated with sequence   
## PROT Name of protein associated with sequence   
## ECNO EC number for enzyme or CAS registry number   
## PDAT Date sequence added to GenBank   
## MDAT Date of last update   
## SUBS CAS chemical name or MEDLINE Substance Name   
## PROP Classification by source qualifiers and molecule type   
## SQID String identifier for sequence   
## GPRJ BioProject   
## SLEN Length of sequence   
## FKEY Feature annotated on sequence   
## PORG Scientific and common names of primary organism, and all higher levels of taxonomy   
## COMP Component accessions for an assembly   
## ASSM Assembly   
## DIV Division   
## STRN Strain   
## ISOL Isolate   
## CULT Cultivar   
## BRD Breed   
## BIOS BioSample

Display the details of any database of your choice.

print(entrez\_db\_summary("protein"))

## DbName: protein  
## MenuName: Protein  
## Description: Protein sequence record  
## DbBuild: Build170701-1801m.1  
## Count: 411103262  
## LastUpdate: 2017/07/03 04:32

Retrieve and print 10 ids of nucleotide sequences from nuccore database about Human.

library (rentrez)  
human <- "Homo Sapiens[Organism]"  
human\_search <- entrez\_search(db="nuccore", term=human, retmax=10)  
print(human\_search$ids)

## [1] "1214357213" "1214357212" "1214357211" "1214357210" "1214357209"  
## [6] "1214357208" "1214357207" "1214357206" "1214357205" "1214357204"

Retrieve and print 20 ids of protein sequences from protein database about Human.

library (rentrez)  
human <- "Homo Sapiens[Organism]"  
protein\_search <- entrez\_search(db="protein", term = human, retmax=20)  
print(protein\_search$ids)

## [1] "1213953399" "1213953397" "1213953394" "1213953388" "1213953386"  
## [6] "1213953384" "1213953382" "1213953380" "1213953376" "1213953371"  
## [11] "1213953369" "1213953363" "1213953361" "1213953359" "1213953356"  
## [16] "1213953353" "1213953351" "1213953349" "1213953347" "1213953345"

Create a Fasta File for a particular human protein sequence from the listed ids.

library (rentrez)  
human <- "Homo Sapiens[Organism]"  
human\_seqs <- entrez\_fetch(db="protein", id=324120908, rettype="fasta")  
write(human\_seqs, file="seq2.fasta")

Create a Fasta File for a particular human nucleotide sequence from the listed ids.

library (rentrez)  
human <- "Homo Sapiens[Organism]"  
human\_seqs <- entrez\_fetch(db="nuccore", id=1179910149, rettype="fasta")  
write(human\_seqs, file="seq1.fasta")

Open the Nucleotide Fasta file and print the details using seqinr package.

library("seqinr")  
sequ<-read.fasta(file="seq1.fasta", as.string = TRUE, seqtype="DNA")  
print(sequ)

## $NM\_006078.4  
## [1] "tccttttctttttaaaaaaaaaacactgcaactggaacagtttctgatctcaaaaggcaagcctcttcccgtgtgatctttataatttacactcttttccgtgagctttcttacctccctttttttataactctccatattctctattcatacatatatccattatattagtagtggaataatttttatttttatttattttttttggctttagtacttgcaccctcacacacactctcccgagaaccagaagtcggttgggtgtttatataatgaagaattatggggctgtttgatcgaggtgttcaaatgcttttaaccaccgttggtgctttcgctgccttcagcctgatgaccatagctgtgggaaccgactattggctctactccagaggggtttgcaagaccaaaagtgtcagtgagaatgaaaccagcaaaaagaacgaggaagttatgacccattccggattatggagaacctgctgcctagaagggaatttcaaaggtctgtgcaagcaaattgatcacttcccagaggatgcagattacgaagctgacacagcagaatatttcctccgggccgtgagggcctccagcattttcccaatcctgagtgtgattctgcttttcatgggtggcctctgcatcgcagccagcgagttctacaaaactcgacacaacatcatcctgagtgccggcatcttcttcgtgtctgcaggtctgagtaacatcattggcatcatagtgtacatatctgccaatgccggagacccctccaagagcgactccaaaaagaatagttactcatacggctggtccttctacttcggggccctgtccttcatcatcgccgagatggtcggggtgctggcggtgcacatgtttatcgaccggcacaaacagctgcgggccacggcccgcgccacggactacctccaggcctctgccatcacccgcatccccagctaccgctaccgctaccagcgccgcagccgctccagctcgcgctccacggagccctcacactccagggacgcctcccccgtgggcatcaagggcttcaacaccctgccgtccacggagatctccatgtacacgctcagcagggaccccctgaaggccgccaccacgcccaccgccacctacaactccgacagggataacagcttcctccaggttcacaactgtatccagaaggagaacaaggactctctccactccaacacagccaaccgccggaccacccccgtataaagaccgcgggcctcgccagaagaccgcgggaggagggcgcggtccccgggggcggggcggggcggggagacccagaccctccgctgggagaccttccaaaagcaaaaacaaaaaacaaaaaaaacaaaaaaacaaaaaacaaaaaaacacacacacacaaaaaaagagaaaaaacataacaagtaaattttaaaaaaaagaacaaaatataagaggaacaaagaagcaaaacaacaggaaatgtgggaaaatataaacgagggaagaaaacaaactttaaaaaaaagcgagagggataaaaaattaaaaatagaaaataaatctaaaagaaaatgcatgatttcccatgtaccattattttaacatttaataaaaatcaatttaaatgaaaaaataaaagggaaccaagataacattaaagcaaaaaaaaaaaaaatgagaacagaaaggaaaggggatgtcctttgtatttttcagggtttatgttactttttttttttttttttaactcggggagagttacttttctgttccctttaacccccagcgggccctgcctccctgggagattggggggcgagactcaggggccctggggccaggtgagcctgcagtcactgccaggtccctggagcccctgggtgggtgccccaggaactccaggaaggctcagagctcgagccggctccgcccagcattgatggggcaatcgtaggcctccaggtgaccgagcccttgtccctcctctccgttagggtgcctggaggggggtacacttggggcttgcctggccccaggttcccagtccttaatgctccttaacccactgtgatgacttcctaggccttgaggaaagggaaggagaggggaggctgccggtggcttaccaagatgccggaaaccccggaatcctcagggtgagcctcttggggtcatgtccccaagctcctgtccttggggtcaggagatgccacccccccccccgggggacatgaaacagctctccctcctcacccctcacctcagggccacctgatgaccctggggcgatggtggaccccctgactcataagccccccagtcccctgggaagggggttcattgaccctttgggggtccttggactcactgatgcccccttggggcccagcgggttcaacaatgacactgcaaaaaggcttctttttacaaaagaaaaaggaaaaacaagtggtgatttttttttaataaaaaaaccacagactataaataaatgtaaatacaaaataagtggatttacttgcaagaaaatcagatagtatttttcttttaattcttttccagctttaaactgtgaaaacaaaaaatggggcggggtgggggacttaaactttagcagggaacttgtaaagaaaaaaaaaacagaaaacgaatatacaaatccatttacaaaaacaaagcaaaaccgttgtgagaggtgagagctgggcttgaaggttggagggagtagcggaaggtcccagtgagctgcagggggtctctgtgatggaaaggtggcttcctcagacaaggaaggtgctgcgaatgggggaagacagaatccaacaaagaaagagaccacacaccccacacgcacacaggcacgttcacacacacatacacagtccacttagcccagcactgcagtcactcacagggacacactcagtctcaacccttccatcccatacacggccaggggcgtggctcaaaggaaattgactcatgccctccaaagccatggacgacaacaactccacactggcctttgtgttcattcacaacctcccaacagagcatacacatgaacacacacatgcacacatacccacacacgcacacatacccacacacacacacacaccactcgcatgcatgggaagggcacccgtctagaatccaggactggattccggaattccttgctgcatggcctctctgggccttaattttccccccatgtaagcatgtggattgacccagagaagcactaaaggcccattcttgctctatgtatctgtgacttaagatctgccacctgccccgaggatatgccagggatgaccaggacagctgccaccaagcccccaggctcatcatcagtcagcctctcagacacacacacacacacacaccatatacctcctcactgtgctccccgaacacctgcccccacatccaatgtcaaagcaaaaatacacacatgtgagcaaacataaagctgttcaggcaaagaggggaaagacgcaggggtccccaaagcccttcttcactttgtgtccccttgctgcgatcatggagagttaaagaggcttccttgggagaagagctctgccaccagggcttccccagtgtctttgggggtctgtgaaaaagaggatcctctgaggtttactgggagggctcaaggctgagggaatggagaggaaaattttagcagttccatcccagtgtaaggaccaaccccaaaagttaaacttgcaccacagactaaaggtcaagggcatcctgtgtttctcccctttcttccccagagtgacaagggccagttcagactgacagaaatccaacagctttcctgagctggaaatttcagaacagtctgcaagttactcccaggtgactgaaggtcaaggtgaggcccccctgcctctgcctgcgagtctcccccggtttgcatttttcttgacaccggcatttcctgaggttgagctctctggggagttctagagaatggctagtaaggctttttgagcttgcacatctcacctgcctttcctgtcttttgcctgggaaaggaaagttattttcccaggtcagcaaggggcagaacatcggccagcccagcccagaagtacagggggaggtcatgggccctggggcagaacaatgggagacaattcaaggtgtggtaacaacaaccaagttgccctcagtctgggcagaaactgaactctacccctctcccaccccaatcttgcccgccatcccaccagattccagacctaaagggatcaaggatgagagcgaagggagaagggagggtccccaagaaaaccgcacccaagcgagcactgtctgaagagaaaaactagctccagttctccgaattctggcagagcgtctgggaaggcgatcagtgcttctttccatggcgcaaggcctgggttctgggtgtgcttgaagaaagccactggggtgtggggtgacatcgccatggctgagaaggggctagggggtccggagggaaggagccaggaccggaactgcaagggcgttgctgcccaggggtgtggatgattgctcatgtccagctcagaccagttcaagaaactaacctccatttattttcttggtgagtcctttttttttttttcagactgttaacagaaaaaaaattttaaaaagcagaaaactgaaaaaaaaaatcctggtacatgaaataaagattttttttttttata"  
## attr(,"name")  
## [1] "NM\_006078.4"  
## attr(,"Annot")  
## [1] ">NM\_006078.4 Homo sapiens calcium voltage-gated channel auxiliary subunit gamma 2 (CACNG2), mRNA"  
## attr(,"class")  
## [1] "SeqFastadna"

Open the Protein Fasta file and print the details using seqinr package.

library (rentrez)  
human <- "Homo Sapiens[Organism]"  
human\_seqs <- entrez\_fetch(db="protein", id=324120908, rettype="fasta")  
write(human\_seqs, file="seq2.fasta")

Open the Nucleotide Fasta file and print only sequence from the created Fasta file striping all other information.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta", as.string = TRUE, seqtype="DNA", strip.desc=TRUE,seqonly=TRUE)  
print(seq1)

## [[1]]  
## [1] "TCCTTTTCTTTTTAAAAAAAAAACACTGCAACTGGAACAGTTTCTGATCTCAAAAGGCAAGCCTCTTCCCGTGTGATCTTTATAATTTACACTCTTTTCCGTGAGCTTTCTTACCTCCCTTTTTTTATAACTCTCCATATTCTCTATTCATACATATATCCATTATATTAGTAGTGGAATAATTTTTATTTTTATTTATTTTTTTTGGCTTTAGTACTTGCACCCTCACACACACTCTCCCGAGAACCAGAAGTCGGTTGGGTGTTTATATAATGAAGAATTATGGGGCTGTTTGATCGAGGTGTTCAAATGCTTTTAACCACCGTTGGTGCTTTCGCTGCCTTCAGCCTGATGACCATAGCTGTGGGAACCGACTATTGGCTCTACTCCAGAGGGGTTTGCAAGACCAAAAGTGTCAGTGAGAATGAAACCAGCAAAAAGAACGAGGAAGTTATGACCCATTCCGGATTATGGAGAACCTGCTGCCTAGAAGGGAATTTCAAAGGTCTGTGCAAGCAAATTGATCACTTCCCAGAGGATGCAGATTACGAAGCTGACACAGCAGAATATTTCCTCCGGGCCGTGAGGGCCTCCAGCATTTTCCCAATCCTGAGTGTGATTCTGCTTTTCATGGGTGGCCTCTGCATCGCAGCCAGCGAGTTCTACAAAACTCGACACAACATCATCCTGAGTGCCGGCATCTTCTTCGTGTCTGCAGGTCTGAGTAACATCATTGGCATCATAGTGTACATATCTGCCAATGCCGGAGACCCCTCCAAGAGCGACTCCAAAAAGAATAGTTACTCATACGGCTGGTCCTTCTACTTCGGGGCCCTGTCCTTCATCATCGCCGAGATGGTCGGGGTGCTGGCGGTGCACATGTTTATCGACCGGCACAAACAGCTGCGGGCCACGGCCCGCGCCACGGACTACCTCCAGGCCTCTGCCATCACCCGCATCCCCAGCTACCGCTACCGCTACCAGCGCCGCAGCCGCTCCAGCTCGCGCTCCACGGAGCCCTCACACTCCAGGGACGCCTCCCCCGTGGGCATCAAGGGCTTCAACACCCTGCCGTCCACGGAGATCTCCATGTACACGCTCAGCAGGGACCCCCTGAAGGCCGCCACCACGCCCACCGCCACCTACAACTCCGACAGGGATAACAGCTTCCTCCAGGTTCACAACTGTATCCAGAAGGAGAACAAGGACTCTCTCCACTCCAACACAGCCAACCGCCGGACCACCCCCGTATAAAGACCGCGGGCCTCGCCAGAAGACCGCGGGAGGAGGGCGCGGTCCCCGGGGGCGGGGCGGGGCGGGGAGACCCAGACCCTCCGCTGGGAGACCTTCCAAAAGCAAAAACAAAAAACAAAAAAAACAAAAAAACAAAAAACAAAAAAACACACACACACAAAAAAAGAGAAAAAACATAACAAGTAAATTTTAAAAAAAAGAACAAAATATAAGAGGAACAAAGAAGCAAAACAACAGGAAATGTGGGAAAATATAAACGAGGGAAGAAAACAAACTTTAAAAAAAAGCGAGAGGGATAAAAAATTAAAAATAGAAAATAAATCTAAAAGAAAATGCATGATTTCCCATGTACCATTATTTTAACATTTAATAAAAATCAATTTAAATGAAAAAATAAAAGGGAACCAAGATAACATTAAAGCAAAAAAAAAAAAAATGAGAACAGAAAGGAAAGGGGATGTCCTTTGTATTTTTCAGGGTTTATGTTACTTTTTTTTTTTTTTTTTAACTCGGGGAGAGTTACTTTTCTGTTCCCTTTAACCCCCAGCGGGCCCTGCCTCCCTGGGAGATTGGGGGGCGAGACTCAGGGGCCCTGGGGCCAGGTGAGCCTGCAGTCACTGCCAGGTCCCTGGAGCCCCTGGGTGGGTGCCCCAGGAACTCCAGGAAGGCTCAGAGCTCGAGCCGGCTCCGCCCAGCATTGATGGGGCAATCGTAGGCCTCCAGGTGACCGAGCCCTTGTCCCTCCTCTCCGTTAGGGTGCCTGGAGGGGGGTACACTTGGGGCTTGCCTGGCCCCAGGTTCCCAGTCCTTAATGCTCCTTAACCCACTGTGATGACTTCCTAGGCCTTGAGGAAAGGGAAGGAGAGGGGAGGCTGCCGGTGGCTTACCAAGATGCCGGAAACCCCGGAATCCTCAGGGTGAGCCTCTTGGGGTCATGTCCCCAAGCTCCTGTCCTTGGGGTCAGGAGATGCCACCCCCCCCCCCGGGGGACATGAAACAGCTCTCCCTCCTCACCCCTCACCTCAGGGCCACCTGATGACCCTGGGGCGATGGTGGACCCCCTGACTCATAAGCCCCCCAGTCCCCTGGGAAGGGGGTTCATTGACCCTTTGGGGGTCCTTGGACTCACTGATGCCCCCTTGGGGCCCAGCGGGTTCAACAATGACACTGCAAAAAGGCTTCTTTTTACAAAAGAAAAAGGAAAAACAAGTGGTGATTTTTTTTTAATAAAAAAACCACAGACTATAAATAAATGTAAATACAAAATAAGTGGATTTACTTGCAAGAAAATCAGATAGTATTTTTCTTTTAATTCTTTTCCAGCTTTAAACTGTGAAAACAAAAAATGGGGCGGGGTGGGGGACTTAAACTTTAGCAGGGAACTTGTAAAGAAAAAAAAAACAGAAAACGAATATACAAATCCATTTACAAAAACAAAGCAAAACCGTTGTGAGAGGTGAGAGCTGGGCTTGAAGGTTGGAGGGAGTAGCGGAAGGTCCCAGTGAGCTGCAGGGGGTCTCTGTGATGGAAAGGTGGCTTCCTCAGACAAGGAAGGTGCTGCGAATGGGGGAAGACAGAATCCAACAAAGAAAGAGACCACACACCCCACACGCACACAGGCACGTTCACACACACATACACAGTCCACTTAGCCCAGCACTGCAGTCACTCACAGGGACACACTCAGTCTCAACCCTTCCATCCCATACACGGCCAGGGGCGTGGCTCAAAGGAAATTGACTCATGCCCTCCAAAGCCATGGACGACAACAACTCCACACTGGCCTTTGTGTTCATTCACAACCTCCCAACAGAGCATACACATGAACACACACATGCACACATACCCACACACGCACACATACCCACACACACACACACACCACTCGCATGCATGGGAAGGGCACCCGTCTAGAATCCAGGACTGGATTCCGGAATTCCTTGCTGCATGGCCTCTCTGGGCCTTAATTTTCCCCCCATGTAAGCATGTGGATTGACCCAGAGAAGCACTAAAGGCCCATTCTTGCTCTATGTATCTGTGACTTAAGATCTGCCACCTGCCCCGAGGATATGCCAGGGATGACCAGGACAGCTGCCACCAAGCCCCCAGGCTCATCATCAGTCAGCCTCTCAGACACACACACACACACACACCATATACCTCCTCACTGTGCTCCCCGAACACCTGCCCCCACATCCAATGTCAAAGCAAAAATACACACATGTGAGCAAACATAAAGCTGTTCAGGCAAAGAGGGGAAAGACGCAGGGGTCCCCAAAGCCCTTCTTCACTTTGTGTCCCCTTGCTGCGATCATGGAGAGTTAAAGAGGCTTCCTTGGGAGAAGAGCTCTGCCACCAGGGCTTCCCCAGTGTCTTTGGGGGTCTGTGAAAAAGAGGATCCTCTGAGGTTTACTGGGAGGGCTCAAGGCTGAGGGAATGGAGAGGAAAATTTTAGCAGTTCCATCCCAGTGTAAGGACCAACCCCAAAAGTTAAACTTGCACCACAGACTAAAGGTCAAGGGCATCCTGTGTTTCTCCCCTTTCTTCCCCAGAGTGACAAGGGCCAGTTCAGACTGACAGAAATCCAACAGCTTTCCTGAGCTGGAAATTTCAGAACAGTCTGCAAGTTACTCCCAGGTGACTGAAGGTCAAGGTGAGGCCCCCCTGCCTCTGCCTGCGAGTCTCCCCCGGTTTGCATTTTTCTTGACACCGGCATTTCCTGAGGTTGAGCTCTCTGGGGAGTTCTAGAGAATGGCTAGTAAGGCTTTTTGAGCTTGCACATCTCACCTGCCTTTCCTGTCTTTTGCCTGGGAAAGGAAAGTTATTTTCCCAGGTCAGCAAGGGGCAGAACATCGGCCAGCCCAGCCCAGAAGTACAGGGGGAGGTCATGGGCCCTGGGGCAGAACAATGGGAGACAATTCAAGGTGTGGTAACAACAACCAAGTTGCCCTCAGTCTGGGCAGAAACTGAACTCTACCCCTCTCCCACCCCAATCTTGCCCGCCATCCCACCAGATTCCAGACCTAAAGGGATCAAGGATGAGAGCGAAGGGAGAAGGGAGGGTCCCCAAGAAAACCGCACCCAAGCGAGCACTGTCTGAAGAGAAAAACTAGCTCCAGTTCTCCGAATTCTGGCAGAGCGTCTGGGAAGGCGATCAGTGCTTCTTTCCATGGCGCAAGGCCTGGGTTCTGGGTGTGCTTGAAGAAAGCCACTGGGGTGTGGGGTGACATCGCCATGGCTGAGAAGGGGCTAGGGGGTCCGGAGGGAAGGAGCCAGGACCGGAACTGCAAGGGCGTTGCTGCCCAGGGGTGTGGATGATTGCTCATGTCCAGCTCAGACCAGTTCAAGAAACTAACCTCCATTTATTTTCTTGGTGAGTCCTTTTTTTTTTTTTCAGACTGTTAACAGAAAAAAAATTTTAAAAAGCAGAAAACTGAAAAAAAAAATCCTGGTACATGAAATAAAGATTTTTTTTTTTTATA"

Read a Fasta File in your current directory and print the sequence.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
print(seq1)

## $NM\_006078.4  
## [1] "t" "c" "c" "t" "t" "t" "t" "c" "t" "t" "t" "t" "t" "a" "a" "a" "a"  
## [18] "a" "a" "a" "a" "a" "a" "c" "a" "c" "t" "g" "c" "a" "a" "c" "t" "g"  
## [35] "g" "a" "a" "c" "a" "g" "t" "t" "t" "c" "t" "g" "a" "t" "c" "t" "c"  
## [52] "a" "a" "a" "a" "g" "g" "c" "a" "a" "g" "c" "c" "t" "c" "t" "t" "c"  
## [69] "c" "c" "g" "t" "g" "t" "g" "a" "t" "c" "t" "t" "t" "a" "t" "a" "a"  
## [86] "t" "t" "t" "a" "c" "a" "c" "t" "c" "t" "t" "t" "t" "c" "c" "g" "t"  
## [103] "g" "a" "g" "c" "t" "t" "t" "c" "t" "t" "a" "c" "c" "t" "c" "c" "c"  
## [120] "t" "t" "t" "t" "t" "t" "t" "a" "t" "a" "a" "c" "t" "c" "t" "c" "c"  
## [137] "a" "t" "a" "t" "t" "c" "t" "c" "t" "a" "t" "t" "c" "a" "t" "a" "c"  
## [154] "a" "t" "a" "t" "a" "t" "c" "c" "a" "t" "t" "a" "t" "a" "t" "t" "a"  
## [171] "g" "t" "a" "g" "t" "g" "g" "a" "a" "t" "a" "a" "t" "t" "t" "t" "t"  
## [188] "a" "t" "t" "t" "t" "t" "a" "t" "t" "t" "a" "t" "t" "t" "t" "t" "t"  
## [205] "t" "t" "g" "g" "c" "t" "t" "t" "a" "g" "t" "a" "c" "t" "t" "g" "c"  
## [222] "a" "c" "c" "c" "t" "c" "a" "c" "a" "c" "a" "c" "a" "c" "t" "c" "t"  
## [239] "c" "c" "c" "g" "a" "g" "a" "a" "c" "c" "a" "g" "a" "a" "g" "t" "c"  
## [256] "g" "g" "t" "t" "g" "g" "g" "t" "g" "t" "t" "t" "a" "t" "a" "t" "a"  
## [273] "a" "t" "g" "a" "a" "g" "a" "a" "t" "t" "a" "t" "g" "g" "g" "g" "c"  
## [290] "t" "g" "t" "t" "t" "g" "a" "t" "c" "g" "a" "g" "g" "t" "g" "t" "t"  
## [307] "c" "a" "a" "a" "t" "g" "c" "t" "t" "t" "t" "a" "a" "c" "c" "a" "c"  
## [324] "c" "g" "t" "t" "g" "g" "t" "g" "c" "t" "t" "t" "c" "g" "c" "t" "g"  
## [341] "c" "c" "t" "t" "c" "a" "g" "c" "c" "t" "g" "a" "t" "g" "a" "c" "c"  
## [358] "a" "t" "a" "g" "c" "t" "g" "t" "g" "g" "g" "a" "a" "c" "c" "g" "a"  
## [375] "c" "t" "a" "t" "t" "g" "g" "c" "t" "c" "t" "a" "c" "t" "c" "c" "a"  
## [392] "g" "a" "g" "g" "g" "g" "t" "t" "t" "g" "c" "a" "a" "g" "a" "c" "c"  
## [409] "a" "a" "a" "a" "g" "t" "g" "t" "c" "a" "g" "t" "g" "a" "g" "a" "a"  
## [426] "t" "g" "a" "a" "a" "c" "c" "a" "g" "c" "a" "a" "a" "a" "a" "g" "a"  
## [443] "a" "c" "g" "a" "g" "g" "a" "a" "g" "t" "t" "a" "t" "g" "a" "c" "c"  
## [460] "c" "a" "t" "t" "c" "c" "g" "g" "a" "t" "t" "a" "t" "g" "g" "a" "g"  
## [477] "a" "a" "c" "c" "t" "g" "c" "t" "g" "c" "c" "t" "a" "g" "a" "a" "g"  
## [494] "g" "g" "a" "a" "t" "t" "t" "c" "a" "a" "a" "g" "g" "t" "c" "t" "g"  
## [511] "t" "g" "c" "a" "a" "g" "c" "a" "a" "a" "t" "t" "g" "a" "t" "c" "a"  
## [528] "c" "t" "t" "c" "c" "c" "a" "g" "a" "g" "g" "a" "t" "g" "c" "a" "g"  
## [545] "a" "t" "t" "a" "c" "g" "a" "a" "g" "c" "t" "g" "a" "c" "a" "c" "a"  
## [562] "g" "c" "a" "g" "a" "a" "t" "a" "t" "t" "t" "c" "c" "t" "c" "c" "g"  
## [579] "g" "g" "c" "c" "g" "t" "g" "a" "g" "g" "g" "c" "c" "t" "c" "c" "a"  
## [596] "g" "c" "a" "t" "t" "t" "t" "c" "c" "c" "a" "a" "t" "c" "c" "t" "g"  
## [613] "a" "g" "t" "g" "t" "g" "a" "t" "t" "c" "t" "g" "c" "t" "t" "t" "t"  
## [630] "c" "a" "t" "g" "g" "g" "t" "g" "g" "c" "c" "t" "c" "t" "g" "c" "a"  
## [647] "t" "c" "g" "c" "a" "g" "c" "c" "a" "g" "c" "g" "a" "g" "t" "t" "c"  
## [664] "t" "a" "c" "a" "a" "a" "a" "c" "t" "c" "g" "a" "c" "a" "c" "a" "a"  
## [681] "c" "a" "t" "c" "a" "t" "c" "c" "t" "g" "a" "g" "t" "g" "c" "c" "g"  
## [698] "g" "c" "a" "t" "c" "t" "t" "c" "t" "t" "c" "g" "t" "g" "t" "c" "t"  
## [715] "g" "c" "a" "g" "g" "t" "c" "t" "g" "a" "g" "t" "a" "a" "c" "a" "t"  
## [732] "c" "a" "t" "t" "g" "g" "c" "a" "t" "c" "a" "t" "a" "g" "t" "g" "t"  
## [749] "a" "c" "a" "t" "a" "t" "c" "t" "g" "c" "c" "a" "a" "t" "g" "c" "c"  
## [766] "g" "g" "a" "g" "a" "c" "c" "c" "c" "t" "c" "c" "a" "a" "g" "a" "g"  
## [783] "c" "g" "a" "c" "t" "c" "c" "a" "a" "a" "a" "a" "g" "a" "a" "t" "a"  
## [800] "g" "t" "t" "a" "c" "t" "c" "a" "t" "a" "c" "g" "g" "c" "t" "g" "g"  
## [817] "t" "c" "c" "t" "t" "c" "t" "a" "c" "t" "t" "c" "g" "g" "g" "g" "c"  
## [834] "c" "c" "t" "g" "t" "c" "c" "t" "t" "c" "a" "t" "c" "a" "t" "c" "g"  
## [851] "c" "c" "g" "a" "g" "a" "t" "g" "g" "t" "c" "g" "g" "g" "g" "t" "g"  
## [868] "c" "t" "g" "g" "c" "g" "g" "t" "g" "c" "a" "c" "a" "t" "g" "t" "t"  
## [885] "t" "a" "t" "c" "g" "a" "c" "c" "g" "g" "c" "a" "c" "a" "a" "a" "c"  
## [902] "a" "g" "c" "t" "g" "c" "g" "g" "g" "c" "c" "a" "c" "g" "g" "c" "c"  
## [919] "c" "g" "c" "g" "c" "c" "a" "c" "g" "g" "a" "c" "t" "a" "c" "c" "t"  
## [936] "c" "c" "a" "g" "g" "c" "c" "t" "c" "t" "g" "c" "c" "a" "t" "c" "a"  
## [953] "c" "c" "c" "g" "c" "a" "t" "c" "c" "c" "c" "a" "g" "c" "t" "a" "c"  
## [970] "c" "g" "c" "t" "a" "c" "c" "g" "c" "t" "a" "c" "c" "a" "g" "c" "g"  
## [987] "c" "c" "g" "c" "a" "g" "c" "c" "g" "c" "t" "c" "c" "a" "g" "c" "t"  
## [1004] "c" "g" "c" "g" "c" "t" "c" "c" "a" "c" "g" "g" "a" "g" "c" "c" "c"  
## [1021] "t" "c" "a" "c" "a" "c" "t" "c" "c" "a" "g" "g" "g" "a" "c" "g" "c"  
## [1038] "c" "t" "c" "c" "c" "c" "c" "g" "t" "g" "g" "g" "c" "a" "t" "c" "a"  
## [1055] "a" "g" "g" "g" "c" "t" "t" "c" "a" "a" "c" "a" "c" "c" "c" "t" "g"  
## [1072] "c" "c" "g" "t" "c" "c" "a" "c" "g" "g" "a" "g" "a" "t" "c" "t" "c"  
## [1089] "c" "a" "t" "g" "t" "a" "c" "a" "c" "g" "c" "t" "c" "a" "g" "c" "a"  
## [1106] "g" "g" "g" "a" "c" "c" "c" "c" "c" "t" "g" "a" "a" "g" "g" "c" "c"  
## [1123] "g" "c" "c" "a" "c" "c" "a" "c" "g" "c" "c" "c" "a" "c" "c" "g" "c"  
## [1140] "c" "a" "c" "c" "t" "a" "c" "a" "a" "c" "t" "c" "c" "g" "a" "c" "a"  
## [1157] "g" "g" "g" "a" "t" "a" "a" "c" "a" "g" "c" "t" "t" "c" "c" "t" "c"  
## [1174] "c" "a" "g" "g" "t" "t" "c" "a" "c" "a" "a" "c" "t" "g" "t" "a" "t"  
## [1191] "c" "c" "a" "g" "a" "a" "g" "g" "a" "g" "a" "a" "c" "a" "a" "g" "g"  
## [1208] "a" "c" "t" "c" "t" "c" "t" "c" "c" "a" "c" "t" "c" "c" "a" "a" "c"  
## [1225] "a" "c" "a" "g" "c" "c" "a" "a" "c" "c" "g" "c" "c" "g" "g" "a" "c"  
## [1242] "c" "a" "c" "c" "c" "c" "c" "g" "t" "a" "t" "a" "a" "a" "g" "a" "c"  
## [1259] "c" "g" "c" "g" "g" "g" "c" "c" "t" "c" "g" "c" "c" "a" "g" "a" "a"  
## [1276] "g" "a" "c" "c" "g" "c" "g" "g" "g" "a" "g" "g" "a" "g" "g" "g" "c"  
## [1293] "g" "c" "g" "g" "t" "c" "c" "c" "c" "g" "g" "g" "g" "g" "c" "g" "g"  
## [1310] "g" "g" "c" "g" "g" "g" "g" "c" "g" "g" "g" "g" "a" "g" "a" "c" "c"  
## [1327] "c" "a" "g" "a" "c" "c" "c" "t" "c" "c" "g" "c" "t" "g" "g" "g" "a"  
## [1344] "g" "a" "c" "c" "t" "t" "c" "c" "a" "a" "a" "a" "g" "c" "a" "a" "a"  
## [1361] "a" "a" "c" "a" "a" "a" "a" "a" "a" "c" "a" "a" "a" "a" "a" "a" "a"  
## [1378] "a" "c" "a" "a" "a" "a" "a" "a" "a" "c" "a" "a" "a" "a" "a" "a" "c"  
## [1395] "a" "a" "a" "a" "a" "a" "a" "c" "a" "c" "a" "c" "a" "c" "a" "c" "a"  
## [1412] "c" "a" "a" "a" "a" "a" "a" "a" "g" "a" "g" "a" "a" "a" "a" "a" "a"  
## [1429] "c" "a" "t" "a" "a" "c" "a" "a" "g" "t" "a" "a" "a" "t" "t" "t" "t"  
## [1446] "a" "a" "a" "a" "a" "a" "a" "a" "g" "a" "a" "c" "a" "a" "a" "a" "t"  
## [1463] "a" "t" "a" "a" "g" "a" "g" "g" "a" "a" "c" "a" "a" "a" "g" "a" "a"  
## [1480] "g" "c" "a" "a" "a" "a" "c" "a" "a" "c" "a" "g" "g" "a" "a" "a" "t"  
## [1497] "g" "t" "g" "g" "g" "a" "a" "a" "a" "t" "a" "t" "a" "a" "a" "c" "g"  
## [1514] "a" "g" "g" "g" "a" "a" "g" "a" "a" "a" "a" "c" "a" "a" "a" "c" "t"  
## [1531] "t" "t" "a" "a" "a" "a" "a" "a" "a" "a" "g" "c" "g" "a" "g" "a" "g"  
## [1548] "g" "g" "a" "t" "a" "a" "a" "a" "a" "a" "t" "t" "a" "a" "a" "a" "a"  
## [1565] "t" "a" "g" "a" "a" "a" "a" "t" "a" "a" "a" "t" "c" "t" "a" "a" "a"  
## [1582] "a" "g" "a" "a" "a" "a" "t" "g" "c" "a" "t" "g" "a" "t" "t" "t" "c"  
## [1599] "c" "c" "a" "t" "g" "t" "a" "c" "c" "a" "t" "t" "a" "t" "t" "t" "t"  
## [1616] "a" "a" "c" "a" "t" "t" "t" "a" "a" "t" "a" "a" "a" "a" "a" "t" "c"  
## [1633] "a" "a" "t" "t" "t" "a" "a" "a" "t" "g" "a" "a" "a" "a" "a" "a" "t"  
## [1650] "a" "a" "a" "a" "g" "g" "g" "a" "a" "c" "c" "a" "a" "g" "a" "t" "a"  
## [1667] "a" "c" "a" "t" "t" "a" "a" "a" "g" "c" "a" "a" "a" "a" "a" "a" "a"  
## [1684] "a" "a" "a" "a" "a" "a" "a" "t" "g" "a" "g" "a" "a" "c" "a" "g" "a"  
## [1701] "a" "a" "g" "g" "a" "a" "a" "g" "g" "g" "g" "a" "t" "g" "t" "c" "c"  
## [1718] "t" "t" "t" "g" "t" "a" "t" "t" "t" "t" "t" "c" "a" "g" "g" "g" "t"  
## [1735] "t" "t" "a" "t" "g" "t" "t" "a" "c" "t" "t" "t" "t" "t" "t" "t" "t"  
## [1752] "t" "t" "t" "t" "t" "t" "t" "t" "t" "a" "a" "c" "t" "c" "g" "g" "g"  
## [1769] "g" "a" "g" "a" "g" "t" "t" "a" "c" "t" "t" "t" "t" "c" "t" "g" "t"  
## [1786] "t" "c" "c" "c" "t" "t" "t" "a" "a" "c" "c" "c" "c" "c" "a" "g" "c"  
## [1803] "g" "g" "g" "c" "c" "c" "t" "g" "c" "c" "t" "c" "c" "c" "t" "g" "g"  
## [1820] "g" "a" "g" "a" "t" "t" "g" "g" "g" "g" "g" "g" "c" "g" "a" "g" "a"  
## [1837] "c" "t" "c" "a" "g" "g" "g" "g" "c" "c" "c" "t" "g" "g" "g" "g" "c"  
## [1854] "c" "a" "g" "g" "t" "g" "a" "g" "c" "c" "t" "g" "c" "a" "g" "t" "c"  
## [1871] "a" "c" "t" "g" "c" "c" "a" "g" "g" "t" "c" "c" "c" "t" "g" "g" "a"  
## [1888] "g" "c" "c" "c" "c" "t" "g" "g" "g" "t" "g" "g" "g" "t" "g" "c" "c"  
## [1905] "c" "c" "a" "g" "g" "a" "a" "c" "t" "c" "c" "a" "g" "g" "a" "a" "g"  
## [1922] "g" "c" "t" "c" "a" "g" "a" "g" "c" "t" "c" "g" "a" "g" "c" "c" "g"  
## [1939] "g" "c" "t" "c" "c" "g" "c" "c" "c" "a" "g" "c" "a" "t" "t" "g" "a"  
## [1956] "t" "g" "g" "g" "g" "c" "a" "a" "t" "c" "g" "t" "a" "g" "g" "c" "c"  
## [1973] "t" "c" "c" "a" "g" "g" "t" "g" "a" "c" "c" "g" "a" "g" "c" "c" "c"  
## [1990] "t" "t" "g" "t" "c" "c" "c" "t" "c" "c" "t" "c" "t" "c" "c" "g" "t"  
## [2007] "t" "a" "g" "g" "g" "t" "g" "c" "c" "t" "g" "g" "a" "g" "g" "g" "g"  
## [2024] "g" "g" "t" "a" "c" "a" "c" "t" "t" "g" "g" "g" "g" "c" "t" "t" "g"  
## [2041] "c" "c" "t" "g" "g" "c" "c" "c" "c" "a" "g" "g" "t" "t" "c" "c" "c"  
## [2058] "a" "g" "t" "c" "c" "t" "t" "a" "a" "t" "g" "c" "t" "c" "c" "t" "t"  
## [2075] "a" "a" "c" "c" "c" "a" "c" "t" "g" "t" "g" "a" "t" "g" "a" "c" "t"  
## [2092] "t" "c" "c" "t" "a" "g" "g" "c" "c" "t" "t" "g" "a" "g" "g" "a" "a"  
## [2109] "a" "g" "g" "g" "a" "a" "g" "g" "a" "g" "a" "g" "g" "g" "g" "a" "g"  
## [2126] "g" "c" "t" "g" "c" "c" "g" "g" "t" "g" "g" "c" "t" "t" "a" "c" "c"  
## [2143] "a" "a" "g" "a" "t" "g" "c" "c" "g" "g" "a" "a" "a" "c" "c" "c" "c"  
## [2160] "g" "g" "a" "a" "t" "c" "c" "t" "c" "a" "g" "g" "g" "t" "g" "a" "g"  
## [2177] "c" "c" "t" "c" "t" "t" "g" "g" "g" "g" "t" "c" "a" "t" "g" "t" "c"  
## [2194] "c" "c" "c" "a" "a" "g" "c" "t" "c" "c" "t" "g" "t" "c" "c" "t" "t"  
## [2211] "g" "g" "g" "g" "t" "c" "a" "g" "g" "a" "g" "a" "t" "g" "c" "c" "a"  
## [2228] "c" "c" "c" "c" "c" "c" "c" "c" "c" "c" "c" "g" "g" "g" "g" "g" "a"  
## [2245] "c" "a" "t" "g" "a" "a" "a" "c" "a" "g" "c" "t" "c" "t" "c" "c" "c"  
## [2262] "t" "c" "c" "t" "c" "a" "c" "c" "c" "c" "t" "c" "a" "c" "c" "t" "c"  
## [2279] "a" "g" "g" "g" "c" "c" "a" "c" "c" "t" "g" "a" "t" "g" "a" "c" "c"  
## [2296] "c" "t" "g" "g" "g" "g" "c" "g" "a" "t" "g" "g" "t" "g" "g" "a" "c"  
## [2313] "c" "c" "c" "c" "t" "g" "a" "c" "t" "c" "a" "t" "a" "a" "g" "c" "c"  
## [2330] "c" "c" "c" "c" "a" "g" "t" "c" "c" "c" "c" "t" "g" "g" "g" "a" "a"  
## [2347] "g" "g" "g" "g" "g" "t" "t" "c" "a" "t" "t" "g" "a" "c" "c" "c" "t"  
## [2364] "t" "t" "g" "g" "g" "g" "g" "t" "c" "c" "t" "t" "g" "g" "a" "c" "t"  
## [2381] "c" "a" "c" "t" "g" "a" "t" "g" "c" "c" "c" "c" "c" "t" "t" "g" "g"  
## [2398] "g" "g" "c" "c" "c" "a" "g" "c" "g" "g" "g" "t" "t" "c" "a" "a" "c"  
## [2415] "a" "a" "t" "g" "a" "c" "a" "c" "t" "g" "c" "a" "a" "a" "a" "a" "g"  
## [2432] "g" "c" "t" "t" "c" "t" "t" "t" "t" "t" "a" "c" "a" "a" "a" "a" "g"  
## [2449] "a" "a" "a" "a" "a" "g" "g" "a" "a" "a" "a" "a" "c" "a" "a" "g" "t"  
## [2466] "g" "g" "t" "g" "a" "t" "t" "t" "t" "t" "t" "t" "t" "t" "a" "a" "t"  
## [2483] "a" "a" "a" "a" "a" "a" "a" "c" "c" "a" "c" "a" "g" "a" "c" "t" "a"  
## [2500] "t" "a" "a" "a" "t" "a" "a" "a" "t" "g" "t" "a" "a" "a" "t" "a" "c"  
## [2517] "a" "a" "a" "a" "t" "a" "a" "g" "t" "g" "g" "a" "t" "t" "t" "a" "c"  
## [2534] "t" "t" "g" "c" "a" "a" "g" "a" "a" "a" "a" "t" "c" "a" "g" "a" "t"  
## [2551] "a" "g" "t" "a" "t" "t" "t" "t" "t" "c" "t" "t" "t" "t" "a" "a" "t"  
## [2568] "t" "c" "t" "t" "t" "t" "c" "c" "a" "g" "c" "t" "t" "t" "a" "a" "a"  
## [2585] "c" "t" "g" "t" "g" "a" "a" "a" "a" "c" "a" "a" "a" "a" "a" "a" "t"  
## [2602] "g" "g" "g" "g" "c" "g" "g" "g" "g" "t" "g" "g" "g" "g" "g" "a" "c"  
## [2619] "t" "t" "a" "a" "a" "c" "t" "t" "t" "a" "g" "c" "a" "g" "g" "g" "a"  
## [2636] "a" "c" "t" "t" "g" "t" "a" "a" "a" "g" "a" "a" "a" "a" "a" "a" "a"  
## [2653] "a" "a" "a" "c" "a" "g" "a" "a" "a" "a" "c" "g" "a" "a" "t" "a" "t"  
## [2670] "a" "c" "a" "a" "a" "t" "c" "c" "a" "t" "t" "t" "a" "c" "a" "a" "a"  
## [2687] "a" "a" "c" "a" "a" "a" "g" "c" "a" "a" "a" "a" "c" "c" "g" "t" "t"  
## [2704] "g" "t" "g" "a" "g" "a" "g" "g" "t" "g" "a" "g" "a" "g" "c" "t" "g"  
## [2721] "g" "g" "c" "t" "t" "g" "a" "a" "g" "g" "t" "t" "g" "g" "a" "g" "g"  
## [2738] "g" "a" "g" "t" "a" "g" "c" "g" "g" "a" "a" "g" "g" "t" "c" "c" "c"  
## [2755] "a" "g" "t" "g" "a" "g" "c" "t" "g" "c" "a" "g" "g" "g" "g" "g" "t"  
## [2772] "c" "t" "c" "t" "g" "t" "g" "a" "t" "g" "g" "a" "a" "a" "g" "g" "t"  
## [2789] "g" "g" "c" "t" "t" "c" "c" "t" "c" "a" "g" "a" "c" "a" "a" "g" "g"  
## [2806] "a" "a" "g" "g" "t" "g" "c" "t" "g" "c" "g" "a" "a" "t" "g" "g" "g"  
## [2823] "g" "g" "a" "a" "g" "a" "c" "a" "g" "a" "a" "t" "c" "c" "a" "a" "c"  
## [2840] "a" "a" "a" "g" "a" "a" "a" "g" "a" "g" "a" "c" "c" "a" "c" "a" "c"  
## [2857] "a" "c" "c" "c" "c" "a" "c" "a" "c" "g" "c" "a" "c" "a" "c" "a" "g"  
## [2874] "g" "c" "a" "c" "g" "t" "t" "c" "a" "c" "a" "c" "a" "c" "a" "c" "a"  
## [2891] "t" "a" "c" "a" "c" "a" "g" "t" "c" "c" "a" "c" "t" "t" "a" "g" "c"  
## [2908] "c" "c" "a" "g" "c" "a" "c" "t" "g" "c" "a" "g" "t" "c" "a" "c" "t"  
## [2925] "c" "a" "c" "a" "g" "g" "g" "a" "c" "a" "c" "a" "c" "t" "c" "a" "g"  
## [2942] "t" "c" "t" "c" "a" "a" "c" "c" "c" "t" "t" "c" "c" "a" "t" "c" "c"  
## [2959] "c" "a" "t" "a" "c" "a" "c" "g" "g" "c" "c" "a" "g" "g" "g" "g" "c"  
## [2976] "g" "t" "g" "g" "c" "t" "c" "a" "a" "a" "g" "g" "a" "a" "a" "t" "t"  
## [2993] "g" "a" "c" "t" "c" "a" "t" "g" "c" "c" "c" "t" "c" "c" "a" "a" "a"  
## [3010] "g" "c" "c" "a" "t" "g" "g" "a" "c" "g" "a" "c" "a" "a" "c" "a" "a"  
## [3027] "c" "t" "c" "c" "a" "c" "a" "c" "t" "g" "g" "c" "c" "t" "t" "t" "g"  
## [3044] "t" "g" "t" "t" "c" "a" "t" "t" "c" "a" "c" "a" "a" "c" "c" "t" "c"  
## [3061] "c" "c" "a" "a" "c" "a" "g" "a" "g" "c" "a" "t" "a" "c" "a" "c" "a"  
## [3078] "t" "g" "a" "a" "c" "a" "c" "a" "c" "a" "c" "a" "t" "g" "c" "a" "c"  
## [3095] "a" "c" "a" "t" "a" "c" "c" "c" "a" "c" "a" "c" "a" "c" "g" "c" "a"  
## [3112] "c" "a" "c" "a" "t" "a" "c" "c" "c" "a" "c" "a" "c" "a" "c" "a" "c"  
## [3129] "a" "c" "a" "c" "a" "c" "a" "c" "c" "a" "c" "t" "c" "g" "c" "a" "t"  
## [3146] "g" "c" "a" "t" "g" "g" "g" "a" "a" "g" "g" "g" "c" "a" "c" "c" "c"  
## [3163] "g" "t" "c" "t" "a" "g" "a" "a" "t" "c" "c" "a" "g" "g" "a" "c" "t"  
## [3180] "g" "g" "a" "t" "t" "c" "c" "g" "g" "a" "a" "t" "t" "c" "c" "t" "t"  
## [3197] "g" "c" "t" "g" "c" "a" "t" "g" "g" "c" "c" "t" "c" "t" "c" "t" "g"  
## [3214] "g" "g" "c" "c" "t" "t" "a" "a" "t" "t" "t" "t" "c" "c" "c" "c" "c"  
## [3231] "c" "a" "t" "g" "t" "a" "a" "g" "c" "a" "t" "g" "t" "g" "g" "a" "t"  
## [3248] "t" "g" "a" "c" "c" "c" "a" "g" "a" "g" "a" "a" "g" "c" "a" "c" "t"  
## [3265] "a" "a" "a" "g" "g" "c" "c" "c" "a" "t" "t" "c" "t" "t" "g" "c" "t"  
## [3282] "c" "t" "a" "t" "g" "t" "a" "t" "c" "t" "g" "t" "g" "a" "c" "t" "t"  
## [3299] "a" "a" "g" "a" "t" "c" "t" "g" "c" "c" "a" "c" "c" "t" "g" "c" "c"  
## [3316] "c" "c" "g" "a" "g" "g" "a" "t" "a" "t" "g" "c" "c" "a" "g" "g" "g"  
## [3333] "a" "t" "g" "a" "c" "c" "a" "g" "g" "a" "c" "a" "g" "c" "t" "g" "c"  
## [3350] "c" "a" "c" "c" "a" "a" "g" "c" "c" "c" "c" "c" "a" "g" "g" "c" "t"  
## [3367] "c" "a" "t" "c" "a" "t" "c" "a" "g" "t" "c" "a" "g" "c" "c" "t" "c"  
## [3384] "t" "c" "a" "g" "a" "c" "a" "c" "a" "c" "a" "c" "a" "c" "a" "c" "a"  
## [3401] "c" "a" "c" "a" "c" "a" "c" "c" "a" "t" "a" "t" "a" "c" "c" "t" "c"  
## [3418] "c" "t" "c" "a" "c" "t" "g" "t" "g" "c" "t" "c" "c" "c" "c" "g" "a"  
## [3435] "a" "c" "a" "c" "c" "t" "g" "c" "c" "c" "c" "c" "a" "c" "a" "t" "c"  
## [3452] "c" "a" "a" "t" "g" "t" "c" "a" "a" "a" "g" "c" "a" "a" "a" "a" "a"  
## [3469] "t" "a" "c" "a" "c" "a" "c" "a" "t" "g" "t" "g" "a" "g" "c" "a" "a"  
## [3486] "a" "c" "a" "t" "a" "a" "a" "g" "c" "t" "g" "t" "t" "c" "a" "g" "g"  
## [3503] "c" "a" "a" "a" "g" "a" "g" "g" "g" "g" "a" "a" "a" "g" "a" "c" "g"  
## [3520] "c" "a" "g" "g" "g" "g" "t" "c" "c" "c" "c" "a" "a" "a" "g" "c" "c"  
## [3537] "c" "t" "t" "c" "t" "t" "c" "a" "c" "t" "t" "t" "g" "t" "g" "t" "c"  
## [3554] "c" "c" "c" "t" "t" "g" "c" "t" "g" "c" "g" "a" "t" "c" "a" "t" "g"  
## [3571] "g" "a" "g" "a" "g" "t" "t" "a" "a" "a" "g" "a" "g" "g" "c" "t" "t"  
## [3588] "c" "c" "t" "t" "g" "g" "g" "a" "g" "a" "a" "g" "a" "g" "c" "t" "c"  
## [3605] "t" "g" "c" "c" "a" "c" "c" "a" "g" "g" "g" "c" "t" "t" "c" "c" "c"  
## [3622] "c" "a" "g" "t" "g" "t" "c" "t" "t" "t" "g" "g" "g" "g" "g" "t" "c"  
## [3639] "t" "g" "t" "g" "a" "a" "a" "a" "a" "g" "a" "g" "g" "a" "t" "c" "c"  
## [3656] "t" "c" "t" "g" "a" "g" "g" "t" "t" "t" "a" "c" "t" "g" "g" "g" "a"  
## [3673] "g" "g" "g" "c" "t" "c" "a" "a" "g" "g" "c" "t" "g" "a" "g" "g" "g"  
## [3690] "a" "a" "t" "g" "g" "a" "g" "a" "g" "g" "a" "a" "a" "a" "t" "t" "t"  
## [3707] "t" "a" "g" "c" "a" "g" "t" "t" "c" "c" "a" "t" "c" "c" "c" "a" "g"  
## [3724] "t" "g" "t" "a" "a" "g" "g" "a" "c" "c" "a" "a" "c" "c" "c" "c" "a"  
## [3741] "a" "a" "a" "g" "t" "t" "a" "a" "a" "c" "t" "t" "g" "c" "a" "c" "c"  
## [3758] "a" "c" "a" "g" "a" "c" "t" "a" "a" "a" "g" "g" "t" "c" "a" "a" "g"  
## [3775] "g" "g" "c" "a" "t" "c" "c" "t" "g" "t" "g" "t" "t" "t" "c" "t" "c"  
## [3792] "c" "c" "c" "t" "t" "t" "c" "t" "t" "c" "c" "c" "c" "a" "g" "a" "g"  
## [3809] "t" "g" "a" "c" "a" "a" "g" "g" "g" "c" "c" "a" "g" "t" "t" "c" "a"  
## [3826] "g" "a" "c" "t" "g" "a" "c" "a" "g" "a" "a" "a" "t" "c" "c" "a" "a"  
## [3843] "c" "a" "g" "c" "t" "t" "t" "c" "c" "t" "g" "a" "g" "c" "t" "g" "g"  
## [3860] "a" "a" "a" "t" "t" "t" "c" "a" "g" "a" "a" "c" "a" "g" "t" "c" "t"  
## [3877] "g" "c" "a" "a" "g" "t" "t" "a" "c" "t" "c" "c" "c" "a" "g" "g" "t"  
## [3894] "g" "a" "c" "t" "g" "a" "a" "g" "g" "t" "c" "a" "a" "g" "g" "t" "g"  
## [3911] "a" "g" "g" "c" "c" "c" "c" "c" "c" "t" "g" "c" "c" "t" "c" "t" "g"  
## [3928] "c" "c" "t" "g" "c" "g" "a" "g" "t" "c" "t" "c" "c" "c" "c" "c" "g"  
## [3945] "g" "t" "t" "t" "g" "c" "a" "t" "t" "t" "t" "t" "c" "t" "t" "g" "a"  
## [3962] "c" "a" "c" "c" "g" "g" "c" "a" "t" "t" "t" "c" "c" "t" "g" "a" "g"  
## [3979] "g" "t" "t" "g" "a" "g" "c" "t" "c" "t" "c" "t" "g" "g" "g" "g" "a"  
## [3996] "g" "t" "t" "c" "t" "a" "g" "a" "g" "a" "a" "t" "g" "g" "c" "t" "a"  
## [4013] "g" "t" "a" "a" "g" "g" "c" "t" "t" "t" "t" "t" "g" "a" "g" "c" "t"  
## [4030] "t" "g" "c" "a" "c" "a" "t" "c" "t" "c" "a" "c" "c" "t" "g" "c" "c"  
## [4047] "t" "t" "t" "c" "c" "t" "g" "t" "c" "t" "t" "t" "t" "g" "c" "c" "t"  
## [4064] "g" "g" "g" "a" "a" "a" "g" "g" "a" "a" "a" "g" "t" "t" "a" "t" "t"  
## [4081] "t" "t" "c" "c" "c" "a" "g" "g" "t" "c" "a" "g" "c" "a" "a" "g" "g"  
## [4098] "g" "g" "c" "a" "g" "a" "a" "c" "a" "t" "c" "g" "g" "c" "c" "a" "g"  
## [4115] "c" "c" "c" "a" "g" "c" "c" "c" "a" "g" "a" "a" "g" "t" "a" "c" "a"  
## [4132] "g" "g" "g" "g" "g" "a" "g" "g" "t" "c" "a" "t" "g" "g" "g" "c" "c"  
## [4149] "c" "t" "g" "g" "g" "g" "c" "a" "g" "a" "a" "c" "a" "a" "t" "g" "g"  
## [4166] "g" "a" "g" "a" "c" "a" "a" "t" "t" "c" "a" "a" "g" "g" "t" "g" "t"  
## [4183] "g" "g" "t" "a" "a" "c" "a" "a" "c" "a" "a" "c" "c" "a" "a" "g" "t"  
## [4200] "t" "g" "c" "c" "c" "t" "c" "a" "g" "t" "c" "t" "g" "g" "g" "c" "a"  
## [4217] "g" "a" "a" "a" "c" "t" "g" "a" "a" "c" "t" "c" "t" "a" "c" "c" "c"  
## [4234] "c" "t" "c" "t" "c" "c" "c" "a" "c" "c" "c" "c" "a" "a" "t" "c" "t"  
## [4251] "t" "g" "c" "c" "c" "g" "c" "c" "a" "t" "c" "c" "c" "a" "c" "c" "a"  
## [4268] "g" "a" "t" "t" "c" "c" "a" "g" "a" "c" "c" "t" "a" "a" "a" "g" "g"  
## [4285] "g" "a" "t" "c" "a" "a" "g" "g" "a" "t" "g" "a" "g" "a" "g" "c" "g"  
## [4302] "a" "a" "g" "g" "g" "a" "g" "a" "a" "g" "g" "g" "a" "g" "g" "g" "t"  
## [4319] "c" "c" "c" "c" "a" "a" "g" "a" "a" "a" "a" "c" "c" "g" "c" "a" "c"  
## [4336] "c" "c" "a" "a" "g" "c" "g" "a" "g" "c" "a" "c" "t" "g" "t" "c" "t"  
## [4353] "g" "a" "a" "g" "a" "g" "a" "a" "a" "a" "a" "c" "t" "a" "g" "c" "t"  
## [4370] "c" "c" "a" "g" "t" "t" "c" "t" "c" "c" "g" "a" "a" "t" "t" "c" "t"  
## [4387] "g" "g" "c" "a" "g" "a" "g" "c" "g" "t" "c" "t" "g" "g" "g" "a" "a"  
## [4404] "g" "g" "c" "g" "a" "t" "c" "a" "g" "t" "g" "c" "t" "t" "c" "t" "t"  
## [4421] "t" "c" "c" "a" "t" "g" "g" "c" "g" "c" "a" "a" "g" "g" "c" "c" "t"  
## [4438] "g" "g" "g" "t" "t" "c" "t" "g" "g" "g" "t" "g" "t" "g" "c" "t" "t"  
## [4455] "g" "a" "a" "g" "a" "a" "a" "g" "c" "c" "a" "c" "t" "g" "g" "g" "g"  
## [4472] "t" "g" "t" "g" "g" "g" "g" "t" "g" "a" "c" "a" "t" "c" "g" "c" "c"  
## [4489] "a" "t" "g" "g" "c" "t" "g" "a" "g" "a" "a" "g" "g" "g" "g" "c" "t"  
## [4506] "a" "g" "g" "g" "g" "g" "t" "c" "c" "g" "g" "a" "g" "g" "g" "a" "a"  
## [4523] "g" "g" "a" "g" "c" "c" "a" "g" "g" "a" "c" "c" "g" "g" "a" "a" "c"  
## [4540] "t" "g" "c" "a" "a" "g" "g" "g" "c" "g" "t" "t" "g" "c" "t" "g" "c"  
## [4557] "c" "c" "a" "g" "g" "g" "g" "t" "g" "t" "g" "g" "a" "t" "g" "a" "t"  
## [4574] "t" "g" "c" "t" "c" "a" "t" "g" "t" "c" "c" "a" "g" "c" "t" "c" "a"  
## [4591] "g" "a" "c" "c" "a" "g" "t" "t" "c" "a" "a" "g" "a" "a" "a" "c" "t"  
## [4608] "a" "a" "c" "c" "t" "c" "c" "a" "t" "t" "t" "a" "t" "t" "t" "t" "c"  
## [4625] "t" "t" "g" "g" "t" "g" "a" "g" "t" "c" "c" "t" "t" "t" "t" "t" "t"  
## [4642] "t" "t" "t" "t" "t" "t" "t" "c" "a" "g" "a" "c" "t" "g" "t" "t" "a"  
## [4659] "a" "c" "a" "g" "a" "a" "a" "a" "a" "a" "a" "a" "t" "t" "t" "t" "a"  
## [4676] "a" "a" "a" "a" "g" "c" "a" "g" "a" "a" "a" "a" "c" "t" "g" "a" "a"  
## [4693] "a" "a" "a" "a" "a" "a" "a" "a" "t" "c" "c" "t" "g" "g" "t" "a" "c"  
## [4710] "a" "t" "g" "a" "a" "a" "t" "a" "a" "a" "g" "a" "t" "t" "t" "t" "t"  
## [4727] "t" "t" "t" "t" "t" "t" "t" "a" "t" "a"  
## attr(,"name")  
## [1] "NM\_006078.4"  
## attr(,"Annot")  
## [1] ">NM\_006078.4 Homo sapiens calcium voltage-gated channel auxiliary subunit gamma 2 (CACNG2), mRNA"  
## attr(,"class")  
## [1] "SeqFastadna"

Read a Fasta File in your current directory and print the length of the sequences.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta", as.string=FALSE)  
length(seq1[[1]])

## [1] 4736

Read a Fasta File in your current directory and count each nucleotide in the file.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
count(seq1[[1]],1)

##   
## a c g t   
## 1344 1246 1116 1030

Read a Fasta File in your current directory and print the details of the sequences.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
print(getAnnot(seq1))

## [[1]]  
## [1] ">NM\_006078.4 Homo sapiens calcium voltage-gated channel auxiliary subunit gamma 2 (CACNG2), mRNA"

Read a Fasta File in your current directory and count all dinucleotides in the file.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
count(seq1[[1]],2)

##   
## aa ac ag at ca cc cg ct ga gc gg gt ta tc tg tt   
## 493 300 334 216 403 421 117 305 293 255 389 179 155 270 276 329

Read a Fasta File in your current directory and print the GC contents.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
print("GC Contents")

## [1] "GC Contents"

print(GC(seq1[[1]]))

## [1] 0.4987331

Read a Fasta File in your current directory and print sequences as characters.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
print(sequences)

## [1] "t" "c" "c" "t" "t" "t" "t" "c" "t" "t" "t" "t" "t" "a" "a" "a" "a"  
## [18] "a" "a" "a" "a" "a" "a" "c" "a" "c" "t" "g" "c" "a" "a" "c" "t" "g"  
## [35] "g" "a" "a" "c" "a" "g" "t" "t" "t" "c" "t" "g" "a" "t" "c" "t" "c"  
## [52] "a" "a" "a" "a" "g" "g" "c" "a" "a" "g" "c" "c" "t" "c" "t" "t" "c"  
## [69] "c" "c" "g" "t" "g" "t" "g" "a" "t" "c" "t" "t" "t" "a" "t" "a" "a"  
## [86] "t" "t" "t" "a" "c" "a" "c" "t" "c" "t" "t" "t" "t" "c" "c" "g" "t"  
## [103] "g" "a" "g" "c" "t" "t" "t" "c" "t" "t" "a" "c" "c" "t" "c" "c" "c"  
## [120] "t" "t" "t" "t" "t" "t" "t" "a" "t" "a" "a" "c" "t" "c" "t" "c" "c"  
## [137] "a" "t" "a" "t" "t" "c" "t" "c" "t" "a" "t" "t" "c" "a" "t" "a" "c"  
## [154] "a" "t" "a" "t" "a" "t" "c" "c" "a" "t" "t" "a" "t" "a" "t" "t" "a"  
## [171] "g" "t" "a" "g" "t" "g" "g" "a" "a" "t" "a" "a" "t" "t" "t" "t" "t"  
## [188] "a" "t" "t" "t" "t" "t" "a" "t" "t" "t" "a" "t" "t" "t" "t" "t" "t"  
## [205] "t" "t" "g" "g" "c" "t" "t" "t" "a" "g" "t" "a" "c" "t" "t" "g" "c"  
## [222] "a" "c" "c" "c" "t" "c" "a" "c" "a" "c" "a" "c" "a" "c" "t" "c" "t"  
## [239] "c" "c" "c" "g" "a" "g" "a" "a" "c" "c" "a" "g" "a" "a" "g" "t" "c"  
## [256] "g" "g" "t" "t" "g" "g" "g" "t" "g" "t" "t" "t" "a" "t" "a" "t" "a"  
## [273] "a" "t" "g" "a" "a" "g" "a" "a" "t" "t" "a" "t" "g" "g" "g" "g" "c"  
## [290] "t" "g" "t" "t" "t" "g" "a" "t" "c" "g" "a" "g" "g" "t" "g" "t" "t"  
## [307] "c" "a" "a" "a" "t" "g" "c" "t" "t" "t" "t" "a" "a" "c" "c" "a" "c"  
## [324] "c" "g" "t" "t" "g" "g" "t" "g" "c" "t" "t" "t" "c" "g" "c" "t" "g"  
## [341] "c" "c" "t" "t" "c" "a" "g" "c" "c" "t" "g" "a" "t" "g" "a" "c" "c"  
## [358] "a" "t" "a" "g" "c" "t" "g" "t" "g" "g" "g" "a" "a" "c" "c" "g" "a"  
## [375] "c" "t" "a" "t" "t" "g" "g" "c" "t" "c" "t" "a" "c" "t" "c" "c" "a"  
## [392] "g" "a" "g" "g" "g" "g" "t" "t" "t" "g" "c" "a" "a" "g" "a" "c" "c"  
## [409] "a" "a" "a" "a" "g" "t" "g" "t" "c" "a" "g" "t" "g" "a" "g" "a" "a"  
## [426] "t" "g" "a" "a" "a" "c" "c" "a" "g" "c" "a" "a" "a" "a" "a" "g" "a"  
## [443] "a" "c" "g" "a" "g" "g" "a" "a" "g" "t" "t" "a" "t" "g" "a" "c" "c"  
## [460] "c" "a" "t" "t" "c" "c" "g" "g" "a" "t" "t" "a" "t" "g" "g" "a" "g"  
## [477] "a" "a" "c" "c" "t" "g" "c" "t" "g" "c" "c" "t" "a" "g" "a" "a" "g"  
## [494] "g" "g" "a" "a" "t" "t" "t" "c" "a" "a" "a" "g" "g" "t" "c" "t" "g"  
## [511] "t" "g" "c" "a" "a" "g" "c" "a" "a" "a" "t" "t" "g" "a" "t" "c" "a"  
## [528] "c" "t" "t" "c" "c" "c" "a" "g" "a" "g" "g" "a" "t" "g" "c" "a" "g"  
## [545] "a" "t" "t" "a" "c" "g" "a" "a" "g" "c" "t" "g" "a" "c" "a" "c" "a"  
## [562] "g" "c" "a" "g" "a" "a" "t" "a" "t" "t" "t" "c" "c" "t" "c" "c" "g"  
## [579] "g" "g" "c" "c" "g" "t" "g" "a" "g" "g" "g" "c" "c" "t" "c" "c" "a"  
## [596] "g" "c" "a" "t" "t" "t" "t" "c" "c" "c" "a" "a" "t" "c" "c" "t" "g"  
## [613] "a" "g" "t" "g" "t" "g" "a" "t" "t" "c" "t" "g" "c" "t" "t" "t" "t"  
## [630] "c" "a" "t" "g" "g" "g" "t" "g" "g" "c" "c" "t" "c" "t" "g" "c" "a"  
## [647] "t" "c" "g" "c" "a" "g" "c" "c" "a" "g" "c" "g" "a" "g" "t" "t" "c"  
## [664] "t" "a" "c" "a" "a" "a" "a" "c" "t" "c" "g" "a" "c" "a" "c" "a" "a"  
## [681] "c" "a" "t" "c" "a" "t" "c" "c" "t" "g" "a" "g" "t" "g" "c" "c" "g"  
## [698] "g" "c" "a" "t" "c" "t" "t" "c" "t" "t" "c" "g" "t" "g" "t" "c" "t"  
## [715] "g" "c" "a" "g" "g" "t" "c" "t" "g" "a" "g" "t" "a" "a" "c" "a" "t"  
## [732] "c" "a" "t" "t" "g" "g" "c" "a" "t" "c" "a" "t" "a" "g" "t" "g" "t"  
## [749] "a" "c" "a" "t" "a" "t" "c" "t" "g" "c" "c" "a" "a" "t" "g" "c" "c"  
## [766] "g" "g" "a" "g" "a" "c" "c" "c" "c" "t" "c" "c" "a" "a" "g" "a" "g"  
## [783] "c" "g" "a" "c" "t" "c" "c" "a" "a" "a" "a" "a" "g" "a" "a" "t" "a"  
## [800] "g" "t" "t" "a" "c" "t" "c" "a" "t" "a" "c" "g" "g" "c" "t" "g" "g"  
## [817] "t" "c" "c" "t" "t" "c" "t" "a" "c" "t" "t" "c" "g" "g" "g" "g" "c"  
## [834] "c" "c" "t" "g" "t" "c" "c" "t" "t" "c" "a" "t" "c" "a" "t" "c" "g"  
## [851] "c" "c" "g" "a" "g" "a" "t" "g" "g" "t" "c" "g" "g" "g" "g" "t" "g"  
## [868] "c" "t" "g" "g" "c" "g" "g" "t" "g" "c" "a" "c" "a" "t" "g" "t" "t"  
## [885] "t" "a" "t" "c" "g" "a" "c" "c" "g" "g" "c" "a" "c" "a" "a" "a" "c"  
## [902] "a" "g" "c" "t" "g" "c" "g" "g" "g" "c" "c" "a" "c" "g" "g" "c" "c"  
## [919] "c" "g" "c" "g" "c" "c" "a" "c" "g" "g" "a" "c" "t" "a" "c" "c" "t"  
## [936] "c" "c" "a" "g" "g" "c" "c" "t" "c" "t" "g" "c" "c" "a" "t" "c" "a"  
## [953] "c" "c" "c" "g" "c" "a" "t" "c" "c" "c" "c" "a" "g" "c" "t" "a" "c"  
## [970] "c" "g" "c" "t" "a" "c" "c" "g" "c" "t" "a" "c" "c" "a" "g" "c" "g"  
## [987] "c" "c" "g" "c" "a" "g" "c" "c" "g" "c" "t" "c" "c" "a" "g" "c" "t"  
## [1004] "c" "g" "c" "g" "c" "t" "c" "c" "a" "c" "g" "g" "a" "g" "c" "c" "c"  
## [1021] "t" "c" "a" "c" "a" "c" "t" "c" "c" "a" "g" "g" "g" "a" "c" "g" "c"  
## [1038] "c" "t" "c" "c" "c" "c" "c" "g" "t" "g" "g" "g" "c" "a" "t" "c" "a"  
## [1055] "a" "g" "g" "g" "c" "t" "t" "c" "a" "a" "c" "a" "c" "c" "c" "t" "g"  
## [1072] "c" "c" "g" "t" "c" "c" "a" "c" "g" "g" "a" "g" "a" "t" "c" "t" "c"  
## [1089] "c" "a" "t" "g" "t" "a" "c" "a" "c" "g" "c" "t" "c" "a" "g" "c" "a"  
## [1106] "g" "g" "g" "a" "c" "c" "c" "c" "c" "t" "g" "a" "a" "g" "g" "c" "c"  
## [1123] "g" "c" "c" "a" "c" "c" "a" "c" "g" "c" "c" "c" "a" "c" "c" "g" "c"  
## [1140] "c" "a" "c" "c" "t" "a" "c" "a" "a" "c" "t" "c" "c" "g" "a" "c" "a"  
## [1157] "g" "g" "g" "a" "t" "a" "a" "c" "a" "g" "c" "t" "t" "c" "c" "t" "c"  
## [1174] "c" "a" "g" "g" "t" "t" "c" "a" "c" "a" "a" "c" "t" "g" "t" "a" "t"  
## [1191] "c" "c" "a" "g" "a" "a" "g" "g" "a" "g" "a" "a" "c" "a" "a" "g" "g"  
## [1208] "a" "c" "t" "c" "t" "c" "t" "c" "c" "a" "c" "t" "c" "c" "a" "a" "c"  
## [1225] "a" "c" "a" "g" "c" "c" "a" "a" "c" "c" "g" "c" "c" "g" "g" "a" "c"  
## [1242] "c" "a" "c" "c" "c" "c" "c" "g" "t" "a" "t" "a" "a" "a" "g" "a" "c"  
## [1259] "c" "g" "c" "g" "g" "g" "c" "c" "t" "c" "g" "c" "c" "a" "g" "a" "a"  
## [1276] "g" "a" "c" "c" "g" "c" "g" "g" "g" "a" "g" "g" "a" "g" "g" "g" "c"  
## [1293] "g" "c" "g" "g" "t" "c" "c" "c" "c" "g" "g" "g" "g" "g" "c" "g" "g"  
## [1310] "g" "g" "c" "g" "g" "g" "g" "c" "g" "g" "g" "g" "a" "g" "a" "c" "c"  
## [1327] "c" "a" "g" "a" "c" "c" "c" "t" "c" "c" "g" "c" "t" "g" "g" "g" "a"  
## [1344] "g" "a" "c" "c" "t" "t" "c" "c" "a" "a" "a" "a" "g" "c" "a" "a" "a"  
## [1361] "a" "a" "c" "a" "a" "a" "a" "a" "a" "c" "a" "a" "a" "a" "a" "a" "a"  
## [1378] "a" "c" "a" "a" "a" "a" "a" "a" "a" "c" "a" "a" "a" "a" "a" "a" "c"  
## [1395] "a" "a" "a" "a" "a" "a" "a" "c" "a" "c" "a" "c" "a" "c" "a" "c" "a"  
## [1412] "c" "a" "a" "a" "a" "a" "a" "a" "g" "a" "g" "a" "a" "a" "a" "a" "a"  
## [1429] "c" "a" "t" "a" "a" "c" "a" "a" "g" "t" "a" "a" "a" "t" "t" "t" "t"  
## [1446] "a" "a" "a" "a" "a" "a" "a" "a" "g" "a" "a" "c" "a" "a" "a" "a" "t"  
## [1463] "a" "t" "a" "a" "g" "a" "g" "g" "a" "a" "c" "a" "a" "a" "g" "a" "a"  
## [1480] "g" "c" "a" "a" "a" "a" "c" "a" "a" "c" "a" "g" "g" "a" "a" "a" "t"  
## [1497] "g" "t" "g" "g" "g" "a" "a" "a" "a" "t" "a" "t" "a" "a" "a" "c" "g"  
## [1514] "a" "g" "g" "g" "a" "a" "g" "a" "a" "a" "a" "c" "a" "a" "a" "c" "t"  
## [1531] "t" "t" "a" "a" "a" "a" "a" "a" "a" "a" "g" "c" "g" "a" "g" "a" "g"  
## [1548] "g" "g" "a" "t" "a" "a" "a" "a" "a" "a" "t" "t" "a" "a" "a" "a" "a"  
## [1565] "t" "a" "g" "a" "a" "a" "a" "t" "a" "a" "a" "t" "c" "t" "a" "a" "a"  
## [1582] "a" "g" "a" "a" "a" "a" "t" "g" "c" "a" "t" "g" "a" "t" "t" "t" "c"  
## [1599] "c" "c" "a" "t" "g" "t" "a" "c" "c" "a" "t" "t" "a" "t" "t" "t" "t"  
## [1616] "a" "a" "c" "a" "t" "t" "t" "a" "a" "t" "a" "a" "a" "a" "a" "t" "c"  
## [1633] "a" "a" "t" "t" "t" "a" "a" "a" "t" "g" "a" "a" "a" "a" "a" "a" "t"  
## [1650] "a" "a" "a" "a" "g" "g" "g" "a" "a" "c" "c" "a" "a" "g" "a" "t" "a"  
## [1667] "a" "c" "a" "t" "t" "a" "a" "a" "g" "c" "a" "a" "a" "a" "a" "a" "a"  
## [1684] "a" "a" "a" "a" "a" "a" "a" "t" "g" "a" "g" "a" "a" "c" "a" "g" "a"  
## [1701] "a" "a" "g" "g" "a" "a" "a" "g" "g" "g" "g" "a" "t" "g" "t" "c" "c"  
## [1718] "t" "t" "t" "g" "t" "a" "t" "t" "t" "t" "t" "c" "a" "g" "g" "g" "t"  
## [1735] "t" "t" "a" "t" "g" "t" "t" "a" "c" "t" "t" "t" "t" "t" "t" "t" "t"  
## [1752] "t" "t" "t" "t" "t" "t" "t" "t" "t" "a" "a" "c" "t" "c" "g" "g" "g"  
## [1769] "g" "a" "g" "a" "g" "t" "t" "a" "c" "t" "t" "t" "t" "c" "t" "g" "t"  
## [1786] "t" "c" "c" "c" "t" "t" "t" "a" "a" "c" "c" "c" "c" "c" "a" "g" "c"  
## [1803] "g" "g" "g" "c" "c" "c" "t" "g" "c" "c" "t" "c" "c" "c" "t" "g" "g"  
## [1820] "g" "a" "g" "a" "t" "t" "g" "g" "g" "g" "g" "g" "c" "g" "a" "g" "a"  
## [1837] "c" "t" "c" "a" "g" "g" "g" "g" "c" "c" "c" "t" "g" "g" "g" "g" "c"  
## [1854] "c" "a" "g" "g" "t" "g" "a" "g" "c" "c" "t" "g" "c" "a" "g" "t" "c"  
## [1871] "a" "c" "t" "g" "c" "c" "a" "g" "g" "t" "c" "c" "c" "t" "g" "g" "a"  
## [1888] "g" "c" "c" "c" "c" "t" "g" "g" "g" "t" "g" "g" "g" "t" "g" "c" "c"  
## [1905] "c" "c" "a" "g" "g" "a" "a" "c" "t" "c" "c" "a" "g" "g" "a" "a" "g"  
## [1922] "g" "c" "t" "c" "a" "g" "a" "g" "c" "t" "c" "g" "a" "g" "c" "c" "g"  
## [1939] "g" "c" "t" "c" "c" "g" "c" "c" "c" "a" "g" "c" "a" "t" "t" "g" "a"  
## [1956] "t" "g" "g" "g" "g" "c" "a" "a" "t" "c" "g" "t" "a" "g" "g" "c" "c"  
## [1973] "t" "c" "c" "a" "g" "g" "t" "g" "a" "c" "c" "g" "a" "g" "c" "c" "c"  
## [1990] "t" "t" "g" "t" "c" "c" "c" "t" "c" "c" "t" "c" "t" "c" "c" "g" "t"  
## [2007] "t" "a" "g" "g" "g" "t" "g" "c" "c" "t" "g" "g" "a" "g" "g" "g" "g"  
## [2024] "g" "g" "t" "a" "c" "a" "c" "t" "t" "g" "g" "g" "g" "c" "t" "t" "g"  
## [2041] "c" "c" "t" "g" "g" "c" "c" "c" "c" "a" "g" "g" "t" "t" "c" "c" "c"  
## [2058] "a" "g" "t" "c" "c" "t" "t" "a" "a" "t" "g" "c" "t" "c" "c" "t" "t"  
## [2075] "a" "a" "c" "c" "c" "a" "c" "t" "g" "t" "g" "a" "t" "g" "a" "c" "t"  
## [2092] "t" "c" "c" "t" "a" "g" "g" "c" "c" "t" "t" "g" "a" "g" "g" "a" "a"  
## [2109] "a" "g" "g" "g" "a" "a" "g" "g" "a" "g" "a" "g" "g" "g" "g" "a" "g"  
## [2126] "g" "c" "t" "g" "c" "c" "g" "g" "t" "g" "g" "c" "t" "t" "a" "c" "c"  
## [2143] "a" "a" "g" "a" "t" "g" "c" "c" "g" "g" "a" "a" "a" "c" "c" "c" "c"  
## [2160] "g" "g" "a" "a" "t" "c" "c" "t" "c" "a" "g" "g" "g" "t" "g" "a" "g"  
## [2177] "c" "c" "t" "c" "t" "t" "g" "g" "g" "g" "t" "c" "a" "t" "g" "t" "c"  
## [2194] "c" "c" "c" "a" "a" "g" "c" "t" "c" "c" "t" "g" "t" "c" "c" "t" "t"  
## [2211] "g" "g" "g" "g" "t" "c" "a" "g" "g" "a" "g" "a" "t" "g" "c" "c" "a"  
## [2228] "c" "c" "c" "c" "c" "c" "c" "c" "c" "c" "c" "g" "g" "g" "g" "g" "a"  
## [2245] "c" "a" "t" "g" "a" "a" "a" "c" "a" "g" "c" "t" "c" "t" "c" "c" "c"  
## [2262] "t" "c" "c" "t" "c" "a" "c" "c" "c" "c" "t" "c" "a" "c" "c" "t" "c"  
## [2279] "a" "g" "g" "g" "c" "c" "a" "c" "c" "t" "g" "a" "t" "g" "a" "c" "c"  
## [2296] "c" "t" "g" "g" "g" "g" "c" "g" "a" "t" "g" "g" "t" "g" "g" "a" "c"  
## [2313] "c" "c" "c" "c" "t" "g" "a" "c" "t" "c" "a" "t" "a" "a" "g" "c" "c"  
## [2330] "c" "c" "c" "c" "a" "g" "t" "c" "c" "c" "c" "t" "g" "g" "g" "a" "a"  
## [2347] "g" "g" "g" "g" "g" "t" "t" "c" "a" "t" "t" "g" "a" "c" "c" "c" "t"  
## [2364] "t" "t" "g" "g" "g" "g" "g" "t" "c" "c" "t" "t" "g" "g" "a" "c" "t"  
## [2381] "c" "a" "c" "t" "g" "a" "t" "g" "c" "c" "c" "c" "c" "t" "t" "g" "g"  
## [2398] "g" "g" "c" "c" "c" "a" "g" "c" "g" "g" "g" "t" "t" "c" "a" "a" "c"  
## [2415] "a" "a" "t" "g" "a" "c" "a" "c" "t" "g" "c" "a" "a" "a" "a" "a" "g"  
## [2432] "g" "c" "t" "t" "c" "t" "t" "t" "t" "t" "a" "c" "a" "a" "a" "a" "g"  
## [2449] "a" "a" "a" "a" "a" "g" "g" "a" "a" "a" "a" "a" "c" "a" "a" "g" "t"  
## [2466] "g" "g" "t" "g" "a" "t" "t" "t" "t" "t" "t" "t" "t" "t" "a" "a" "t"  
## [2483] "a" "a" "a" "a" "a" "a" "a" "c" "c" "a" "c" "a" "g" "a" "c" "t" "a"  
## [2500] "t" "a" "a" "a" "t" "a" "a" "a" "t" "g" "t" "a" "a" "a" "t" "a" "c"  
## [2517] "a" "a" "a" "a" "t" "a" "a" "g" "t" "g" "g" "a" "t" "t" "t" "a" "c"  
## [2534] "t" "t" "g" "c" "a" "a" "g" "a" "a" "a" "a" "t" "c" "a" "g" "a" "t"  
## [2551] "a" "g" "t" "a" "t" "t" "t" "t" "t" "c" "t" "t" "t" "t" "a" "a" "t"  
## [2568] "t" "c" "t" "t" "t" "t" "c" "c" "a" "g" "c" "t" "t" "t" "a" "a" "a"  
## [2585] "c" "t" "g" "t" "g" "a" "a" "a" "a" "c" "a" "a" "a" "a" "a" "a" "t"  
## [2602] "g" "g" "g" "g" "c" "g" "g" "g" "g" "t" "g" "g" "g" "g" "g" "a" "c"  
## [2619] "t" "t" "a" "a" "a" "c" "t" "t" "t" "a" "g" "c" "a" "g" "g" "g" "a"  
## [2636] "a" "c" "t" "t" "g" "t" "a" "a" "a" "g" "a" "a" "a" "a" "a" "a" "a"  
## [2653] "a" "a" "a" "c" "a" "g" "a" "a" "a" "a" "c" "g" "a" "a" "t" "a" "t"  
## [2670] "a" "c" "a" "a" "a" "t" "c" "c" "a" "t" "t" "t" "a" "c" "a" "a" "a"  
## [2687] "a" "a" "c" "a" "a" "a" "g" "c" "a" "a" "a" "a" "c" "c" "g" "t" "t"  
## [2704] "g" "t" "g" "a" "g" "a" "g" "g" "t" "g" "a" "g" "a" "g" "c" "t" "g"  
## [2721] "g" "g" "c" "t" "t" "g" "a" "a" "g" "g" "t" "t" "g" "g" "a" "g" "g"  
## [2738] "g" "a" "g" "t" "a" "g" "c" "g" "g" "a" "a" "g" "g" "t" "c" "c" "c"  
## [2755] "a" "g" "t" "g" "a" "g" "c" "t" "g" "c" "a" "g" "g" "g" "g" "g" "t"  
## [2772] "c" "t" "c" "t" "g" "t" "g" "a" "t" "g" "g" "a" "a" "a" "g" "g" "t"  
## [2789] "g" "g" "c" "t" "t" "c" "c" "t" "c" "a" "g" "a" "c" "a" "a" "g" "g"  
## [2806] "a" "a" "g" "g" "t" "g" "c" "t" "g" "c" "g" "a" "a" "t" "g" "g" "g"  
## [2823] "g" "g" "a" "a" "g" "a" "c" "a" "g" "a" "a" "t" "c" "c" "a" "a" "c"  
## [2840] "a" "a" "a" "g" "a" "a" "a" "g" "a" "g" "a" "c" "c" "a" "c" "a" "c"  
## [2857] "a" "c" "c" "c" "c" "a" "c" "a" "c" "g" "c" "a" "c" "a" "c" "a" "g"  
## [2874] "g" "c" "a" "c" "g" "t" "t" "c" "a" "c" "a" "c" "a" "c" "a" "c" "a"  
## [2891] "t" "a" "c" "a" "c" "a" "g" "t" "c" "c" "a" "c" "t" "t" "a" "g" "c"  
## [2908] "c" "c" "a" "g" "c" "a" "c" "t" "g" "c" "a" "g" "t" "c" "a" "c" "t"  
## [2925] "c" "a" "c" "a" "g" "g" "g" "a" "c" "a" "c" "a" "c" "t" "c" "a" "g"  
## [2942] "t" "c" "t" "c" "a" "a" "c" "c" "c" "t" "t" "c" "c" "a" "t" "c" "c"  
## [2959] "c" "a" "t" "a" "c" "a" "c" "g" "g" "c" "c" "a" "g" "g" "g" "g" "c"  
## [2976] "g" "t" "g" "g" "c" "t" "c" "a" "a" "a" "g" "g" "a" "a" "a" "t" "t"  
## [2993] "g" "a" "c" "t" "c" "a" "t" "g" "c" "c" "c" "t" "c" "c" "a" "a" "a"  
## [3010] "g" "c" "c" "a" "t" "g" "g" "a" "c" "g" "a" "c" "a" "a" "c" "a" "a"  
## [3027] "c" "t" "c" "c" "a" "c" "a" "c" "t" "g" "g" "c" "c" "t" "t" "t" "g"  
## [3044] "t" "g" "t" "t" "c" "a" "t" "t" "c" "a" "c" "a" "a" "c" "c" "t" "c"  
## [3061] "c" "c" "a" "a" "c" "a" "g" "a" "g" "c" "a" "t" "a" "c" "a" "c" "a"  
## [3078] "t" "g" "a" "a" "c" "a" "c" "a" "c" "a" "c" "a" "t" "g" "c" "a" "c"  
## [3095] "a" "c" "a" "t" "a" "c" "c" "c" "a" "c" "a" "c" "a" "c" "g" "c" "a"  
## [3112] "c" "a" "c" "a" "t" "a" "c" "c" "c" "a" "c" "a" "c" "a" "c" "a" "c"  
## [3129] "a" "c" "a" "c" "a" "c" "a" "c" "c" "a" "c" "t" "c" "g" "c" "a" "t"  
## [3146] "g" "c" "a" "t" "g" "g" "g" "a" "a" "g" "g" "g" "c" "a" "c" "c" "c"  
## [3163] "g" "t" "c" "t" "a" "g" "a" "a" "t" "c" "c" "a" "g" "g" "a" "c" "t"  
## [3180] "g" "g" "a" "t" "t" "c" "c" "g" "g" "a" "a" "t" "t" "c" "c" "t" "t"  
## [3197] "g" "c" "t" "g" "c" "a" "t" "g" "g" "c" "c" "t" "c" "t" "c" "t" "g"  
## [3214] "g" "g" "c" "c" "t" "t" "a" "a" "t" "t" "t" "t" "c" "c" "c" "c" "c"  
## [3231] "c" "a" "t" "g" "t" "a" "a" "g" "c" "a" "t" "g" "t" "g" "g" "a" "t"  
## [3248] "t" "g" "a" "c" "c" "c" "a" "g" "a" "g" "a" "a" "g" "c" "a" "c" "t"  
## [3265] "a" "a" "a" "g" "g" "c" "c" "c" "a" "t" "t" "c" "t" "t" "g" "c" "t"  
## [3282] "c" "t" "a" "t" "g" "t" "a" "t" "c" "t" "g" "t" "g" "a" "c" "t" "t"  
## [3299] "a" "a" "g" "a" "t" "c" "t" "g" "c" "c" "a" "c" "c" "t" "g" "c" "c"  
## [3316] "c" "c" "g" "a" "g" "g" "a" "t" "a" "t" "g" "c" "c" "a" "g" "g" "g"  
## [3333] "a" "t" "g" "a" "c" "c" "a" "g" "g" "a" "c" "a" "g" "c" "t" "g" "c"  
## [3350] "c" "a" "c" "c" "a" "a" "g" "c" "c" "c" "c" "c" "a" "g" "g" "c" "t"  
## [3367] "c" "a" "t" "c" "a" "t" "c" "a" "g" "t" "c" "a" "g" "c" "c" "t" "c"  
## [3384] "t" "c" "a" "g" "a" "c" "a" "c" "a" "c" "a" "c" "a" "c" "a" "c" "a"  
## [3401] "c" "a" "c" "a" "c" "a" "c" "c" "a" "t" "a" "t" "a" "c" "c" "t" "c"  
## [3418] "c" "t" "c" "a" "c" "t" "g" "t" "g" "c" "t" "c" "c" "c" "c" "g" "a"  
## [3435] "a" "c" "a" "c" "c" "t" "g" "c" "c" "c" "c" "c" "a" "c" "a" "t" "c"  
## [3452] "c" "a" "a" "t" "g" "t" "c" "a" "a" "a" "g" "c" "a" "a" "a" "a" "a"  
## [3469] "t" "a" "c" "a" "c" "a" "c" "a" "t" "g" "t" "g" "a" "g" "c" "a" "a"  
## [3486] "a" "c" "a" "t" "a" "a" "a" "g" "c" "t" "g" "t" "t" "c" "a" "g" "g"  
## [3503] "c" "a" "a" "a" "g" "a" "g" "g" "g" "g" "a" "a" "a" "g" "a" "c" "g"  
## [3520] "c" "a" "g" "g" "g" "g" "t" "c" "c" "c" "c" "a" "a" "a" "g" "c" "c"  
## [3537] "c" "t" "t" "c" "t" "t" "c" "a" "c" "t" "t" "t" "g" "t" "g" "t" "c"  
## [3554] "c" "c" "c" "t" "t" "g" "c" "t" "g" "c" "g" "a" "t" "c" "a" "t" "g"  
## [3571] "g" "a" "g" "a" "g" "t" "t" "a" "a" "a" "g" "a" "g" "g" "c" "t" "t"  
## [3588] "c" "c" "t" "t" "g" "g" "g" "a" "g" "a" "a" "g" "a" "g" "c" "t" "c"  
## [3605] "t" "g" "c" "c" "a" "c" "c" "a" "g" "g" "g" "c" "t" "t" "c" "c" "c"  
## [3622] "c" "a" "g" "t" "g" "t" "c" "t" "t" "t" "g" "g" "g" "g" "g" "t" "c"  
## [3639] "t" "g" "t" "g" "a" "a" "a" "a" "a" "g" "a" "g" "g" "a" "t" "c" "c"  
## [3656] "t" "c" "t" "g" "a" "g" "g" "t" "t" "t" "a" "c" "t" "g" "g" "g" "a"  
## [3673] "g" "g" "g" "c" "t" "c" "a" "a" "g" "g" "c" "t" "g" "a" "g" "g" "g"  
## [3690] "a" "a" "t" "g" "g" "a" "g" "a" "g" "g" "a" "a" "a" "a" "t" "t" "t"  
## [3707] "t" "a" "g" "c" "a" "g" "t" "t" "c" "c" "a" "t" "c" "c" "c" "a" "g"  
## [3724] "t" "g" "t" "a" "a" "g" "g" "a" "c" "c" "a" "a" "c" "c" "c" "c" "a"  
## [3741] "a" "a" "a" "g" "t" "t" "a" "a" "a" "c" "t" "t" "g" "c" "a" "c" "c"  
## [3758] "a" "c" "a" "g" "a" "c" "t" "a" "a" "a" "g" "g" "t" "c" "a" "a" "g"  
## [3775] "g" "g" "c" "a" "t" "c" "c" "t" "g" "t" "g" "t" "t" "t" "c" "t" "c"  
## [3792] "c" "c" "c" "t" "t" "t" "c" "t" "t" "c" "c" "c" "c" "a" "g" "a" "g"  
## [3809] "t" "g" "a" "c" "a" "a" "g" "g" "g" "c" "c" "a" "g" "t" "t" "c" "a"  
## [3826] "g" "a" "c" "t" "g" "a" "c" "a" "g" "a" "a" "a" "t" "c" "c" "a" "a"  
## [3843] "c" "a" "g" "c" "t" "t" "t" "c" "c" "t" "g" "a" "g" "c" "t" "g" "g"  
## [3860] "a" "a" "a" "t" "t" "t" "c" "a" "g" "a" "a" "c" "a" "g" "t" "c" "t"  
## [3877] "g" "c" "a" "a" "g" "t" "t" "a" "c" "t" "c" "c" "c" "a" "g" "g" "t"  
## [3894] "g" "a" "c" "t" "g" "a" "a" "g" "g" "t" "c" "a" "a" "g" "g" "t" "g"  
## [3911] "a" "g" "g" "c" "c" "c" "c" "c" "c" "t" "g" "c" "c" "t" "c" "t" "g"  
## [3928] "c" "c" "t" "g" "c" "g" "a" "g" "t" "c" "t" "c" "c" "c" "c" "c" "g"  
## [3945] "g" "t" "t" "t" "g" "c" "a" "t" "t" "t" "t" "t" "c" "t" "t" "g" "a"  
## [3962] "c" "a" "c" "c" "g" "g" "c" "a" "t" "t" "t" "c" "c" "t" "g" "a" "g"  
## [3979] "g" "t" "t" "g" "a" "g" "c" "t" "c" "t" "c" "t" "g" "g" "g" "g" "a"  
## [3996] "g" "t" "t" "c" "t" "a" "g" "a" "g" "a" "a" "t" "g" "g" "c" "t" "a"  
## [4013] "g" "t" "a" "a" "g" "g" "c" "t" "t" "t" "t" "t" "g" "a" "g" "c" "t"  
## [4030] "t" "g" "c" "a" "c" "a" "t" "c" "t" "c" "a" "c" "c" "t" "g" "c" "c"  
## [4047] "t" "t" "t" "c" "c" "t" "g" "t" "c" "t" "t" "t" "t" "g" "c" "c" "t"  
## [4064] "g" "g" "g" "a" "a" "a" "g" "g" "a" "a" "a" "g" "t" "t" "a" "t" "t"  
## [4081] "t" "t" "c" "c" "c" "a" "g" "g" "t" "c" "a" "g" "c" "a" "a" "g" "g"  
## [4098] "g" "g" "c" "a" "g" "a" "a" "c" "a" "t" "c" "g" "g" "c" "c" "a" "g"  
## [4115] "c" "c" "c" "a" "g" "c" "c" "c" "a" "g" "a" "a" "g" "t" "a" "c" "a"  
## [4132] "g" "g" "g" "g" "g" "a" "g" "g" "t" "c" "a" "t" "g" "g" "g" "c" "c"  
## [4149] "c" "t" "g" "g" "g" "g" "c" "a" "g" "a" "a" "c" "a" "a" "t" "g" "g"  
## [4166] "g" "a" "g" "a" "c" "a" "a" "t" "t" "c" "a" "a" "g" "g" "t" "g" "t"  
## [4183] "g" "g" "t" "a" "a" "c" "a" "a" "c" "a" "a" "c" "c" "a" "a" "g" "t"  
## [4200] "t" "g" "c" "c" "c" "t" "c" "a" "g" "t" "c" "t" "g" "g" "g" "c" "a"  
## [4217] "g" "a" "a" "a" "c" "t" "g" "a" "a" "c" "t" "c" "t" "a" "c" "c" "c"  
## [4234] "c" "t" "c" "t" "c" "c" "c" "a" "c" "c" "c" "c" "a" "a" "t" "c" "t"  
## [4251] "t" "g" "c" "c" "c" "g" "c" "c" "a" "t" "c" "c" "c" "a" "c" "c" "a"  
## [4268] "g" "a" "t" "t" "c" "c" "a" "g" "a" "c" "c" "t" "a" "a" "a" "g" "g"  
## [4285] "g" "a" "t" "c" "a" "a" "g" "g" "a" "t" "g" "a" "g" "a" "g" "c" "g"  
## [4302] "a" "a" "g" "g" "g" "a" "g" "a" "a" "g" "g" "g" "a" "g" "g" "g" "t"  
## [4319] "c" "c" "c" "c" "a" "a" "g" "a" "a" "a" "a" "c" "c" "g" "c" "a" "c"  
## [4336] "c" "c" "a" "a" "g" "c" "g" "a" "g" "c" "a" "c" "t" "g" "t" "c" "t"  
## [4353] "g" "a" "a" "g" "a" "g" "a" "a" "a" "a" "a" "c" "t" "a" "g" "c" "t"  
## [4370] "c" "c" "a" "g" "t" "t" "c" "t" "c" "c" "g" "a" "a" "t" "t" "c" "t"  
## [4387] "g" "g" "c" "a" "g" "a" "g" "c" "g" "t" "c" "t" "g" "g" "g" "a" "a"  
## [4404] "g" "g" "c" "g" "a" "t" "c" "a" "g" "t" "g" "c" "t" "t" "c" "t" "t"  
## [4421] "t" "c" "c" "a" "t" "g" "g" "c" "g" "c" "a" "a" "g" "g" "c" "c" "t"  
## [4438] "g" "g" "g" "t" "t" "c" "t" "g" "g" "g" "t" "g" "t" "g" "c" "t" "t"  
## [4455] "g" "a" "a" "g" "a" "a" "a" "g" "c" "c" "a" "c" "t" "g" "g" "g" "g"  
## [4472] "t" "g" "t" "g" "g" "g" "g" "t" "g" "a" "c" "a" "t" "c" "g" "c" "c"  
## [4489] "a" "t" "g" "g" "c" "t" "g" "a" "g" "a" "a" "g" "g" "g" "g" "c" "t"  
## [4506] "a" "g" "g" "g" "g" "g" "t" "c" "c" "g" "g" "a" "g" "g" "g" "a" "a"  
## [4523] "g" "g" "a" "g" "c" "c" "a" "g" "g" "a" "c" "c" "g" "g" "a" "a" "c"  
## [4540] "t" "g" "c" "a" "a" "g" "g" "g" "c" "g" "t" "t" "g" "c" "t" "g" "c"  
## [4557] "c" "c" "a" "g" "g" "g" "g" "t" "g" "t" "g" "g" "a" "t" "g" "a" "t"  
## [4574] "t" "g" "c" "t" "c" "a" "t" "g" "t" "c" "c" "a" "g" "c" "t" "c" "a"  
## [4591] "g" "a" "c" "c" "a" "g" "t" "t" "c" "a" "a" "g" "a" "a" "a" "c" "t"  
## [4608] "a" "a" "c" "c" "t" "c" "c" "a" "t" "t" "t" "a" "t" "t" "t" "t" "c"  
## [4625] "t" "t" "g" "g" "t" "g" "a" "g" "t" "c" "c" "t" "t" "t" "t" "t" "t"  
## [4642] "t" "t" "t" "t" "t" "t" "t" "c" "a" "g" "a" "c" "t" "g" "t" "t" "a"  
## [4659] "a" "c" "a" "g" "a" "a" "a" "a" "a" "a" "a" "a" "t" "t" "t" "t" "a"  
## [4676] "a" "a" "a" "a" "g" "c" "a" "g" "a" "a" "a" "a" "c" "t" "g" "a" "a"  
## [4693] "a" "a" "a" "a" "a" "a" "a" "a" "t" "c" "c" "t" "g" "g" "t" "a" "c"  
## [4710] "a" "t" "g" "a" "a" "a" "t" "a" "a" "a" "g" "a" "t" "t" "t" "t" "t"  
## [4727] "t" "t" "t" "t" "t" "t" "t" "a" "t" "a"

Open the Nucleotide Fasta file and translate the sequences to Amino acids in Forward Translation.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
getTrans(sequences, sens = "F", NAstring = "X", ambiguous = FALSE)

## [1] "S" "F" "S" "F" "\*" "K" "K" "N" "T" "A" "T" "G" "T" "V" "S" "D" "L"  
## [18] "K" "R" "Q" "A" "S" "S" "R" "V" "I" "F" "I" "I" "Y" "T" "L" "F" "R"  
## [35] "E" "L" "S" "Y" "L" "P" "F" "F" "I" "T" "L" "H" "I" "L" "Y" "S" "Y"  
## [52] "I" "Y" "P" "L" "Y" "\*" "\*" "W" "N" "N" "F" "Y" "F" "Y" "L" "F" "F"  
## [69] "L" "A" "L" "V" "L" "A" "P" "S" "H" "T" "L" "S" "R" "E" "P" "E" "V"  
## [86] "G" "W" "V" "F" "I" "\*" "\*" "R" "I" "M" "G" "L" "F" "D" "R" "G" "V"  
## [103] "Q" "M" "L" "L" "T" "T" "V" "G" "A" "F" "A" "A" "F" "S" "L" "M" "T"  
## [120] "I" "A" "V" "G" "T" "D" "Y" "W" "L" "Y" "S" "R" "G" "V" "C" "K" "T"  
## [137] "K" "S" "V" "S" "E" "N" "E" "T" "S" "K" "K" "N" "E" "E" "V" "M" "T"  
## [154] "H" "S" "G" "L" "W" "R" "T" "C" "C" "L" "E" "G" "N" "F" "K" "G" "L"  
## [171] "C" "K" "Q" "I" "D" "H" "F" "P" "E" "D" "A" "D" "Y" "E" "A" "D" "T"  
## [188] "A" "E" "Y" "F" "L" "R" "A" "V" "R" "A" "S" "S" "I" "F" "P" "I" "L"  
## [205] "S" "V" "I" "L" "L" "F" "M" "G" "G" "L" "C" "I" "A" "A" "S" "E" "F"  
## [222] "Y" "K" "T" "R" "H" "N" "I" "I" "L" "S" "A" "G" "I" "F" "F" "V" "S"  
## [239] "A" "G" "L" "S" "N" "I" "I" "G" "I" "I" "V" "Y" "I" "S" "A" "N" "A"  
## [256] "G" "D" "P" "S" "K" "S" "D" "S" "K" "K" "N" "S" "Y" "S" "Y" "G" "W"  
## [273] "S" "F" "Y" "F" "G" "A" "L" "S" "F" "I" "I" "A" "E" "M" "V" "G" "V"  
## [290] "L" "A" "V" "H" "M" "F" "I" "D" "R" "H" "K" "Q" "L" "R" "A" "T" "A"  
## [307] "R" "A" "T" "D" "Y" "L" "Q" "A" "S" "A" "I" "T" "R" "I" "P" "S" "Y"  
## [324] "R" "Y" "R" "Y" "Q" "R" "R" "S" "R" "S" "S" "S" "R" "S" "T" "E" "P"  
## [341] "S" "H" "S" "R" "D" "A" "S" "P" "V" "G" "I" "K" "G" "F" "N" "T" "L"  
## [358] "P" "S" "T" "E" "I" "S" "M" "Y" "T" "L" "S" "R" "D" "P" "L" "K" "A"  
## [375] "A" "T" "T" "P" "T" "A" "T" "Y" "N" "S" "D" "R" "D" "N" "S" "F" "L"  
## [392] "Q" "V" "H" "N" "C" "I" "Q" "K" "E" "N" "K" "D" "S" "L" "H" "S" "N"  
## [409] "T" "A" "N" "R" "R" "T" "T" "P" "V" "\*" "R" "P" "R" "A" "S" "P" "E"  
## [426] "D" "R" "G" "R" "R" "A" "R" "S" "P" "G" "A" "G" "R" "G" "G" "E" "T"  
## [443] "Q" "T" "L" "R" "W" "E" "T" "F" "Q" "K" "Q" "K" "Q" "K" "T" "K" "K"  
## [460] "T" "K" "K" "Q" "K" "T" "K" "K" "H" "T" "H" "T" "K" "K" "E" "K" "K"  
## [477] "H" "N" "K" "\*" "I" "L" "K" "K" "R" "T" "K" "Y" "K" "R" "N" "K" "E"  
## [494] "A" "K" "Q" "Q" "E" "M" "W" "E" "N" "I" "N" "E" "G" "R" "K" "Q" "T"  
## [511] "L" "K" "K" "S" "E" "R" "D" "K" "K" "L" "K" "I" "E" "N" "K" "S" "K"  
## [528] "R" "K" "C" "M" "I" "S" "H" "V" "P" "L" "F" "\*" "H" "L" "I" "K" "I"  
## [545] "N" "L" "N" "E" "K" "I" "K" "G" "N" "Q" "D" "N" "I" "K" "A" "K" "K"  
## [562] "K" "K" "M" "R" "T" "E" "R" "K" "G" "D" "V" "L" "C" "I" "F" "Q" "G"  
## [579] "L" "C" "Y" "F" "F" "F" "F" "F" "L" "T" "R" "G" "E" "L" "L" "F" "C"  
## [596] "S" "L" "\*" "P" "P" "A" "G" "P" "A" "S" "L" "G" "D" "W" "G" "A" "R"  
## [613] "L" "R" "G" "P" "G" "A" "R" "\*" "A" "C" "S" "H" "C" "Q" "V" "P" "G"  
## [630] "A" "P" "G" "W" "V" "P" "Q" "E" "L" "Q" "E" "G" "S" "E" "L" "E" "P"  
## [647] "A" "P" "P" "S" "I" "D" "G" "A" "I" "V" "G" "L" "Q" "V" "T" "E" "P"  
## [664] "L" "S" "L" "L" "S" "V" "R" "V" "P" "G" "G" "G" "Y" "T" "W" "G" "L"  
## [681] "P" "G" "P" "R" "F" "P" "V" "L" "N" "A" "P" "\*" "P" "T" "V" "M" "T"  
## [698] "S" "\*" "A" "L" "R" "K" "G" "K" "E" "R" "G" "G" "C" "R" "W" "L" "T"  
## [715] "K" "M" "P" "E" "T" "P" "E" "S" "S" "G" "\*" "A" "S" "W" "G" "H" "V"  
## [732] "P" "K" "L" "L" "S" "L" "G" "S" "G" "D" "A" "T" "P" "P" "P" "G" "G"  
## [749] "H" "E" "T" "A" "L" "P" "P" "H" "P" "S" "P" "Q" "G" "H" "L" "M" "T"  
## [766] "L" "G" "R" "W" "W" "T" "P" "\*" "L" "I" "S" "P" "P" "V" "P" "W" "E"  
## [783] "G" "G" "S" "L" "T" "L" "W" "G" "S" "L" "D" "S" "L" "M" "P" "P" "W"  
## [800] "G" "P" "A" "G" "S" "T" "M" "T" "L" "Q" "K" "G" "F" "F" "L" "Q" "K"  
## [817] "K" "K" "E" "K" "Q" "V" "V" "I" "F" "F" "\*" "\*" "K" "N" "H" "R" "L"  
## [834] "\*" "I" "N" "V" "N" "T" "K" "\*" "V" "D" "L" "L" "A" "R" "K" "S" "D"  
## [851] "S" "I" "F" "L" "L" "I" "L" "F" "Q" "L" "\*" "T" "V" "K" "T" "K" "N"  
## [868] "G" "A" "G" "W" "G" "T" "\*" "T" "L" "A" "G" "N" "L" "\*" "R" "K" "K"  
## [885] "K" "Q" "K" "T" "N" "I" "Q" "I" "H" "L" "Q" "K" "Q" "S" "K" "T" "V"  
## [902] "V" "R" "G" "E" "S" "W" "A" "\*" "R" "L" "E" "G" "V" "A" "E" "G" "P"  
## [919] "S" "E" "L" "Q" "G" "V" "S" "V" "M" "E" "R" "W" "L" "P" "Q" "T" "R"  
## [936] "K" "V" "L" "R" "M" "G" "E" "D" "R" "I" "Q" "Q" "R" "K" "R" "P" "H"  
## [953] "T" "P" "H" "A" "H" "R" "H" "V" "H" "T" "H" "I" "H" "S" "P" "L" "S"  
## [970] "P" "A" "L" "Q" "S" "L" "T" "G" "T" "H" "S" "V" "S" "T" "L" "P" "S"  
## [987] "H" "T" "R" "P" "G" "A" "W" "L" "K" "G" "N" "\*" "L" "M" "P" "S" "K"  
## [1004] "A" "M" "D" "D" "N" "N" "S" "T" "L" "A" "F" "V" "F" "I" "H" "N" "L"  
## [1021] "P" "T" "E" "H" "T" "H" "E" "H" "T" "H" "A" "H" "I" "P" "T" "H" "A"  
## [1038] "H" "I" "P" "T" "H" "T" "H" "T" "P" "L" "A" "C" "M" "G" "R" "A" "P"  
## [1055] "V" "\*" "N" "P" "G" "L" "D" "S" "G" "I" "P" "C" "C" "M" "A" "S" "L"  
## [1072] "G" "L" "N" "F" "P" "P" "M" "\*" "A" "C" "G" "L" "T" "Q" "R" "S" "T"  
## [1089] "K" "G" "P" "F" "L" "L" "Y" "V" "S" "V" "T" "\*" "D" "L" "P" "P" "A"  
## [1106] "P" "R" "I" "C" "Q" "G" "\*" "P" "G" "Q" "L" "P" "P" "S" "P" "Q" "A"  
## [1123] "H" "H" "Q" "S" "A" "S" "Q" "T" "H" "T" "H" "T" "H" "T" "I" "Y" "L"  
## [1140] "L" "T" "V" "L" "P" "E" "H" "L" "P" "P" "H" "P" "M" "S" "K" "Q" "K"  
## [1157] "Y" "T" "H" "V" "S" "K" "H" "K" "A" "V" "Q" "A" "K" "R" "G" "K" "T"  
## [1174] "Q" "G" "S" "P" "K" "P" "F" "F" "T" "L" "C" "P" "L" "A" "A" "I" "M"  
## [1191] "E" "S" "\*" "R" "G" "F" "L" "G" "R" "R" "A" "L" "P" "P" "G" "L" "P"  
## [1208] "Q" "C" "L" "W" "G" "S" "V" "K" "K" "R" "I" "L" "\*" "G" "L" "L" "G"  
## [1225] "G" "L" "K" "A" "E" "G" "M" "E" "R" "K" "I" "L" "A" "V" "P" "S" "Q"  
## [1242] "C" "K" "D" "Q" "P" "Q" "K" "L" "N" "L" "H" "H" "R" "L" "K" "V" "K"  
## [1259] "G" "I" "L" "C" "F" "S" "P" "F" "F" "P" "R" "V" "T" "R" "A" "S" "S"  
## [1276] "D" "\*" "Q" "K" "S" "N" "S" "F" "P" "E" "L" "E" "I" "S" "E" "Q" "S"  
## [1293] "A" "S" "Y" "S" "Q" "V" "T" "E" "G" "Q" "G" "E" "A" "P" "L" "P" "L"  
## [1310] "P" "A" "S" "L" "P" "R" "F" "A" "F" "F" "L" "T" "P" "A" "F" "P" "E"  
## [1327] "V" "E" "L" "S" "G" "E" "F" "\*" "R" "M" "A" "S" "K" "A" "F" "\*" "A"  
## [1344] "C" "T" "S" "H" "L" "P" "F" "L" "S" "F" "A" "W" "E" "R" "K" "V" "I"  
## [1361] "F" "P" "G" "Q" "Q" "G" "A" "E" "H" "R" "P" "A" "Q" "P" "R" "S" "T"  
## [1378] "G" "G" "G" "H" "G" "P" "W" "G" "R" "T" "M" "G" "D" "N" "S" "R" "C"  
## [1395] "G" "N" "N" "N" "Q" "V" "A" "L" "S" "L" "G" "R" "N" "\*" "T" "L" "P"  
## [1412] "L" "S" "H" "P" "N" "L" "A" "R" "H" "P" "T" "R" "F" "Q" "T" "\*" "R"  
## [1429] "D" "Q" "G" "\*" "E" "R" "R" "E" "K" "G" "G" "S" "P" "R" "K" "P" "H"  
## [1446] "P" "S" "E" "H" "C" "L" "K" "R" "K" "T" "S" "S" "S" "S" "P" "N" "S"  
## [1463] "G" "R" "A" "S" "G" "K" "A" "I" "S" "A" "S" "F" "H" "G" "A" "R" "P"  
## [1480] "G" "F" "W" "V" "C" "L" "K" "K" "A" "T" "G" "V" "W" "G" "D" "I" "A"  
## [1497] "M" "A" "E" "K" "G" "L" "G" "G" "P" "E" "G" "R" "S" "Q" "D" "R" "N"  
## [1514] "C" "K" "G" "V" "A" "A" "Q" "G" "C" "G" "\*" "L" "L" "M" "S" "S" "S"  
## [1531] "D" "Q" "F" "K" "K" "L" "T" "S" "I" "Y" "F" "L" "G" "E" "S" "F" "F"  
## [1548] "F" "F" "S" "D" "C" "\*" "Q" "K" "K" "N" "F" "K" "K" "Q" "K" "T" "E"  
## [1565] "K" "K" "N" "P" "G" "T" "\*" "N" "K" "D" "F" "F" "F" "L"

Open the Nucleotide Fasta file and translate the sequences to Amino acids in Reverse Translation.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
getTrans(sequences, sens = "R", NAstring = "X", ambiguous = FALSE,numcode=1)

## [1] "Y" "K" "K" "K" "K" "S" "L" "F" "H" "V" "P" "G" "F" "F" "F" "S" "V"  
## [18] "F" "C" "F" "L" "K" "F" "F" "F" "C" "\*" "Q" "S" "E" "K" "K" "K" "K"  
## [35] "D" "S" "P" "R" "K" "\*" "M" "E" "V" "S" "F" "L" "N" "W" "S" "E" "L"  
## [52] "D" "M" "S" "N" "H" "P" "H" "P" "W" "A" "A" "T" "P" "L" "Q" "F" "R"  
## [69] "S" "W" "L" "L" "P" "S" "G" "P" "P" "S" "P" "F" "S" "A" "M" "A" "M"  
## [86] "S" "P" "H" "T" "P" "V" "A" "F" "F" "K" "H" "T" "Q" "N" "P" "G" "L"  
## [103] "A" "P" "W" "K" "E" "A" "L" "I" "A" "F" "P" "D" "A" "L" "P" "E" "F"  
## [120] "G" "E" "L" "E" "L" "V" "F" "L" "F" "R" "Q" "C" "S" "L" "G" "C" "G"  
## [137] "F" "L" "G" "D" "P" "P" "F" "S" "L" "R" "S" "H" "P" "\*" "S" "L" "\*"  
## [154] "V" "W" "N" "L" "V" "G" "W" "R" "A" "R" "L" "G" "W" "E" "R" "G" "R"  
## [171] "V" "Q" "F" "L" "P" "R" "L" "R" "A" "T" "W" "L" "L" "L" "P" "H" "L"  
## [188] "E" "L" "S" "P" "I" "V" "L" "P" "Q" "G" "P" "\*" "P" "P" "P" "V" "L"  
## [205] "L" "G" "W" "A" "G" "R" "C" "S" "A" "P" "C" "\*" "P" "G" "K" "I" "T"  
## [222] "F" "L" "S" "Q" "A" "K" "D" "R" "K" "G" "R" "\*" "D" "V" "Q" "A" "Q"  
## [239] "K" "A" "L" "L" "A" "I" "L" "\*" "N" "S" "P" "E" "S" "S" "T" "S" "G"  
## [256] "N" "A" "G" "V" "K" "K" "N" "A" "N" "R" "G" "R" "L" "A" "G" "R" "G"  
## [273] "R" "G" "A" "S" "P" "\*" "P" "S" "V" "T" "W" "E" "\*" "L" "A" "D" "C"  
## [290] "S" "E" "I" "S" "S" "S" "G" "K" "L" "L" "D" "F" "C" "Q" "S" "E" "L"  
## [307] "A" "L" "V" "T" "L" "G" "K" "K" "G" "E" "K" "H" "R" "M" "P" "L" "T"  
## [324] "F" "S" "L" "W" "C" "K" "F" "N" "F" "W" "G" "W" "S" "L" "H" "W" "D"  
## [341] "G" "T" "A" "K" "I" "F" "L" "S" "I" "P" "S" "A" "L" "S" "P" "P" "S"  
## [358] "K" "P" "Q" "R" "I" "L" "F" "F" "T" "D" "P" "Q" "R" "H" "W" "G" "S"  
## [375] "P" "G" "G" "R" "A" "L" "L" "P" "R" "K" "P" "L" "\*" "L" "S" "M" "I"  
## [392] "A" "A" "R" "G" "H" "K" "V" "K" "K" "G" "F" "G" "D" "P" "C" "V" "F"  
## [409] "P" "L" "F" "A" "\*" "T" "A" "L" "C" "L" "L" "T" "C" "V" "Y" "F" "C"  
## [426] "F" "D" "I" "G" "C" "G" "G" "R" "C" "S" "G" "S" "T" "V" "R" "R" "Y"  
## [443] "M" "V" "C" "V" "C" "V" "C" "V" "\*" "E" "A" "D" "\*" "\*" "\*" "A" "W"  
## [460] "G" "L" "G" "G" "S" "C" "P" "G" "H" "P" "W" "H" "I" "L" "G" "A" "G"  
## [477] "G" "R" "S" "\*" "V" "T" "D" "T" "\*" "S" "K" "N" "G" "P" "L" "V" "L"  
## [494] "L" "W" "V" "N" "P" "H" "A" "Y" "M" "G" "G" "K" "L" "R" "P" "R" "E"  
## [511] "A" "M" "Q" "Q" "G" "I" "P" "E" "S" "S" "P" "G" "F" "\*" "T" "G" "A"  
## [528] "L" "P" "M" "H" "A" "S" "G" "V" "C" "V" "C" "V" "G" "M" "C" "A" "C"  
## [545] "V" "G" "M" "C" "A" "C" "V" "C" "S" "C" "V" "C" "S" "V" "G" "R" "L"  
## [562] "\*" "M" "N" "T" "K" "A" "S" "V" "E" "L" "L" "S" "S" "M" "A" "L" "E"  
## [579] "G" "M" "S" "Q" "F" "P" "L" "S" "H" "A" "P" "G" "R" "V" "W" "D" "G"  
## [596] "R" "V" "E" "T" "E" "C" "V" "P" "V" "S" "D" "C" "S" "A" "G" "L" "S"  
## [613] "G" "L" "C" "M" "C" "V" "\*" "T" "C" "L" "C" "A" "C" "G" "V" "C" "G"  
## [630] "L" "F" "L" "C" "W" "I" "L" "S" "S" "P" "I" "R" "S" "T" "F" "L" "V"  
## [647] "\*" "G" "S" "H" "L" "S" "I" "T" "E" "T" "P" "C" "S" "S" "L" "G" "P"  
## [664] "S" "A" "T" "P" "S" "N" "L" "Q" "A" "Q" "L" "S" "P" "L" "T" "T" "V"  
## [681] "L" "L" "C" "F" "C" "K" "W" "I" "C" "I" "F" "V" "F" "C" "F" "F" "F"  
## [698] "L" "Y" "K" "F" "P" "A" "K" "V" "\*" "V" "P" "H" "P" "A" "P" "F" "F"  
## [715] "V" "F" "T" "V" "\*" "S" "W" "K" "R" "I" "K" "R" "K" "I" "L" "S" "D"  
## [732] "F" "L" "A" "S" "K" "S" "T" "Y" "F" "V" "F" "T" "F" "I" "Y" "S" "L"  
## [749] "W" "F" "F" "Y" "\*" "K" "K" "I" "T" "T" "C" "F" "S" "F" "F" "F" "C"  
## [766] "K" "K" "K" "P" "F" "C" "S" "V" "I" "V" "E" "P" "A" "G" "P" "Q" "G"  
## [783] "G" "I" "S" "E" "S" "K" "D" "P" "Q" "R" "V" "N" "E" "P" "P" "S" "Q"  
## [800] "G" "T" "G" "G" "L" "M" "S" "Q" "G" "V" "H" "H" "R" "P" "R" "V" "I"  
## [817] "R" "W" "P" "\*" "G" "E" "G" "\*" "G" "G" "R" "A" "V" "S" "C" "P" "P"  
## [834] "G" "G" "G" "V" "A" "S" "P" "D" "P" "K" "D" "R" "S" "L" "G" "T" "\*"  
## [851] "P" "Q" "E" "A" "H" "P" "E" "D" "S" "G" "V" "S" "G" "I" "L" "V" "S"  
## [868] "H" "R" "Q" "P" "P" "L" "S" "F" "P" "F" "L" "K" "A" "\*" "E" "V" "I"  
## [885] "T" "V" "G" "\*" "G" "A" "L" "R" "T" "G" "N" "L" "G" "P" "G" "K" "P"  
## [902] "Q" "V" "Y" "P" "P" "P" "G" "T" "L" "T" "E" "R" "R" "D" "K" "G" "S"  
## [919] "V" "T" "W" "R" "P" "T" "I" "A" "P" "S" "M" "L" "G" "G" "A" "G" "S"  
## [936] "S" "S" "E" "P" "S" "W" "S" "S" "W" "G" "T" "H" "P" "G" "A" "P" "G"  
## [953] "T" "W" "Q" "\*" "L" "Q" "A" "H" "L" "A" "P" "G" "P" "L" "S" "L" "A"  
## [970] "P" "Q" "S" "P" "R" "E" "A" "G" "P" "A" "G" "G" "\*" "R" "E" "Q" "K"  
## [987] "S" "N" "S" "P" "R" "V" "K" "K" "K" "K" "K" "K" "\*" "H" "K" "P" "\*"  
## [1004] "K" "I" "Q" "R" "T" "S" "P" "F" "L" "S" "V" "L" "I" "F" "F" "F" "F"  
## [1021] "A" "L" "M" "L" "S" "W" "F" "P" "F" "I" "F" "S" "F" "K" "L" "I" "F"  
## [1038] "I" "K" "C" "\*" "N" "N" "G" "T" "W" "E" "I" "M" "H" "F" "L" "L" "D"  
## [1055] "L" "F" "S" "I" "F" "N" "F" "L" "S" "L" "S" "L" "F" "F" "K" "V" "C"  
## [1072] "F" "L" "P" "S" "F" "I" "F" "S" "H" "I" "S" "C" "C" "F" "A" "S" "L"  
## [1089] "F" "L" "L" "Y" "F" "V" "L" "F" "F" "K" "I" "Y" "L" "L" "C" "F" "F"  
## [1106] "S" "F" "F" "V" "C" "V" "C" "F" "F" "V" "F" "C" "F" "F" "V" "F" "F"  
## [1123] "V" "F" "C" "F" "C" "F" "W" "K" "V" "S" "Q" "R" "R" "V" "W" "V" "S"  
## [1140] "P" "P" "R" "P" "A" "P" "G" "D" "R" "A" "L" "L" "P" "R" "S" "S" "G"  
## [1157] "E" "A" "R" "G" "L" "Y" "T" "G" "V" "V" "R" "R" "L" "A" "V" "L" "E"  
## [1174] "W" "R" "E" "S" "L" "F" "S" "F" "W" "I" "Q" "L" "\*" "T" "W" "R" "K"  
## [1191] "L" "L" "S" "L" "S" "E" "L" "\*" "V" "A" "V" "G" "V" "V" "A" "A" "F"  
## [1208] "R" "G" "S" "L" "L" "S" "V" "Y" "M" "E" "I" "S" "V" "D" "G" "R" "V"  
## [1225] "L" "K" "P" "L" "M" "P" "T" "G" "E" "A" "S" "L" "E" "C" "E" "G" "S"  
## [1242] "V" "E" "R" "E" "L" "E" "R" "L" "R" "R" "W" "\*" "R" "\*" "R" "\*" "L"  
## [1259] "G" "M" "R" "V" "M" "A" "E" "A" "W" "R" "\*" "S" "V" "A" "R" "A" "V"  
## [1276] "A" "R" "S" "C" "L" "C" "R" "S" "I" "N" "M" "C" "T" "A" "S" "T" "P"  
## [1293] "T" "I" "S" "A" "M" "M" "K" "D" "R" "A" "P" "K" "\*" "K" "D" "Q" "P"  
## [1310] "Y" "E" "\*" "L" "F" "F" "L" "E" "S" "L" "L" "E" "G" "S" "P" "A" "L"  
## [1327] "A" "D" "M" "Y" "T" "M" "M" "P" "M" "M" "L" "L" "R" "P" "A" "D" "T"  
## [1344] "K" "K" "M" "P" "A" "L" "R" "M" "M" "L" "C" "R" "V" "L" "\*" "N" "S"  
## [1361] "L" "A" "A" "M" "Q" "R" "P" "P" "M" "K" "S" "R" "I" "T" "L" "R" "I"  
## [1378] "G" "K" "M" "L" "E" "A" "L" "T" "A" "R" "R" "K" "Y" "S" "A" "V" "S"  
## [1395] "A" "S" "\*" "S" "A" "S" "S" "G" "K" "\*" "S" "I" "C" "L" "H" "R" "P"  
## [1412] "L" "K" "F" "P" "S" "R" "Q" "Q" "V" "L" "H" "N" "P" "E" "W" "V" "I"  
## [1429] "T" "S" "S" "F" "F" "L" "L" "V" "S" "F" "S" "L" "T" "L" "L" "V" "L"  
## [1446] "Q" "T" "P" "L" "E" "\*" "S" "Q" "\*" "S" "V" "P" "T" "A" "M" "V" "I"  
## [1463] "R" "L" "K" "A" "A" "K" "A" "P" "T" "V" "V" "K" "S" "I" "\*" "T" "P"  
## [1480] "R" "S" "N" "S" "P" "I" "I" "L" "H" "Y" "I" "N" "T" "Q" "P" "T" "S"  
## [1497] "G" "S" "R" "E" "S" "V" "C" "E" "G" "A" "S" "T" "K" "A" "K" "K" "N"  
## [1514] "K" "\*" "K" "\*" "K" "L" "F" "H" "Y" "\*" "Y" "N" "G" "Y" "M" "Y" "E"  
## [1531] "\*" "R" "I" "W" "R" "V" "I" "K" "K" "G" "R" "\*" "E" "S" "S" "R" "K"  
## [1548] "R" "V" "\*" "I" "I" "K" "I" "T" "R" "E" "E" "A" "C" "L" "L" "R" "S"  
## [1565] "E" "T" "V" "P" "V" "A" "V" "F" "F" "F" "\*" "K" "E" "K"

Open the Nucleotide Fasta file and translate the sequences to Amino acids and print the three letter codons of the translated amino acids.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
Amino<-getTrans(sequences, sens = "F", NAstring = "X", ambiguous = FALSE)  
print(aaa(Amino))

## [1] "Ser" "Phe" "Ser" "Phe" "Stp" "Lys" "Lys" "Asn" "Thr" "Ala" "Thr"  
## [12] "Gly" "Thr" "Val" "Ser" "Asp" "Leu" "Lys" "Arg" "Gln" "Ala" "Ser"  
## [23] "Ser" "Arg" "Val" "Ile" "Phe" "Ile" "Ile" "Tyr" "Thr" "Leu" "Phe"  
## [34] "Arg" "Glu" "Leu" "Ser" "Tyr" "Leu" "Pro" "Phe" "Phe" "Ile" "Thr"  
## [45] "Leu" "His" "Ile" "Leu" "Tyr" "Ser" "Tyr" "Ile" "Tyr" "Pro" "Leu"  
## [56] "Tyr" "Stp" "Stp" "Trp" "Asn" "Asn" "Phe" "Tyr" "Phe" "Tyr" "Leu"  
## [67] "Phe" "Phe" "Leu" "Ala" "Leu" "Val" "Leu" "Ala" "Pro" "Ser" "His"  
## [78] "Thr" "Leu" "Ser" "Arg" "Glu" "Pro" "Glu" "Val" "Gly" "Trp" "Val"  
## [89] "Phe" "Ile" "Stp" "Stp" "Arg" "Ile" "Met" "Gly" "Leu" "Phe" "Asp"  
## [100] "Arg" "Gly" "Val" "Gln" "Met" "Leu" "Leu" "Thr" "Thr" "Val" "Gly"  
## [111] "Ala" "Phe" "Ala" "Ala" "Phe" "Ser" "Leu" "Met" "Thr" "Ile" "Ala"  
## [122] "Val" "Gly" "Thr" "Asp" "Tyr" "Trp" "Leu" "Tyr" "Ser" "Arg" "Gly"  
## [133] "Val" "Cys" "Lys" "Thr" "Lys" "Ser" "Val" "Ser" "Glu" "Asn" "Glu"  
## [144] "Thr" "Ser" "Lys" "Lys" "Asn" "Glu" "Glu" "Val" "Met" "Thr" "His"  
## [155] "Ser" "Gly" "Leu" "Trp" "Arg" "Thr" "Cys" "Cys" "Leu" "Glu" "Gly"  
## [166] "Asn" "Phe" "Lys" "Gly" "Leu" "Cys" "Lys" "Gln" "Ile" "Asp" "His"  
## [177] "Phe" "Pro" "Glu" "Asp" "Ala" "Asp" "Tyr" "Glu" "Ala" "Asp" "Thr"  
## [188] "Ala" "Glu" "Tyr" "Phe" "Leu" "Arg" "Ala" "Val" "Arg" "Ala" "Ser"  
## [199] "Ser" "Ile" "Phe" "Pro" "Ile" "Leu" "Ser" "Val" "Ile" "Leu" "Leu"  
## [210] "Phe" "Met" "Gly" "Gly" "Leu" "Cys" "Ile" "Ala" "Ala" "Ser" "Glu"  
## [221] "Phe" "Tyr" "Lys" "Thr" "Arg" "His" "Asn" "Ile" "Ile" "Leu" "Ser"  
## [232] "Ala" "Gly" "Ile" "Phe" "Phe" "Val" "Ser" "Ala" "Gly" "Leu" "Ser"  
## [243] "Asn" "Ile" "Ile" "Gly" "Ile" "Ile" "Val" "Tyr" "Ile" "Ser" "Ala"  
## [254] "Asn" "Ala" "Gly" "Asp" "Pro" "Ser" "Lys" "Ser" "Asp" "Ser" "Lys"  
## [265] "Lys" "Asn" "Ser" "Tyr" "Ser" "Tyr" "Gly" "Trp" "Ser" "Phe" "Tyr"  
## [276] "Phe" "Gly" "Ala" "Leu" "Ser" "Phe" "Ile" "Ile" "Ala" "Glu" "Met"  
## [287] "Val" "Gly" "Val" "Leu" "Ala" "Val" "His" "Met" "Phe" "Ile" "Asp"  
## [298] "Arg" "His" "Lys" "Gln" "Leu" "Arg" "Ala" "Thr" "Ala" "Arg" "Ala"  
## [309] "Thr" "Asp" "Tyr" "Leu" "Gln" "Ala" "Ser" "Ala" "Ile" "Thr" "Arg"  
## [320] "Ile" "Pro" "Ser" "Tyr" "Arg" "Tyr" "Arg" "Tyr" "Gln" "Arg" "Arg"  
## [331] "Ser" "Arg" "Ser" "Ser" "Ser" "Arg" "Ser" "Thr" "Glu" "Pro" "Ser"  
## [342] "His" "Ser" "Arg" "Asp" "Ala" "Ser" "Pro" "Val" "Gly" "Ile" "Lys"  
## [353] "Gly" "Phe" "Asn" "Thr" "Leu" "Pro" "Ser" "Thr" "Glu" "Ile" "Ser"  
## [364] "Met" "Tyr" "Thr" "Leu" "Ser" "Arg" "Asp" "Pro" "Leu" "Lys" "Ala"  
## [375] "Ala" "Thr" "Thr" "Pro" "Thr" "Ala" "Thr" "Tyr" "Asn" "Ser" "Asp"  
## [386] "Arg" "Asp" "Asn" "Ser" "Phe" "Leu" "Gln" "Val" "His" "Asn" "Cys"  
## [397] "Ile" "Gln" "Lys" "Glu" "Asn" "Lys" "Asp" "Ser" "Leu" "His" "Ser"  
## [408] "Asn" "Thr" "Ala" "Asn" "Arg" "Arg" "Thr" "Thr" "Pro" "Val" "Stp"  
## [419] "Arg" "Pro" "Arg" "Ala" "Ser" "Pro" "Glu" "Asp" "Arg" "Gly" "Arg"  
## [430] "Arg" "Ala" "Arg" "Ser" "Pro" "Gly" "Ala" "Gly" "Arg" "Gly" "Gly"  
## [441] "Glu" "Thr" "Gln" "Thr" "Leu" "Arg" "Trp" "Glu" "Thr" "Phe" "Gln"  
## [452] "Lys" "Gln" "Lys" "Gln" "Lys" "Thr" "Lys" "Lys" "Thr" "Lys" "Lys"  
## [463] "Gln" "Lys" "Thr" "Lys" "Lys" "His" "Thr" "His" "Thr" "Lys" "Lys"  
## [474] "Glu" "Lys" "Lys" "His" "Asn" "Lys" "Stp" "Ile" "Leu" "Lys" "Lys"  
## [485] "Arg" "Thr" "Lys" "Tyr" "Lys" "Arg" "Asn" "Lys" "Glu" "Ala" "Lys"  
## [496] "Gln" "Gln" "Glu" "Met" "Trp" "Glu" "Asn" "Ile" "Asn" "Glu" "Gly"  
## [507] "Arg" "Lys" "Gln" "Thr" "Leu" "Lys" "Lys" "Ser" "Glu" "Arg" "Asp"  
## [518] "Lys" "Lys" "Leu" "Lys" "Ile" "Glu" "Asn" "Lys" "Ser" "Lys" "Arg"  
## [529] "Lys" "Cys" "Met" "Ile" "Ser" "His" "Val" "Pro" "Leu" "Phe" "Stp"  
## [540] "His" "Leu" "Ile" "Lys" "Ile" "Asn" "Leu" "Asn" "Glu" "Lys" "Ile"  
## [551] "Lys" "Gly" "Asn" "Gln" "Asp" "Asn" "Ile" "Lys" "Ala" "Lys" "Lys"  
## [562] "Lys" "Lys" "Met" "Arg" "Thr" "Glu" "Arg" "Lys" "Gly" "Asp" "Val"  
## [573] "Leu" "Cys" "Ile" "Phe" "Gln" "Gly" "Leu" "Cys" "Tyr" "Phe" "Phe"  
## [584] "Phe" "Phe" "Phe" "Leu" "Thr" "Arg" "Gly" "Glu" "Leu" "Leu" "Phe"  
## [595] "Cys" "Ser" "Leu" "Stp" "Pro" "Pro" "Ala" "Gly" "Pro" "Ala" "Ser"  
## [606] "Leu" "Gly" "Asp" "Trp" "Gly" "Ala" "Arg" "Leu" "Arg" "Gly" "Pro"  
## [617] "Gly" "Ala" "Arg" "Stp" "Ala" "Cys" "Ser" "His" "Cys" "Gln" "Val"  
## [628] "Pro" "Gly" "Ala" "Pro" "Gly" "Trp" "Val" "Pro" "Gln" "Glu" "Leu"  
## [639] "Gln" "Glu" "Gly" "Ser" "Glu" "Leu" "Glu" "Pro" "Ala" "Pro" "Pro"  
## [650] "Ser" "Ile" "Asp" "Gly" "Ala" "Ile" "Val" "Gly" "Leu" "Gln" "Val"  
## [661] "Thr" "Glu" "Pro" "Leu" "Ser" "Leu" "Leu" "Ser" "Val" "Arg" "Val"  
## [672] "Pro" "Gly" "Gly" "Gly" "Tyr" "Thr" "Trp" "Gly" "Leu" "Pro" "Gly"  
## [683] "Pro" "Arg" "Phe" "Pro" "Val" "Leu" "Asn" "Ala" "Pro" "Stp" "Pro"  
## [694] "Thr" "Val" "Met" "Thr" "Ser" "Stp" "Ala" "Leu" "Arg" "Lys" "Gly"  
## [705] "Lys" "Glu" "Arg" "Gly" "Gly" "Cys" "Arg" "Trp" "Leu" "Thr" "Lys"  
## [716] "Met" "Pro" "Glu" "Thr" "Pro" "Glu" "Ser" "Ser" "Gly" "Stp" "Ala"  
## [727] "Ser" "Trp" "Gly" "His" "Val" "Pro" "Lys" "Leu" "Leu" "Ser" "Leu"  
## [738] "Gly" "Ser" "Gly" "Asp" "Ala" "Thr" "Pro" "Pro" "Pro" "Gly" "Gly"  
## [749] "His" "Glu" "Thr" "Ala" "Leu" "Pro" "Pro" "His" "Pro" "Ser" "Pro"  
## [760] "Gln" "Gly" "His" "Leu" "Met" "Thr" "Leu" "Gly" "Arg" "Trp" "Trp"  
## [771] "Thr" "Pro" "Stp" "Leu" "Ile" "Ser" "Pro" "Pro" "Val" "Pro" "Trp"  
## [782] "Glu" "Gly" "Gly" "Ser" "Leu" "Thr" "Leu" "Trp" "Gly" "Ser" "Leu"  
## [793] "Asp" "Ser" "Leu" "Met" "Pro" "Pro" "Trp" "Gly" "Pro" "Ala" "Gly"  
## [804] "Ser" "Thr" "Met" "Thr" "Leu" "Gln" "Lys" "Gly" "Phe" "Phe" "Leu"  
## [815] "Gln" "Lys" "Lys" "Lys" "Glu" "Lys" "Gln" "Val" "Val" "Ile" "Phe"  
## [826] "Phe" "Stp" "Stp" "Lys" "Asn" "His" "Arg" "Leu" "Stp" "Ile" "Asn"  
## [837] "Val" "Asn" "Thr" "Lys" "Stp" "Val" "Asp" "Leu" "Leu" "Ala" "Arg"  
## [848] "Lys" "Ser" "Asp" "Ser" "Ile" "Phe" "Leu" "Leu" "Ile" "Leu" "Phe"  
## [859] "Gln" "Leu" "Stp" "Thr" "Val" "Lys" "Thr" "Lys" "Asn" "Gly" "Ala"  
## [870] "Gly" "Trp" "Gly" "Thr" "Stp" "Thr" "Leu" "Ala" "Gly" "Asn" "Leu"  
## [881] "Stp" "Arg" "Lys" "Lys" "Lys" "Gln" "Lys" "Thr" "Asn" "Ile" "Gln"  
## [892] "Ile" "His" "Leu" "Gln" "Lys" "Gln" "Ser" "Lys" "Thr" "Val" "Val"  
## [903] "Arg" "Gly" "Glu" "Ser" "Trp" "Ala" "Stp" "Arg" "Leu" "Glu" "Gly"  
## [914] "Val" "Ala" "Glu" "Gly" "Pro" "Ser" "Glu" "Leu" "Gln" "Gly" "Val"  
## [925] "Ser" "Val" "Met" "Glu" "Arg" "Trp" "Leu" "Pro" "Gln" "Thr" "Arg"  
## [936] "Lys" "Val" "Leu" "Arg" "Met" "Gly" "Glu" "Asp" "Arg" "Ile" "Gln"  
## [947] "Gln" "Arg" "Lys" "Arg" "Pro" "His" "Thr" "Pro" "His" "Ala" "His"  
## [958] "Arg" "His" "Val" "His" "Thr" "His" "Ile" "His" "Ser" "Pro" "Leu"  
## [969] "Ser" "Pro" "Ala" "Leu" "Gln" "Ser" "Leu" "Thr" "Gly" "Thr" "His"  
## [980] "Ser" "Val" "Ser" "Thr" "Leu" "Pro" "Ser" "His" "Thr" "Arg" "Pro"  
## [991] "Gly" "Ala" "Trp" "Leu" "Lys" "Gly" "Asn" "Stp" "Leu" "Met" "Pro"  
## [1002] "Ser" "Lys" "Ala" "Met" "Asp" "Asp" "Asn" "Asn" "Ser" "Thr" "Leu"  
## [1013] "Ala" "Phe" "Val" "Phe" "Ile" "His" "Asn" "Leu" "Pro" "Thr" "Glu"  
## [1024] "His" "Thr" "His" "Glu" "His" "Thr" "His" "Ala" "His" "Ile" "Pro"  
## [1035] "Thr" "His" "Ala" "His" "Ile" "Pro" "Thr" "His" "Thr" "His" "Thr"  
## [1046] "Pro" "Leu" "Ala" "Cys" "Met" "Gly" "Arg" "Ala" "Pro" "Val" "Stp"  
## [1057] "Asn" "Pro" "Gly" "Leu" "Asp" "Ser" "Gly" "Ile" "Pro" "Cys" "Cys"  
## [1068] "Met" "Ala" "Ser" "Leu" "Gly" "Leu" "Asn" "Phe" "Pro" "Pro" "Met"  
## [1079] "Stp" "Ala" "Cys" "Gly" "Leu" "Thr" "Gln" "Arg" "Ser" "Thr" "Lys"  
## [1090] "Gly" "Pro" "Phe" "Leu" "Leu" "Tyr" "Val" "Ser" "Val" "Thr" "Stp"  
## [1101] "Asp" "Leu" "Pro" "Pro" "Ala" "Pro" "Arg" "Ile" "Cys" "Gln" "Gly"  
## [1112] "Stp" "Pro" "Gly" "Gln" "Leu" "Pro" "Pro" "Ser" "Pro" "Gln" "Ala"  
## [1123] "His" "His" "Gln" "Ser" "Ala" "Ser" "Gln" "Thr" "His" "Thr" "His"  
## [1134] "Thr" "His" "Thr" "Ile" "Tyr" "Leu" "Leu" "Thr" "Val" "Leu" "Pro"  
## [1145] "Glu" "His" "Leu" "Pro" "Pro" "His" "Pro" "Met" "Ser" "Lys" "Gln"  
## [1156] "Lys" "Tyr" "Thr" "His" "Val" "Ser" "Lys" "His" "Lys" "Ala" "Val"  
## [1167] "Gln" "Ala" "Lys" "Arg" "Gly" "Lys" "Thr" "Gln" "Gly" "Ser" "Pro"  
## [1178] "Lys" "Pro" "Phe" "Phe" "Thr" "Leu" "Cys" "Pro" "Leu" "Ala" "Ala"  
## [1189] "Ile" "Met" "Glu" "Ser" "Stp" "Arg" "Gly" "Phe" "Leu" "Gly" "Arg"  
## [1200] "Arg" "Ala" "Leu" "Pro" "Pro" "Gly" "Leu" "Pro" "Gln" "Cys" "Leu"  
## [1211] "Trp" "Gly" "Ser" "Val" "Lys" "Lys" "Arg" "Ile" "Leu" "Stp" "Gly"  
## [1222] "Leu" "Leu" "Gly" "Gly" "Leu" "Lys" "Ala" "Glu" "Gly" "Met" "Glu"  
## [1233] "Arg" "Lys" "Ile" "Leu" "Ala" "Val" "Pro" "Ser" "Gln" "Cys" "Lys"  
## [1244] "Asp" "Gln" "Pro" "Gln" "Lys" "Leu" "Asn" "Leu" "His" "His" "Arg"  
## [1255] "Leu" "Lys" "Val" "Lys" "Gly" "Ile" "Leu" "Cys" "Phe" "Ser" "Pro"  
## [1266] "Phe" "Phe" "Pro" "Arg" "Val" "Thr" "Arg" "Ala" "Ser" "Ser" "Asp"  
## [1277] "Stp" "Gln" "Lys" "Ser" "Asn" "Ser" "Phe" "Pro" "Glu" "Leu" "Glu"  
## [1288] "Ile" "Ser" "Glu" "Gln" "Ser" "Ala" "Ser" "Tyr" "Ser" "Gln" "Val"  
## [1299] "Thr" "Glu" "Gly" "Gln" "Gly" "Glu" "Ala" "Pro" "Leu" "Pro" "Leu"  
## [1310] "Pro" "Ala" "Ser" "Leu" "Pro" "Arg" "Phe" "Ala" "Phe" "Phe" "Leu"  
## [1321] "Thr" "Pro" "Ala" "Phe" "Pro" "Glu" "Val" "Glu" "Leu" "Ser" "Gly"  
## [1332] "Glu" "Phe" "Stp" "Arg" "Met" "Ala" "Ser" "Lys" "Ala" "Phe" "Stp"  
## [1343] "Ala" "Cys" "Thr" "Ser" "His" "Leu" "Pro" "Phe" "Leu" "Ser" "Phe"  
## [1354] "Ala" "Trp" "Glu" "Arg" "Lys" "Val" "Ile" "Phe" "Pro" "Gly" "Gln"  
## [1365] "Gln" "Gly" "Ala" "Glu" "His" "Arg" "Pro" "Ala" "Gln" "Pro" "Arg"  
## [1376] "Ser" "Thr" "Gly" "Gly" "Gly" "His" "Gly" "Pro" "Trp" "Gly" "Arg"  
## [1387] "Thr" "Met" "Gly" "Asp" "Asn" "Ser" "Arg" "Cys" "Gly" "Asn" "Asn"  
## [1398] "Asn" "Gln" "Val" "Ala" "Leu" "Ser" "Leu" "Gly" "Arg" "Asn" "Stp"  
## [1409] "Thr" "Leu" "Pro" "Leu" "Ser" "His" "Pro" "Asn" "Leu" "Ala" "Arg"  
## [1420] "His" "Pro" "Thr" "Arg" "Phe" "Gln" "Thr" "Stp" "Arg" "Asp" "Gln"  
## [1431] "Gly" "Stp" "Glu" "Arg" "Arg" "Glu" "Lys" "Gly" "Gly" "Ser" "Pro"  
## [1442] "Arg" "Lys" "Pro" "His" "Pro" "Ser" "Glu" "His" "Cys" "Leu" "Lys"  
## [1453] "Arg" "Lys" "Thr" "Ser" "Ser" "Ser" "Ser" "Pro" "Asn" "Ser" "Gly"  
## [1464] "Arg" "Ala" "Ser" "Gly" "Lys" "Ala" "Ile" "Ser" "Ala" "Ser" "Phe"  
## [1475] "His" "Gly" "Ala" "Arg" "Pro" "Gly" "Phe" "Trp" "Val" "Cys" "Leu"  
## [1486] "Lys" "Lys" "Ala" "Thr" "Gly" "Val" "Trp" "Gly" "Asp" "Ile" "Ala"  
## [1497] "Met" "Ala" "Glu" "Lys" "Gly" "Leu" "Gly" "Gly" "Pro" "Glu" "Gly"  
## [1508] "Arg" "Ser" "Gln" "Asp" "Arg" "Asn" "Cys" "Lys" "Gly" "Val" "Ala"  
## [1519] "Ala" "Gln" "Gly" "Cys" "Gly" "Stp" "Leu" "Leu" "Met" "Ser" "Ser"  
## [1530] "Ser" "Asp" "Gln" "Phe" "Lys" "Lys" "Leu" "Thr" "Ser" "Ile" "Tyr"  
## [1541] "Phe" "Leu" "Gly" "Glu" "Ser" "Phe" "Phe" "Phe" "Phe" "Ser" "Asp"  
## [1552] "Cys" "Stp" "Gln" "Lys" "Lys" "Asn" "Phe" "Lys" "Lys" "Gln" "Lys"  
## [1563] "Thr" "Glu" "Lys" "Lys" "Asn" "Pro" "Gly" "Thr" "Stp" "Asn" "Lys"  
## [1574] "Asp" "Phe" "Phe" "Phe" "Leu"

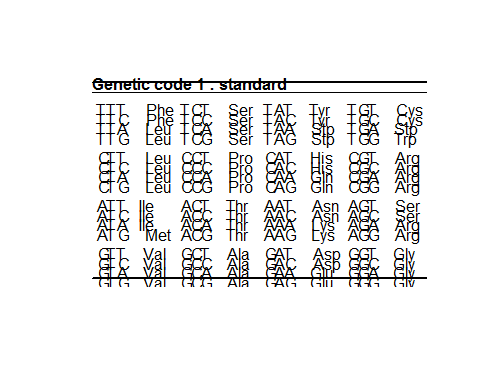
Read a Fasta File in your current directory and print the complement of the sequence.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
complementsequence<-comp(sequences,forceToLower = TRUE,ambiguous = FALSE)  
print(complementsequence)

## [1] "a" "g" "g" "a" "a" "a" "a" "g" "a" "a" "a" "a" "a" "t" "t" "t" "t"  
## [18] "t" "t" "t" "t" "t" "t" "g" "t" "g" "a" "c" "g" "t" "t" "g" "a" "c"  
## [35] "c" "t" "t" "g" "t" "c" "a" "a" "a" "g" "a" "c" "t" "a" "g" "a" "g"  
## [52] "t" "t" "t" "t" "c" "c" "g" "t" "t" "c" "g" "g" "a" "g" "a" "a" "g"  
## [69] "g" "g" "c" "a" "c" "a" "c" "t" "a" "g" "a" "a" "a" "t" "a" "t" "t"  
## [86] "a" "a" "a" "t" "g" "t" "g" "a" "g" "a" "a" "a" "a" "g" "g" "c" "a"  
## [103] "c" "t" "c" "g" "a" "a" "a" "g" "a" "a" "t" "g" "g" "a" "g" "g" "g"  
## [120] "a" "a" "a" "a" "a" "a" "a" "t" "a" "t" "t" "g" "a" "g" "a" "g" "g"  
## [137] "t" "a" "t" "a" "a" "g" "a" "g" "a" "t" "a" "a" "g" "t" "a" "t" "g"  
## [154] "t" "a" "t" "a" "t" "a" "g" "g" "t" "a" "a" "t" "a" "t" "a" "a" "t"  
## [171] "c" "a" "t" "c" "a" "c" "c" "t" "t" "a" "t" "t" "a" "a" "a" "a" "a"  
## [188] "t" "a" "a" "a" "a" "a" "t" "a" "a" "a" "t" "a" "a" "a" "a" "a" "a"  
## [205] "a" "a" "c" "c" "g" "a" "a" "a" "t" "c" "a" "t" "g" "a" "a" "c" "g"  
## [222] "t" "g" "g" "g" "a" "g" "t" "g" "t" "g" "t" "g" "t" "g" "a" "g" "a"  
## [239] "g" "g" "g" "c" "t" "c" "t" "t" "g" "g" "t" "c" "t" "t" "c" "a" "g"  
## [256] "c" "c" "a" "a" "c" "c" "c" "a" "c" "a" "a" "a" "t" "a" "t" "a" "t"  
## [273] "t" "a" "c" "t" "t" "c" "t" "t" "a" "a" "t" "a" "c" "c" "c" "c" "g"  
## [290] "a" "c" "a" "a" "a" "c" "t" "a" "g" "c" "t" "c" "c" "a" "c" "a" "a"  
## [307] "g" "t" "t" "t" "a" "c" "g" "a" "a" "a" "a" "t" "t" "g" "g" "t" "g"  
## [324] "g" "c" "a" "a" "c" "c" "a" "c" "g" "a" "a" "a" "g" "c" "g" "a" "c"  
## [341] "g" "g" "a" "a" "g" "t" "c" "g" "g" "a" "c" "t" "a" "c" "t" "g" "g"  
## [358] "t" "a" "t" "c" "g" "a" "c" "a" "c" "c" "c" "t" "t" "g" "g" "c" "t"  
## [375] "g" "a" "t" "a" "a" "c" "c" "g" "a" "g" "a" "t" "g" "a" "g" "g" "t"  
## [392] "c" "t" "c" "c" "c" "c" "a" "a" "a" "c" "g" "t" "t" "c" "t" "g" "g"  
## [409] "t" "t" "t" "t" "c" "a" "c" "a" "g" "t" "c" "a" "c" "t" "c" "t" "t"  
## [426] "a" "c" "t" "t" "t" "g" "g" "t" "c" "g" "t" "t" "t" "t" "t" "c" "t"  
## [443] "t" "g" "c" "t" "c" "c" "t" "t" "c" "a" "a" "t" "a" "c" "t" "g" "g"  
## [460] "g" "t" "a" "a" "g" "g" "c" "c" "t" "a" "a" "t" "a" "c" "c" "t" "c"  
## [477] "t" "t" "g" "g" "a" "c" "g" "a" "c" "g" "g" "a" "t" "c" "t" "t" "c"  
## [494] "c" "c" "t" "t" "a" "a" "a" "g" "t" "t" "t" "c" "c" "a" "g" "a" "c"  
## [511] "a" "c" "g" "t" "t" "c" "g" "t" "t" "t" "a" "a" "c" "t" "a" "g" "t"  
## [528] "g" "a" "a" "g" "g" "g" "t" "c" "t" "c" "c" "t" "a" "c" "g" "t" "c"  
## [545] "t" "a" "a" "t" "g" "c" "t" "t" "c" "g" "a" "c" "t" "g" "t" "g" "t"  
## [562] "c" "g" "t" "c" "t" "t" "a" "t" "a" "a" "a" "g" "g" "a" "g" "g" "c"  
## [579] "c" "c" "g" "g" "c" "a" "c" "t" "c" "c" "c" "g" "g" "a" "g" "g" "t"  
## [596] "c" "g" "t" "a" "a" "a" "a" "g" "g" "g" "t" "t" "a" "g" "g" "a" "c"  
## [613] "t" "c" "a" "c" "a" "c" "t" "a" "a" "g" "a" "c" "g" "a" "a" "a" "a"  
## [630] "g" "t" "a" "c" "c" "c" "a" "c" "c" "g" "g" "a" "g" "a" "c" "g" "t"  
## [647] "a" "g" "c" "g" "t" "c" "g" "g" "t" "c" "g" "c" "t" "c" "a" "a" "g"  
## [664] "a" "t" "g" "t" "t" "t" "t" "g" "a" "g" "c" "t" "g" "t" "g" "t" "t"  
## [681] "g" "t" "a" "g" "t" "a" "g" "g" "a" "c" "t" "c" "a" "c" "g" "g" "c"  
## [698] "c" "g" "t" "a" "g" "a" "a" "g" "a" "a" "g" "c" "a" "c" "a" "g" "a"  
## [715] "c" "g" "t" "c" "c" "a" "g" "a" "c" "t" "c" "a" "t" "t" "g" "t" "a"  
## [732] "g" "t" "a" "a" "c" "c" "g" "t" "a" "g" "t" "a" "t" "c" "a" "c" "a"  
## [749] "t" "g" "t" "a" "t" "a" "g" "a" "c" "g" "g" "t" "t" "a" "c" "g" "g"  
## [766] "c" "c" "t" "c" "t" "g" "g" "g" "g" "a" "g" "g" "t" "t" "c" "t" "c"  
## [783] "g" "c" "t" "g" "a" "g" "g" "t" "t" "t" "t" "t" "c" "t" "t" "a" "t"  
## [800] "c" "a" "a" "t" "g" "a" "g" "t" "a" "t" "g" "c" "c" "g" "a" "c" "c"  
## [817] "a" "g" "g" "a" "a" "g" "a" "t" "g" "a" "a" "g" "c" "c" "c" "c" "g"  
## [834] "g" "g" "a" "c" "a" "g" "g" "a" "a" "g" "t" "a" "g" "t" "a" "g" "c"  
## [851] "g" "g" "c" "t" "c" "t" "a" "c" "c" "a" "g" "c" "c" "c" "c" "a" "c"  
## [868] "g" "a" "c" "c" "g" "c" "c" "a" "c" "g" "t" "g" "t" "a" "c" "a" "a"  
## [885] "a" "t" "a" "g" "c" "t" "g" "g" "c" "c" "g" "t" "g" "t" "t" "t" "g"  
## [902] "t" "c" "g" "a" "c" "g" "c" "c" "c" "g" "g" "t" "g" "c" "c" "g" "g"  
## [919] "g" "c" "g" "c" "g" "g" "t" "g" "c" "c" "t" "g" "a" "t" "g" "g" "a"  
## [936] "g" "g" "t" "c" "c" "g" "g" "a" "g" "a" "c" "g" "g" "t" "a" "g" "t"  
## [953] "g" "g" "g" "c" "g" "t" "a" "g" "g" "g" "g" "t" "c" "g" "a" "t" "g"  
## [970] "g" "c" "g" "a" "t" "g" "g" "c" "g" "a" "t" "g" "g" "t" "c" "g" "c"  
## [987] "g" "g" "c" "g" "t" "c" "g" "g" "c" "g" "a" "g" "g" "t" "c" "g" "a"  
## [1004] "g" "c" "g" "c" "g" "a" "g" "g" "t" "g" "c" "c" "t" "c" "g" "g" "g"  
## [1021] "a" "g" "t" "g" "t" "g" "a" "g" "g" "t" "c" "c" "c" "t" "g" "c" "g"  
## [1038] "g" "a" "g" "g" "g" "g" "g" "c" "a" "c" "c" "c" "g" "t" "a" "g" "t"  
## [1055] "t" "c" "c" "c" "g" "a" "a" "g" "t" "t" "g" "t" "g" "g" "g" "a" "c"  
## [1072] "g" "g" "c" "a" "g" "g" "t" "g" "c" "c" "t" "c" "t" "a" "g" "a" "g"  
## [1089] "g" "t" "a" "c" "a" "t" "g" "t" "g" "c" "g" "a" "g" "t" "c" "g" "t"  
## [1106] "c" "c" "c" "t" "g" "g" "g" "g" "g" "a" "c" "t" "t" "c" "c" "g" "g"  
## [1123] "c" "g" "g" "t" "g" "g" "t" "g" "c" "g" "g" "g" "t" "g" "g" "c" "g"  
## [1140] "g" "t" "g" "g" "a" "t" "g" "t" "t" "g" "a" "g" "g" "c" "t" "g" "t"  
## [1157] "c" "c" "c" "t" "a" "t" "t" "g" "t" "c" "g" "a" "a" "g" "g" "a" "g"  
## [1174] "g" "t" "c" "c" "a" "a" "g" "t" "g" "t" "t" "g" "a" "c" "a" "t" "a"  
## [1191] "g" "g" "t" "c" "t" "t" "c" "c" "t" "c" "t" "t" "g" "t" "t" "c" "c"  
## [1208] "t" "g" "a" "g" "a" "g" "a" "g" "g" "t" "g" "a" "g" "g" "t" "t" "g"  
## [1225] "t" "g" "t" "c" "g" "g" "t" "t" "g" "g" "c" "g" "g" "c" "c" "t" "g"  
## [1242] "g" "t" "g" "g" "g" "g" "g" "c" "a" "t" "a" "t" "t" "t" "c" "t" "g"  
## [1259] "g" "c" "g" "c" "c" "c" "g" "g" "a" "g" "c" "g" "g" "t" "c" "t" "t"  
## [1276] "c" "t" "g" "g" "c" "g" "c" "c" "c" "t" "c" "c" "t" "c" "c" "c" "g"  
## [1293] "c" "g" "c" "c" "a" "g" "g" "g" "g" "c" "c" "c" "c" "c" "g" "c" "c"  
## [1310] "c" "c" "g" "c" "c" "c" "c" "g" "c" "c" "c" "c" "t" "c" "t" "g" "g"  
## [1327] "g" "t" "c" "t" "g" "g" "g" "a" "g" "g" "c" "g" "a" "c" "c" "c" "t"  
## [1344] "c" "t" "g" "g" "a" "a" "g" "g" "t" "t" "t" "t" "c" "g" "t" "t" "t"  
## [1361] "t" "t" "g" "t" "t" "t" "t" "t" "t" "g" "t" "t" "t" "t" "t" "t" "t"  
## [1378] "t" "g" "t" "t" "t" "t" "t" "t" "t" "g" "t" "t" "t" "t" "t" "t" "g"  
## [1395] "t" "t" "t" "t" "t" "t" "t" "g" "t" "g" "t" "g" "t" "g" "t" "g" "t"  
## [1412] "g" "t" "t" "t" "t" "t" "t" "t" "c" "t" "c" "t" "t" "t" "t" "t" "t"  
## [1429] "g" "t" "a" "t" "t" "g" "t" "t" "c" "a" "t" "t" "t" "a" "a" "a" "a"  
## [1446] "t" "t" "t" "t" "t" "t" "t" "t" "c" "t" "t" "g" "t" "t" "t" "t" "a"  
## [1463] "t" "a" "t" "t" "c" "t" "c" "c" "t" "t" "g" "t" "t" "t" "c" "t" "t"  
## [1480] "c" "g" "t" "t" "t" "t" "g" "t" "t" "g" "t" "c" "c" "t" "t" "t" "a"  
## [1497] "c" "a" "c" "c" "c" "t" "t" "t" "t" "a" "t" "a" "t" "t" "t" "g" "c"  
## [1514] "t" "c" "c" "c" "t" "t" "c" "t" "t" "t" "t" "g" "t" "t" "t" "g" "a"  
## [1531] "a" "a" "t" "t" "t" "t" "t" "t" "t" "t" "c" "g" "c" "t" "c" "t" "c"  
## [1548] "c" "c" "t" "a" "t" "t" "t" "t" "t" "t" "a" "a" "t" "t" "t" "t" "t"  
## [1565] "a" "t" "c" "t" "t" "t" "t" "a" "t" "t" "t" "a" "g" "a" "t" "t" "t"  
## [1582] "t" "c" "t" "t" "t" "t" "a" "c" "g" "t" "a" "c" "t" "a" "a" "a" "g"  
## [1599] "g" "g" "t" "a" "c" "a" "t" "g" "g" "t" "a" "a" "t" "a" "a" "a" "a"  
## [1616] "t" "t" "g" "t" "a" "a" "a" "t" "t" "a" "t" "t" "t" "t" "t" "a" "g"  
## [1633] "t" "t" "a" "a" "a" "t" "t" "t" "a" "c" "t" "t" "t" "t" "t" "t" "a"  
## [1650] "t" "t" "t" "t" "c" "c" "c" "t" "t" "g" "g" "t" "t" "c" "t" "a" "t"  
## [1667] "t" "g" "t" "a" "a" "t" "t" "t" "c" "g" "t" "t" "t" "t" "t" "t" "t"  
## [1684] "t" "t" "t" "t" "t" "t" "t" "a" "c" "t" "c" "t" "t" "g" "t" "c" "t"  
## [1701] "t" "t" "c" "c" "t" "t" "t" "c" "c" "c" "c" "t" "a" "c" "a" "g" "g"  
## [1718] "a" "a" "a" "c" "a" "t" "a" "a" "a" "a" "a" "g" "t" "c" "c" "c" "a"  
## [1735] "a" "a" "t" "a" "c" "a" "a" "t" "g" "a" "a" "a" "a" "a" "a" "a" "a"  
## [1752] "a" "a" "a" "a" "a" "a" "a" "a" "a" "t" "t" "g" "a" "g" "c" "c" "c"  
## [1769] "c" "t" "c" "t" "c" "a" "a" "t" "g" "a" "a" "a" "a" "g" "a" "c" "a"  
## [1786] "a" "g" "g" "g" "a" "a" "a" "t" "t" "g" "g" "g" "g" "g" "t" "c" "g"  
## [1803] "c" "c" "c" "g" "g" "g" "a" "c" "g" "g" "a" "g" "g" "g" "a" "c" "c"  
## [1820] "c" "t" "c" "t" "a" "a" "c" "c" "c" "c" "c" "c" "g" "c" "t" "c" "t"  
## [1837] "g" "a" "g" "t" "c" "c" "c" "c" "g" "g" "g" "a" "c" "c" "c" "c" "g"  
## [1854] "g" "t" "c" "c" "a" "c" "t" "c" "g" "g" "a" "c" "g" "t" "c" "a" "g"  
## [1871] "t" "g" "a" "c" "g" "g" "t" "c" "c" "a" "g" "g" "g" "a" "c" "c" "t"  
## [1888] "c" "g" "g" "g" "g" "a" "c" "c" "c" "a" "c" "c" "c" "a" "c" "g" "g"  
## [1905] "g" "g" "t" "c" "c" "t" "t" "g" "a" "g" "g" "t" "c" "c" "t" "t" "c"  
## [1922] "c" "g" "a" "g" "t" "c" "t" "c" "g" "a" "g" "c" "t" "c" "g" "g" "c"  
## [1939] "c" "g" "a" "g" "g" "c" "g" "g" "g" "t" "c" "g" "t" "a" "a" "c" "t"  
## [1956] "a" "c" "c" "c" "c" "g" "t" "t" "a" "g" "c" "a" "t" "c" "c" "g" "g"  
## [1973] "a" "g" "g" "t" "c" "c" "a" "c" "t" "g" "g" "c" "t" "c" "g" "g" "g"  
## [1990] "a" "a" "c" "a" "g" "g" "g" "a" "g" "g" "a" "g" "a" "g" "g" "c" "a"  
## [2007] "a" "t" "c" "c" "c" "a" "c" "g" "g" "a" "c" "c" "t" "c" "c" "c" "c"  
## [2024] "c" "c" "a" "t" "g" "t" "g" "a" "a" "c" "c" "c" "c" "g" "a" "a" "c"  
## [2041] "g" "g" "a" "c" "c" "g" "g" "g" "g" "t" "c" "c" "a" "a" "g" "g" "g"  
## [2058] "t" "c" "a" "g" "g" "a" "a" "t" "t" "a" "c" "g" "a" "g" "g" "a" "a"  
## [2075] "t" "t" "g" "g" "g" "t" "g" "a" "c" "a" "c" "t" "a" "c" "t" "g" "a"  
## [2092] "a" "g" "g" "a" "t" "c" "c" "g" "g" "a" "a" "c" "t" "c" "c" "t" "t"  
## [2109] "t" "c" "c" "c" "t" "t" "c" "c" "t" "c" "t" "c" "c" "c" "c" "t" "c"  
## [2126] "c" "g" "a" "c" "g" "g" "c" "c" "a" "c" "c" "g" "a" "a" "t" "g" "g"  
## [2143] "t" "t" "c" "t" "a" "c" "g" "g" "c" "c" "t" "t" "t" "g" "g" "g" "g"  
## [2160] "c" "c" "t" "t" "a" "g" "g" "a" "g" "t" "c" "c" "c" "a" "c" "t" "c"  
## [2177] "g" "g" "a" "g" "a" "a" "c" "c" "c" "c" "a" "g" "t" "a" "c" "a" "g"  
## [2194] "g" "g" "g" "t" "t" "c" "g" "a" "g" "g" "a" "c" "a" "g" "g" "a" "a"  
## [2211] "c" "c" "c" "c" "a" "g" "t" "c" "c" "t" "c" "t" "a" "c" "g" "g" "t"  
## [2228] "g" "g" "g" "g" "g" "g" "g" "g" "g" "g" "g" "c" "c" "c" "c" "c" "t"  
## [2245] "g" "t" "a" "c" "t" "t" "t" "g" "t" "c" "g" "a" "g" "a" "g" "g" "g"  
## [2262] "a" "g" "g" "a" "g" "t" "g" "g" "g" "g" "a" "g" "t" "g" "g" "a" "g"  
## [2279] "t" "c" "c" "c" "g" "g" "t" "g" "g" "a" "c" "t" "a" "c" "t" "g" "g"  
## [2296] "g" "a" "c" "c" "c" "c" "g" "c" "t" "a" "c" "c" "a" "c" "c" "t" "g"  
## [2313] "g" "g" "g" "g" "a" "c" "t" "g" "a" "g" "t" "a" "t" "t" "c" "g" "g"  
## [2330] "g" "g" "g" "g" "t" "c" "a" "g" "g" "g" "g" "a" "c" "c" "c" "t" "t"  
## [2347] "c" "c" "c" "c" "c" "a" "a" "g" "t" "a" "a" "c" "t" "g" "g" "g" "a"  
## [2364] "a" "a" "c" "c" "c" "c" "c" "a" "g" "g" "a" "a" "c" "c" "t" "g" "a"  
## [2381] "g" "t" "g" "a" "c" "t" "a" "c" "g" "g" "g" "g" "g" "a" "a" "c" "c"  
## [2398] "c" "c" "g" "g" "g" "t" "c" "g" "c" "c" "c" "a" "a" "g" "t" "t" "g"  
## [2415] "t" "t" "a" "c" "t" "g" "t" "g" "a" "c" "g" "t" "t" "t" "t" "t" "c"  
## [2432] "c" "g" "a" "a" "g" "a" "a" "a" "a" "a" "t" "g" "t" "t" "t" "t" "c"  
## [2449] "t" "t" "t" "t" "t" "c" "c" "t" "t" "t" "t" "t" "g" "t" "t" "c" "a"  
## [2466] "c" "c" "a" "c" "t" "a" "a" "a" "a" "a" "a" "a" "a" "a" "t" "t" "a"  
## [2483] "t" "t" "t" "t" "t" "t" "t" "g" "g" "t" "g" "t" "c" "t" "g" "a" "t"  
## [2500] "a" "t" "t" "t" "a" "t" "t" "t" "a" "c" "a" "t" "t" "t" "a" "t" "g"  
## [2517] "t" "t" "t" "t" "a" "t" "t" "c" "a" "c" "c" "t" "a" "a" "a" "t" "g"  
## [2534] "a" "a" "c" "g" "t" "t" "c" "t" "t" "t" "t" "a" "g" "t" "c" "t" "a"  
## [2551] "t" "c" "a" "t" "a" "a" "a" "a" "a" "g" "a" "a" "a" "a" "t" "t" "a"  
## [2568] "a" "g" "a" "a" "a" "a" "g" "g" "t" "c" "g" "a" "a" "a" "t" "t" "t"  
## [2585] "g" "a" "c" "a" "c" "t" "t" "t" "t" "g" "t" "t" "t" "t" "t" "t" "a"  
## [2602] "c" "c" "c" "c" "g" "c" "c" "c" "c" "a" "c" "c" "c" "c" "c" "t" "g"  
## [2619] "a" "a" "t" "t" "t" "g" "a" "a" "a" "t" "c" "g" "t" "c" "c" "c" "t"  
## [2636] "t" "g" "a" "a" "c" "a" "t" "t" "t" "c" "t" "t" "t" "t" "t" "t" "t"  
## [2653] "t" "t" "t" "g" "t" "c" "t" "t" "t" "t" "g" "c" "t" "t" "a" "t" "a"  
## [2670] "t" "g" "t" "t" "t" "a" "g" "g" "t" "a" "a" "a" "t" "g" "t" "t" "t"  
## [2687] "t" "t" "g" "t" "t" "t" "c" "g" "t" "t" "t" "t" "g" "g" "c" "a" "a"  
## [2704] "c" "a" "c" "t" "c" "t" "c" "c" "a" "c" "t" "c" "t" "c" "g" "a" "c"  
## [2721] "c" "c" "g" "a" "a" "c" "t" "t" "c" "c" "a" "a" "c" "c" "t" "c" "c"  
## [2738] "c" "t" "c" "a" "t" "c" "g" "c" "c" "t" "t" "c" "c" "a" "g" "g" "g"  
## [2755] "t" "c" "a" "c" "t" "c" "g" "a" "c" "g" "t" "c" "c" "c" "c" "c" "a"  
## [2772] "g" "a" "g" "a" "c" "a" "c" "t" "a" "c" "c" "t" "t" "t" "c" "c" "a"  
## [2789] "c" "c" "g" "a" "a" "g" "g" "a" "g" "t" "c" "t" "g" "t" "t" "c" "c"  
## [2806] "t" "t" "c" "c" "a" "c" "g" "a" "c" "g" "c" "t" "t" "a" "c" "c" "c"  
## [2823] "c" "c" "t" "t" "c" "t" "g" "t" "c" "t" "t" "a" "g" "g" "t" "t" "g"  
## [2840] "t" "t" "t" "c" "t" "t" "t" "c" "t" "c" "t" "g" "g" "t" "g" "t" "g"  
## [2857] "t" "g" "g" "g" "g" "t" "g" "t" "g" "c" "g" "t" "g" "t" "g" "t" "c"  
## [2874] "c" "g" "t" "g" "c" "a" "a" "g" "t" "g" "t" "g" "t" "g" "t" "g" "t"  
## [2891] "a" "t" "g" "t" "g" "t" "c" "a" "g" "g" "t" "g" "a" "a" "t" "c" "g"  
## [2908] "g" "g" "t" "c" "g" "t" "g" "a" "c" "g" "t" "c" "a" "g" "t" "g" "a"  
## [2925] "g" "t" "g" "t" "c" "c" "c" "t" "g" "t" "g" "t" "g" "a" "g" "t" "c"  
## [2942] "a" "g" "a" "g" "t" "t" "g" "g" "g" "a" "a" "g" "g" "t" "a" "g" "g"  
## [2959] "g" "t" "a" "t" "g" "t" "g" "c" "c" "g" "g" "t" "c" "c" "c" "c" "g"  
## [2976] "c" "a" "c" "c" "g" "a" "g" "t" "t" "t" "c" "c" "t" "t" "t" "a" "a"  
## [2993] "c" "t" "g" "a" "g" "t" "a" "c" "g" "g" "g" "a" "g" "g" "t" "t" "t"  
## [3010] "c" "g" "g" "t" "a" "c" "c" "t" "g" "c" "t" "g" "t" "t" "g" "t" "t"  
## [3027] "g" "a" "g" "g" "t" "g" "t" "g" "a" "c" "c" "g" "g" "a" "a" "a" "c"  
## [3044] "a" "c" "a" "a" "g" "t" "a" "a" "g" "t" "g" "t" "t" "g" "g" "a" "g"  
## [3061] "g" "g" "t" "t" "g" "t" "c" "t" "c" "g" "t" "a" "t" "g" "t" "g" "t"  
## [3078] "a" "c" "t" "t" "g" "t" "g" "t" "g" "t" "g" "t" "a" "c" "g" "t" "g"  
## [3095] "t" "g" "t" "a" "t" "g" "g" "g" "t" "g" "t" "g" "t" "g" "c" "g" "t"  
## [3112] "g" "t" "g" "t" "a" "t" "g" "g" "g" "t" "g" "t" "g" "t" "g" "t" "g"  
## [3129] "t" "g" "t" "g" "t" "g" "t" "g" "g" "t" "g" "a" "g" "c" "g" "t" "a"  
## [3146] "c" "g" "t" "a" "c" "c" "c" "t" "t" "c" "c" "c" "g" "t" "g" "g" "g"  
## [3163] "c" "a" "g" "a" "t" "c" "t" "t" "a" "g" "g" "t" "c" "c" "t" "g" "a"  
## [3180] "c" "c" "t" "a" "a" "g" "g" "c" "c" "t" "t" "a" "a" "g" "g" "a" "a"  
## [3197] "c" "g" "a" "c" "g" "t" "a" "c" "c" "g" "g" "a" "g" "a" "g" "a" "c"  
## [3214] "c" "c" "g" "g" "a" "a" "t" "t" "a" "a" "a" "a" "g" "g" "g" "g" "g"  
## [3231] "g" "t" "a" "c" "a" "t" "t" "c" "g" "t" "a" "c" "a" "c" "c" "t" "a"  
## [3248] "a" "c" "t" "g" "g" "g" "t" "c" "t" "c" "t" "t" "c" "g" "t" "g" "a"  
## [3265] "t" "t" "t" "c" "c" "g" "g" "g" "t" "a" "a" "g" "a" "a" "c" "g" "a"  
## [3282] "g" "a" "t" "a" "c" "a" "t" "a" "g" "a" "c" "a" "c" "t" "g" "a" "a"  
## [3299] "t" "t" "c" "t" "a" "g" "a" "c" "g" "g" "t" "g" "g" "a" "c" "g" "g"  
## [3316] "g" "g" "c" "t" "c" "c" "t" "a" "t" "a" "c" "g" "g" "t" "c" "c" "c"  
## [3333] "t" "a" "c" "t" "g" "g" "t" "c" "c" "t" "g" "t" "c" "g" "a" "c" "g"  
## [3350] "g" "t" "g" "g" "t" "t" "c" "g" "g" "g" "g" "g" "t" "c" "c" "g" "a"  
## [3367] "g" "t" "a" "g" "t" "a" "g" "t" "c" "a" "g" "t" "c" "g" "g" "a" "g"  
## [3384] "a" "g" "t" "c" "t" "g" "t" "g" "t" "g" "t" "g" "t" "g" "t" "g" "t"  
## [3401] "g" "t" "g" "t" "g" "t" "g" "g" "t" "a" "t" "a" "t" "g" "g" "a" "g"  
## [3418] "g" "a" "g" "t" "g" "a" "c" "a" "c" "g" "a" "g" "g" "g" "g" "c" "t"  
## [3435] "t" "g" "t" "g" "g" "a" "c" "g" "g" "g" "g" "g" "t" "g" "t" "a" "g"  
## [3452] "g" "t" "t" "a" "c" "a" "g" "t" "t" "t" "c" "g" "t" "t" "t" "t" "t"  
## [3469] "a" "t" "g" "t" "g" "t" "g" "t" "a" "c" "a" "c" "t" "c" "g" "t" "t"  
## [3486] "t" "g" "t" "a" "t" "t" "t" "c" "g" "a" "c" "a" "a" "g" "t" "c" "c"  
## [3503] "g" "t" "t" "t" "c" "t" "c" "c" "c" "c" "t" "t" "t" "c" "t" "g" "c"  
## [3520] "g" "t" "c" "c" "c" "c" "a" "g" "g" "g" "g" "t" "t" "t" "c" "g" "g"  
## [3537] "g" "a" "a" "g" "a" "a" "g" "t" "g" "a" "a" "a" "c" "a" "c" "a" "g"  
## [3554] "g" "g" "g" "a" "a" "c" "g" "a" "c" "g" "c" "t" "a" "g" "t" "a" "c"  
## [3571] "c" "t" "c" "t" "c" "a" "a" "t" "t" "t" "c" "t" "c" "c" "g" "a" "a"  
## [3588] "g" "g" "a" "a" "c" "c" "c" "t" "c" "t" "t" "c" "t" "c" "g" "a" "g"  
## [3605] "a" "c" "g" "g" "t" "g" "g" "t" "c" "c" "c" "g" "a" "a" "g" "g" "g"  
## [3622] "g" "t" "c" "a" "c" "a" "g" "a" "a" "a" "c" "c" "c" "c" "c" "a" "g"  
## [3639] "a" "c" "a" "c" "t" "t" "t" "t" "t" "c" "t" "c" "c" "t" "a" "g" "g"  
## [3656] "a" "g" "a" "c" "t" "c" "c" "a" "a" "a" "t" "g" "a" "c" "c" "c" "t"  
## [3673] "c" "c" "c" "g" "a" "g" "t" "t" "c" "c" "g" "a" "c" "t" "c" "c" "c"  
## [3690] "t" "t" "a" "c" "c" "t" "c" "t" "c" "c" "t" "t" "t" "t" "a" "a" "a"  
## [3707] "a" "t" "c" "g" "t" "c" "a" "a" "g" "g" "t" "a" "g" "g" "g" "t" "c"  
## [3724] "a" "c" "a" "t" "t" "c" "c" "t" "g" "g" "t" "t" "g" "g" "g" "g" "t"  
## [3741] "t" "t" "t" "c" "a" "a" "t" "t" "t" "g" "a" "a" "c" "g" "t" "g" "g"  
## [3758] "t" "g" "t" "c" "t" "g" "a" "t" "t" "t" "c" "c" "a" "g" "t" "t" "c"  
## [3775] "c" "c" "g" "t" "a" "g" "g" "a" "c" "a" "c" "a" "a" "a" "g" "a" "g"  
## [3792] "g" "g" "g" "a" "a" "a" "g" "a" "a" "g" "g" "g" "g" "t" "c" "t" "c"  
## [3809] "a" "c" "t" "g" "t" "t" "c" "c" "c" "g" "g" "t" "c" "a" "a" "g" "t"  
## [3826] "c" "t" "g" "a" "c" "t" "g" "t" "c" "t" "t" "t" "a" "g" "g" "t" "t"  
## [3843] "g" "t" "c" "g" "a" "a" "a" "g" "g" "a" "c" "t" "c" "g" "a" "c" "c"  
## [3860] "t" "t" "t" "a" "a" "a" "g" "t" "c" "t" "t" "g" "t" "c" "a" "g" "a"  
## [3877] "c" "g" "t" "t" "c" "a" "a" "t" "g" "a" "g" "g" "g" "t" "c" "c" "a"  
## [3894] "c" "t" "g" "a" "c" "t" "t" "c" "c" "a" "g" "t" "t" "c" "c" "a" "c"  
## [3911] "t" "c" "c" "g" "g" "g" "g" "g" "g" "a" "c" "g" "g" "a" "g" "a" "c"  
## [3928] "g" "g" "a" "c" "g" "c" "t" "c" "a" "g" "a" "g" "g" "g" "g" "g" "c"  
## [3945] "c" "a" "a" "a" "c" "g" "t" "a" "a" "a" "a" "a" "g" "a" "a" "c" "t"  
## [3962] "g" "t" "g" "g" "c" "c" "g" "t" "a" "a" "a" "g" "g" "a" "c" "t" "c"  
## [3979] "c" "a" "a" "c" "t" "c" "g" "a" "g" "a" "g" "a" "c" "c" "c" "c" "t"  
## [3996] "c" "a" "a" "g" "a" "t" "c" "t" "c" "t" "t" "a" "c" "c" "g" "a" "t"  
## [4013] "c" "a" "t" "t" "c" "c" "g" "a" "a" "a" "a" "a" "c" "t" "c" "g" "a"  
## [4030] "a" "c" "g" "t" "g" "t" "a" "g" "a" "g" "t" "g" "g" "a" "c" "g" "g"  
## [4047] "a" "a" "a" "g" "g" "a" "c" "a" "g" "a" "a" "a" "a" "c" "g" "g" "a"  
## [4064] "c" "c" "c" "t" "t" "t" "c" "c" "t" "t" "t" "c" "a" "a" "t" "a" "a"  
## [4081] "a" "a" "g" "g" "g" "t" "c" "c" "a" "g" "t" "c" "g" "t" "t" "c" "c"  
## [4098] "c" "c" "g" "t" "c" "t" "t" "g" "t" "a" "g" "c" "c" "g" "g" "t" "c"  
## [4115] "g" "g" "g" "t" "c" "g" "g" "g" "t" "c" "t" "t" "c" "a" "t" "g" "t"  
## [4132] "c" "c" "c" "c" "c" "t" "c" "c" "a" "g" "t" "a" "c" "c" "c" "g" "g"  
## [4149] "g" "a" "c" "c" "c" "c" "g" "t" "c" "t" "t" "g" "t" "t" "a" "c" "c"  
## [4166] "c" "t" "c" "t" "g" "t" "t" "a" "a" "g" "t" "t" "c" "c" "a" "c" "a"  
## [4183] "c" "c" "a" "t" "t" "g" "t" "t" "g" "t" "t" "g" "g" "t" "t" "c" "a"  
## [4200] "a" "c" "g" "g" "g" "a" "g" "t" "c" "a" "g" "a" "c" "c" "c" "g" "t"  
## [4217] "c" "t" "t" "t" "g" "a" "c" "t" "t" "g" "a" "g" "a" "t" "g" "g" "g"  
## [4234] "g" "a" "g" "a" "g" "g" "g" "t" "g" "g" "g" "g" "t" "t" "a" "g" "a"  
## [4251] "a" "c" "g" "g" "g" "c" "g" "g" "t" "a" "g" "g" "g" "t" "g" "g" "t"  
## [4268] "c" "t" "a" "a" "g" "g" "t" "c" "t" "g" "g" "a" "t" "t" "t" "c" "c"  
## [4285] "c" "t" "a" "g" "t" "t" "c" "c" "t" "a" "c" "t" "c" "t" "c" "g" "c"  
## [4302] "t" "t" "c" "c" "c" "t" "c" "t" "t" "c" "c" "c" "t" "c" "c" "c" "a"  
## [4319] "g" "g" "g" "g" "t" "t" "c" "t" "t" "t" "t" "g" "g" "c" "g" "t" "g"  
## [4336] "g" "g" "t" "t" "c" "g" "c" "t" "c" "g" "t" "g" "a" "c" "a" "g" "a"  
## [4353] "c" "t" "t" "c" "t" "c" "t" "t" "t" "t" "t" "g" "a" "t" "c" "g" "a"  
## [4370] "g" "g" "t" "c" "a" "a" "g" "a" "g" "g" "c" "t" "t" "a" "a" "g" "a"  
## [4387] "c" "c" "g" "t" "c" "t" "c" "g" "c" "a" "g" "a" "c" "c" "c" "t" "t"  
## [4404] "c" "c" "g" "c" "t" "a" "g" "t" "c" "a" "c" "g" "a" "a" "g" "a" "a"  
## [4421] "a" "g" "g" "t" "a" "c" "c" "g" "c" "g" "t" "t" "c" "c" "g" "g" "a"  
## [4438] "c" "c" "c" "a" "a" "g" "a" "c" "c" "c" "a" "c" "a" "c" "g" "a" "a"  
## [4455] "c" "t" "t" "c" "t" "t" "t" "c" "g" "g" "t" "g" "a" "c" "c" "c" "c"  
## [4472] "a" "c" "a" "c" "c" "c" "c" "a" "c" "t" "g" "t" "a" "g" "c" "g" "g"  
## [4489] "t" "a" "c" "c" "g" "a" "c" "t" "c" "t" "t" "c" "c" "c" "c" "g" "a"  
## [4506] "t" "c" "c" "c" "c" "c" "a" "g" "g" "c" "c" "t" "c" "c" "c" "t" "t"  
## [4523] "c" "c" "t" "c" "g" "g" "t" "c" "c" "t" "g" "g" "c" "c" "t" "t" "g"  
## [4540] "a" "c" "g" "t" "t" "c" "c" "c" "g" "c" "a" "a" "c" "g" "a" "c" "g"  
## [4557] "g" "g" "t" "c" "c" "c" "c" "a" "c" "a" "c" "c" "t" "a" "c" "t" "a"  
## [4574] "a" "c" "g" "a" "g" "t" "a" "c" "a" "g" "g" "t" "c" "g" "a" "g" "t"  
## [4591] "c" "t" "g" "g" "t" "c" "a" "a" "g" "t" "t" "c" "t" "t" "t" "g" "a"  
## [4608] "t" "t" "g" "g" "a" "g" "g" "t" "a" "a" "a" "t" "a" "a" "a" "a" "g"  
## [4625] "a" "a" "c" "c" "a" "c" "t" "c" "a" "g" "g" "a" "a" "a" "a" "a" "a"  
## [4642] "a" "a" "a" "a" "a" "a" "a" "g" "t" "c" "t" "g" "a" "c" "a" "a" "t"  
## [4659] "t" "g" "t" "c" "t" "t" "t" "t" "t" "t" "t" "t" "a" "a" "a" "a" "t"  
## [4676] "t" "t" "t" "t" "c" "g" "t" "c" "t" "t" "t" "t" "g" "a" "c" "t" "t"  
## [4693] "t" "t" "t" "t" "t" "t" "t" "t" "a" "g" "g" "a" "c" "c" "a" "t" "g"  
## [4710] "t" "a" "c" "t" "t" "t" "a" "t" "t" "t" "c" "t" "a" "a" "a" "a" "a"  
## [4727] "a" "a" "a" "a" "a" "a" "a" "t" "a" "t"

List the Standard codon tables available for translation of the nucleotide sequences.

library("seqinr")  
c <- tablecode()

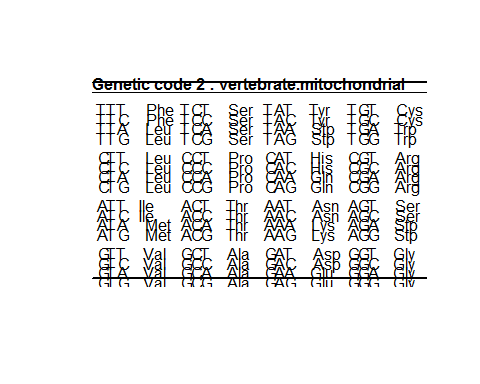


print(c)

## NULL

List the Vertebrate Mitochondrial codon tables available for translation of the nucleotide sequences.

library("seqinr")  
c <- tablecode(2)



print(c)

## NULL

Find out the synonym codons of a any three letter codon in the standard codon table.

library("seqinr")  
c<-syncodons('aaa',numcode = 1)  
print(c)

## $aaa  
## [1] "aaa" "aag"

Read a Fasta File in your current directory and translate into amino acids using Vertebrate Mitochondrial codon table.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
Amino<-getTrans(sequences, sens = "F", numcode = 2,NAstring = "X", ambiguous = FALSE)  
print(aaa(Amino))

## [1] "Ser" "Phe" "Ser" "Phe" "Stp" "Lys" "Lys" "Asn" "Thr" "Ala" "Thr"  
## [12] "Gly" "Thr" "Val" "Ser" "Asp" "Leu" "Lys" "Stp" "Gln" "Ala" "Ser"  
## [23] "Ser" "Arg" "Val" "Ile" "Phe" "Met" "Ile" "Tyr" "Thr" "Leu" "Phe"  
## [34] "Arg" "Glu" "Leu" "Ser" "Tyr" "Leu" "Pro" "Phe" "Phe" "Met" "Thr"  
## [45] "Leu" "His" "Ile" "Leu" "Tyr" "Ser" "Tyr" "Met" "Tyr" "Pro" "Leu"  
## [56] "Tyr" "Stp" "Stp" "Trp" "Asn" "Asn" "Phe" "Tyr" "Phe" "Tyr" "Leu"  
## [67] "Phe" "Phe" "Leu" "Ala" "Leu" "Val" "Leu" "Ala" "Pro" "Ser" "His"  
## [78] "Thr" "Leu" "Ser" "Arg" "Glu" "Pro" "Glu" "Val" "Gly" "Trp" "Val"  
## [89] "Phe" "Met" "Stp" "Trp" "Stp" "Ile" "Met" "Gly" "Leu" "Phe" "Asp"  
## [100] "Arg" "Gly" "Val" "Gln" "Met" "Leu" "Leu" "Thr" "Thr" "Val" "Gly"  
## [111] "Ala" "Phe" "Ala" "Ala" "Phe" "Ser" "Leu" "Met" "Thr" "Met" "Ala"  
## [122] "Val" "Gly" "Thr" "Asp" "Tyr" "Trp" "Leu" "Tyr" "Ser" "Stp" "Gly"  
## [133] "Val" "Cys" "Lys" "Thr" "Lys" "Ser" "Val" "Ser" "Glu" "Asn" "Glu"  
## [144] "Thr" "Ser" "Lys" "Lys" "Asn" "Glu" "Glu" "Val" "Met" "Thr" "His"  
## [155] "Ser" "Gly" "Leu" "Trp" "Stp" "Thr" "Cys" "Cys" "Leu" "Glu" "Gly"  
## [166] "Asn" "Phe" "Lys" "Gly" "Leu" "Cys" "Lys" "Gln" "Ile" "Asp" "His"  
## [177] "Phe" "Pro" "Glu" "Asp" "Ala" "Asp" "Tyr" "Glu" "Ala" "Asp" "Thr"  
## [188] "Ala" "Glu" "Tyr" "Phe" "Leu" "Arg" "Ala" "Val" "Stp" "Ala" "Ser"  
## [199] "Ser" "Ile" "Phe" "Pro" "Ile" "Leu" "Ser" "Val" "Ile" "Leu" "Leu"  
## [210] "Phe" "Met" "Gly" "Gly" "Leu" "Cys" "Ile" "Ala" "Ala" "Ser" "Glu"  
## [221] "Phe" "Tyr" "Lys" "Thr" "Arg" "His" "Asn" "Ile" "Ile" "Leu" "Ser"  
## [232] "Ala" "Gly" "Ile" "Phe" "Phe" "Val" "Ser" "Ala" "Gly" "Leu" "Ser"  
## [243] "Asn" "Ile" "Ile" "Gly" "Ile" "Met" "Val" "Tyr" "Met" "Ser" "Ala"  
## [254] "Asn" "Ala" "Gly" "Asp" "Pro" "Ser" "Lys" "Ser" "Asp" "Ser" "Lys"  
## [265] "Lys" "Asn" "Ser" "Tyr" "Ser" "Tyr" "Gly" "Trp" "Ser" "Phe" "Tyr"  
## [276] "Phe" "Gly" "Ala" "Leu" "Ser" "Phe" "Ile" "Ile" "Ala" "Glu" "Met"  
## [287] "Val" "Gly" "Val" "Leu" "Ala" "Val" "His" "Met" "Phe" "Ile" "Asp"  
## [298] "Arg" "His" "Lys" "Gln" "Leu" "Arg" "Ala" "Thr" "Ala" "Arg" "Ala"  
## [309] "Thr" "Asp" "Tyr" "Leu" "Gln" "Ala" "Ser" "Ala" "Ile" "Thr" "Arg"  
## [320] "Ile" "Pro" "Ser" "Tyr" "Arg" "Tyr" "Arg" "Tyr" "Gln" "Arg" "Arg"  
## [331] "Ser" "Arg" "Ser" "Ser" "Ser" "Arg" "Ser" "Thr" "Glu" "Pro" "Ser"  
## [342] "His" "Ser" "Stp" "Asp" "Ala" "Ser" "Pro" "Val" "Gly" "Ile" "Lys"  
## [353] "Gly" "Phe" "Asn" "Thr" "Leu" "Pro" "Ser" "Thr" "Glu" "Ile" "Ser"  
## [364] "Met" "Tyr" "Thr" "Leu" "Ser" "Stp" "Asp" "Pro" "Leu" "Lys" "Ala"  
## [375] "Ala" "Thr" "Thr" "Pro" "Thr" "Ala" "Thr" "Tyr" "Asn" "Ser" "Asp"  
## [386] "Stp" "Asp" "Asn" "Ser" "Phe" "Leu" "Gln" "Val" "His" "Asn" "Cys"  
## [397] "Ile" "Gln" "Lys" "Glu" "Asn" "Lys" "Asp" "Ser" "Leu" "His" "Ser"  
## [408] "Asn" "Thr" "Ala" "Asn" "Arg" "Arg" "Thr" "Thr" "Pro" "Val" "Stp"  
## [419] "Stp" "Pro" "Arg" "Ala" "Ser" "Pro" "Glu" "Asp" "Arg" "Gly" "Stp"  
## [430] "Stp" "Ala" "Arg" "Ser" "Pro" "Gly" "Ala" "Gly" "Arg" "Gly" "Gly"  
## [441] "Glu" "Thr" "Gln" "Thr" "Leu" "Arg" "Trp" "Glu" "Thr" "Phe" "Gln"  
## [452] "Lys" "Gln" "Lys" "Gln" "Lys" "Thr" "Lys" "Lys" "Thr" "Lys" "Lys"  
## [463] "Gln" "Lys" "Thr" "Lys" "Lys" "His" "Thr" "His" "Thr" "Lys" "Lys"  
## [474] "Glu" "Lys" "Lys" "His" "Asn" "Lys" "Stp" "Ile" "Leu" "Lys" "Lys"  
## [485] "Stp" "Thr" "Lys" "Tyr" "Lys" "Stp" "Asn" "Lys" "Glu" "Ala" "Lys"  
## [496] "Gln" "Gln" "Glu" "Met" "Trp" "Glu" "Asn" "Met" "Asn" "Glu" "Gly"  
## [507] "Stp" "Lys" "Gln" "Thr" "Leu" "Lys" "Lys" "Ser" "Glu" "Stp" "Asp"  
## [518] "Lys" "Lys" "Leu" "Lys" "Met" "Glu" "Asn" "Lys" "Ser" "Lys" "Stp"  
## [529] "Lys" "Cys" "Met" "Ile" "Ser" "His" "Val" "Pro" "Leu" "Phe" "Stp"  
## [540] "His" "Leu" "Met" "Lys" "Ile" "Asn" "Leu" "Asn" "Glu" "Lys" "Met"  
## [551] "Lys" "Gly" "Asn" "Gln" "Asp" "Asn" "Ile" "Lys" "Ala" "Lys" "Lys"  
## [562] "Lys" "Lys" "Met" "Stp" "Thr" "Glu" "Stp" "Lys" "Gly" "Asp" "Val"  
## [573] "Leu" "Cys" "Ile" "Phe" "Gln" "Gly" "Leu" "Cys" "Tyr" "Phe" "Phe"  
## [584] "Phe" "Phe" "Phe" "Leu" "Thr" "Arg" "Gly" "Glu" "Leu" "Leu" "Phe"  
## [595] "Cys" "Ser" "Leu" "Stp" "Pro" "Pro" "Ala" "Gly" "Pro" "Ala" "Ser"  
## [606] "Leu" "Gly" "Asp" "Trp" "Gly" "Ala" "Stp" "Leu" "Stp" "Gly" "Pro"  
## [617] "Gly" "Ala" "Stp" "Trp" "Ala" "Cys" "Ser" "His" "Cys" "Gln" "Val"  
## [628] "Pro" "Gly" "Ala" "Pro" "Gly" "Trp" "Val" "Pro" "Gln" "Glu" "Leu"  
## [639] "Gln" "Glu" "Gly" "Ser" "Glu" "Leu" "Glu" "Pro" "Ala" "Pro" "Pro"  
## [650] "Ser" "Ile" "Asp" "Gly" "Ala" "Ile" "Val" "Gly" "Leu" "Gln" "Val"  
## [661] "Thr" "Glu" "Pro" "Leu" "Ser" "Leu" "Leu" "Ser" "Val" "Stp" "Val"  
## [672] "Pro" "Gly" "Gly" "Gly" "Tyr" "Thr" "Trp" "Gly" "Leu" "Pro" "Gly"  
## [683] "Pro" "Stp" "Phe" "Pro" "Val" "Leu" "Asn" "Ala" "Pro" "Stp" "Pro"  
## [694] "Thr" "Val" "Met" "Thr" "Ser" "Stp" "Ala" "Leu" "Stp" "Lys" "Gly"  
## [705] "Lys" "Glu" "Stp" "Gly" "Gly" "Cys" "Arg" "Trp" "Leu" "Thr" "Lys"  
## [716] "Met" "Pro" "Glu" "Thr" "Pro" "Glu" "Ser" "Ser" "Gly" "Trp" "Ala"  
## [727] "Ser" "Trp" "Gly" "His" "Val" "Pro" "Lys" "Leu" "Leu" "Ser" "Leu"  
## [738] "Gly" "Ser" "Gly" "Asp" "Ala" "Thr" "Pro" "Pro" "Pro" "Gly" "Gly"  
## [749] "His" "Glu" "Thr" "Ala" "Leu" "Pro" "Pro" "His" "Pro" "Ser" "Pro"  
## [760] "Gln" "Gly" "His" "Leu" "Met" "Thr" "Leu" "Gly" "Arg" "Trp" "Trp"  
## [771] "Thr" "Pro" "Trp" "Leu" "Met" "Ser" "Pro" "Pro" "Val" "Pro" "Trp"  
## [782] "Glu" "Gly" "Gly" "Ser" "Leu" "Thr" "Leu" "Trp" "Gly" "Ser" "Leu"  
## [793] "Asp" "Ser" "Leu" "Met" "Pro" "Pro" "Trp" "Gly" "Pro" "Ala" "Gly"  
## [804] "Ser" "Thr" "Met" "Thr" "Leu" "Gln" "Lys" "Gly" "Phe" "Phe" "Leu"  
## [815] "Gln" "Lys" "Lys" "Lys" "Glu" "Lys" "Gln" "Val" "Val" "Ile" "Phe"  
## [826] "Phe" "Stp" "Stp" "Lys" "Asn" "His" "Stp" "Leu" "Stp" "Met" "Asn"  
## [837] "Val" "Asn" "Thr" "Lys" "Stp" "Val" "Asp" "Leu" "Leu" "Ala" "Stp"  
## [848] "Lys" "Ser" "Asp" "Ser" "Ile" "Phe" "Leu" "Leu" "Ile" "Leu" "Phe"  
## [859] "Gln" "Leu" "Stp" "Thr" "Val" "Lys" "Thr" "Lys" "Asn" "Gly" "Ala"  
## [870] "Gly" "Trp" "Gly" "Thr" "Stp" "Thr" "Leu" "Ala" "Gly" "Asn" "Leu"  
## [881] "Stp" "Stp" "Lys" "Lys" "Lys" "Gln" "Lys" "Thr" "Asn" "Met" "Gln"  
## [892] "Ile" "His" "Leu" "Gln" "Lys" "Gln" "Ser" "Lys" "Thr" "Val" "Val"  
## [903] "Stp" "Gly" "Glu" "Ser" "Trp" "Ala" "Trp" "Stp" "Leu" "Glu" "Gly"  
## [914] "Val" "Ala" "Glu" "Gly" "Pro" "Ser" "Glu" "Leu" "Gln" "Gly" "Val"  
## [925] "Ser" "Val" "Met" "Glu" "Stp" "Trp" "Leu" "Pro" "Gln" "Thr" "Stp"  
## [936] "Lys" "Val" "Leu" "Arg" "Met" "Gly" "Glu" "Asp" "Stp" "Ile" "Gln"  
## [947] "Gln" "Stp" "Lys" "Stp" "Pro" "His" "Thr" "Pro" "His" "Ala" "His"  
## [958] "Stp" "His" "Val" "His" "Thr" "His" "Met" "His" "Ser" "Pro" "Leu"  
## [969] "Ser" "Pro" "Ala" "Leu" "Gln" "Ser" "Leu" "Thr" "Gly" "Thr" "His"  
## [980] "Ser" "Val" "Ser" "Thr" "Leu" "Pro" "Ser" "His" "Thr" "Arg" "Pro"  
## [991] "Gly" "Ala" "Trp" "Leu" "Lys" "Gly" "Asn" "Trp" "Leu" "Met" "Pro"  
## [1002] "Ser" "Lys" "Ala" "Met" "Asp" "Asp" "Asn" "Asn" "Ser" "Thr" "Leu"  
## [1013] "Ala" "Phe" "Val" "Phe" "Ile" "His" "Asn" "Leu" "Pro" "Thr" "Glu"  
## [1024] "His" "Thr" "His" "Glu" "His" "Thr" "His" "Ala" "His" "Met" "Pro"  
## [1035] "Thr" "His" "Ala" "His" "Met" "Pro" "Thr" "His" "Thr" "His" "Thr"  
## [1046] "Pro" "Leu" "Ala" "Cys" "Met" "Gly" "Stp" "Ala" "Pro" "Val" "Stp"  
## [1057] "Asn" "Pro" "Gly" "Leu" "Asp" "Ser" "Gly" "Ile" "Pro" "Cys" "Cys"  
## [1068] "Met" "Ala" "Ser" "Leu" "Gly" "Leu" "Asn" "Phe" "Pro" "Pro" "Met"  
## [1079] "Stp" "Ala" "Cys" "Gly" "Leu" "Thr" "Gln" "Stp" "Ser" "Thr" "Lys"  
## [1090] "Gly" "Pro" "Phe" "Leu" "Leu" "Tyr" "Val" "Ser" "Val" "Thr" "Stp"  
## [1101] "Asp" "Leu" "Pro" "Pro" "Ala" "Pro" "Stp" "Met" "Cys" "Gln" "Gly"  
## [1112] "Trp" "Pro" "Gly" "Gln" "Leu" "Pro" "Pro" "Ser" "Pro" "Gln" "Ala"  
## [1123] "His" "His" "Gln" "Ser" "Ala" "Ser" "Gln" "Thr" "His" "Thr" "His"  
## [1134] "Thr" "His" "Thr" "Met" "Tyr" "Leu" "Leu" "Thr" "Val" "Leu" "Pro"  
## [1145] "Glu" "His" "Leu" "Pro" "Pro" "His" "Pro" "Met" "Ser" "Lys" "Gln"  
## [1156] "Lys" "Tyr" "Thr" "His" "Val" "Ser" "Lys" "His" "Lys" "Ala" "Val"  
## [1167] "Gln" "Ala" "Lys" "Stp" "Gly" "Lys" "Thr" "Gln" "Gly" "Ser" "Pro"  
## [1178] "Lys" "Pro" "Phe" "Phe" "Thr" "Leu" "Cys" "Pro" "Leu" "Ala" "Ala"  
## [1189] "Ile" "Met" "Glu" "Ser" "Stp" "Stp" "Gly" "Phe" "Leu" "Gly" "Stp"  
## [1200] "Stp" "Ala" "Leu" "Pro" "Pro" "Gly" "Leu" "Pro" "Gln" "Cys" "Leu"  
## [1211] "Trp" "Gly" "Ser" "Val" "Lys" "Lys" "Stp" "Ile" "Leu" "Trp" "Gly"  
## [1222] "Leu" "Leu" "Gly" "Gly" "Leu" "Lys" "Ala" "Glu" "Gly" "Met" "Glu"  
## [1233] "Stp" "Lys" "Ile" "Leu" "Ala" "Val" "Pro" "Ser" "Gln" "Cys" "Lys"  
## [1244] "Asp" "Gln" "Pro" "Gln" "Lys" "Leu" "Asn" "Leu" "His" "His" "Stp"  
## [1255] "Leu" "Lys" "Val" "Lys" "Gly" "Ile" "Leu" "Cys" "Phe" "Ser" "Pro"  
## [1266] "Phe" "Phe" "Pro" "Stp" "Val" "Thr" "Stp" "Ala" "Ser" "Ser" "Asp"  
## [1277] "Trp" "Gln" "Lys" "Ser" "Asn" "Ser" "Phe" "Pro" "Glu" "Leu" "Glu"  
## [1288] "Ile" "Ser" "Glu" "Gln" "Ser" "Ala" "Ser" "Tyr" "Ser" "Gln" "Val"  
## [1299] "Thr" "Glu" "Gly" "Gln" "Gly" "Glu" "Ala" "Pro" "Leu" "Pro" "Leu"  
## [1310] "Pro" "Ala" "Ser" "Leu" "Pro" "Arg" "Phe" "Ala" "Phe" "Phe" "Leu"  
## [1321] "Thr" "Pro" "Ala" "Phe" "Pro" "Glu" "Val" "Glu" "Leu" "Ser" "Gly"  
## [1332] "Glu" "Phe" "Stp" "Stp" "Met" "Ala" "Ser" "Lys" "Ala" "Phe" "Trp"  
## [1343] "Ala" "Cys" "Thr" "Ser" "His" "Leu" "Pro" "Phe" "Leu" "Ser" "Phe"  
## [1354] "Ala" "Trp" "Glu" "Stp" "Lys" "Val" "Ile" "Phe" "Pro" "Gly" "Gln"  
## [1365] "Gln" "Gly" "Ala" "Glu" "His" "Arg" "Pro" "Ala" "Gln" "Pro" "Stp"  
## [1376] "Ser" "Thr" "Gly" "Gly" "Gly" "His" "Gly" "Pro" "Trp" "Gly" "Stp"  
## [1387] "Thr" "Met" "Gly" "Asp" "Asn" "Ser" "Stp" "Cys" "Gly" "Asn" "Asn"  
## [1398] "Asn" "Gln" "Val" "Ala" "Leu" "Ser" "Leu" "Gly" "Stp" "Asn" "Trp"  
## [1409] "Thr" "Leu" "Pro" "Leu" "Ser" "His" "Pro" "Asn" "Leu" "Ala" "Arg"  
## [1420] "His" "Pro" "Thr" "Stp" "Phe" "Gln" "Thr" "Stp" "Stp" "Asp" "Gln"  
## [1431] "Gly" "Trp" "Glu" "Arg" "Stp" "Glu" "Lys" "Gly" "Gly" "Ser" "Pro"  
## [1442] "Stp" "Lys" "Pro" "His" "Pro" "Ser" "Glu" "His" "Cys" "Leu" "Lys"  
## [1453] "Stp" "Lys" "Thr" "Ser" "Ser" "Ser" "Ser" "Pro" "Asn" "Ser" "Gly"  
## [1464] "Stp" "Ala" "Ser" "Gly" "Lys" "Ala" "Ile" "Ser" "Ala" "Ser" "Phe"  
## [1475] "His" "Gly" "Ala" "Stp" "Pro" "Gly" "Phe" "Trp" "Val" "Cys" "Leu"  
## [1486] "Lys" "Lys" "Ala" "Thr" "Gly" "Val" "Trp" "Gly" "Asp" "Ile" "Ala"  
## [1497] "Met" "Ala" "Glu" "Lys" "Gly" "Leu" "Gly" "Gly" "Pro" "Glu" "Gly"  
## [1508] "Stp" "Ser" "Gln" "Asp" "Arg" "Asn" "Cys" "Lys" "Gly" "Val" "Ala"  
## [1519] "Ala" "Gln" "Gly" "Cys" "Gly" "Trp" "Leu" "Leu" "Met" "Ser" "Ser"  
## [1530] "Ser" "Asp" "Gln" "Phe" "Lys" "Lys" "Leu" "Thr" "Ser" "Ile" "Tyr"  
## [1541] "Phe" "Leu" "Gly" "Glu" "Ser" "Phe" "Phe" "Phe" "Phe" "Ser" "Asp"  
## [1552] "Cys" "Stp" "Gln" "Lys" "Lys" "Asn" "Phe" "Lys" "Lys" "Gln" "Lys"  
## [1563] "Thr" "Glu" "Lys" "Lys" "Asn" "Pro" "Gly" "Thr" "Trp" "Asn" "Lys"  
## [1574] "Asp" "Phe" "Phe" "Phe" "Leu"

Read a Fasta File in your current directory and do frame 1 translation into amino acid sequences.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
Amino<-getTrans(sequences, sens = "F", Frame = 1,numcode = 2,NAstring = "X", ambiguous = FALSE)  
print(aaa(Amino))

## [1] "Ser" "Phe" "Ser" "Phe" "Stp" "Lys" "Lys" "Asn" "Thr" "Ala" "Thr"  
## [12] "Gly" "Thr" "Val" "Ser" "Asp" "Leu" "Lys" "Stp" "Gln" "Ala" "Ser"  
## [23] "Ser" "Arg" "Val" "Ile" "Phe" "Met" "Ile" "Tyr" "Thr" "Leu" "Phe"  
## [34] "Arg" "Glu" "Leu" "Ser" "Tyr" "Leu" "Pro" "Phe" "Phe" "Met" "Thr"  
## [45] "Leu" "His" "Ile" "Leu" "Tyr" "Ser" "Tyr" "Met" "Tyr" "Pro" "Leu"  
## [56] "Tyr" "Stp" "Stp" "Trp" "Asn" "Asn" "Phe" "Tyr" "Phe" "Tyr" "Leu"  
## [67] "Phe" "Phe" "Leu" "Ala" "Leu" "Val" "Leu" "Ala" "Pro" "Ser" "His"  
## [78] "Thr" "Leu" "Ser" "Arg" "Glu" "Pro" "Glu" "Val" "Gly" "Trp" "Val"  
## [89] "Phe" "Met" "Stp" "Trp" "Stp" "Ile" "Met" "Gly" "Leu" "Phe" "Asp"  
## [100] "Arg" "Gly" "Val" "Gln" "Met" "Leu" "Leu" "Thr" "Thr" "Val" "Gly"  
## [111] "Ala" "Phe" "Ala" "Ala" "Phe" "Ser" "Leu" "Met" "Thr" "Met" "Ala"  
## [122] "Val" "Gly" "Thr" "Asp" "Tyr" "Trp" "Leu" "Tyr" "Ser" "Stp" "Gly"  
## [133] "Val" "Cys" "Lys" "Thr" "Lys" "Ser" "Val" "Ser" "Glu" "Asn" "Glu"  
## [144] "Thr" "Ser" "Lys" "Lys" "Asn" "Glu" "Glu" "Val" "Met" "Thr" "His"  
## [155] "Ser" "Gly" "Leu" "Trp" "Stp" "Thr" "Cys" "Cys" "Leu" "Glu" "Gly"  
## [166] "Asn" "Phe" "Lys" "Gly" "Leu" "Cys" "Lys" "Gln" "Ile" "Asp" "His"  
## [177] "Phe" "Pro" "Glu" "Asp" "Ala" "Asp" "Tyr" "Glu" "Ala" "Asp" "Thr"  
## [188] "Ala" "Glu" "Tyr" "Phe" "Leu" "Arg" "Ala" "Val" "Stp" "Ala" "Ser"  
## [199] "Ser" "Ile" "Phe" "Pro" "Ile" "Leu" "Ser" "Val" "Ile" "Leu" "Leu"  
## [210] "Phe" "Met" "Gly" "Gly" "Leu" "Cys" "Ile" "Ala" "Ala" "Ser" "Glu"  
## [221] "Phe" "Tyr" "Lys" "Thr" "Arg" "His" "Asn" "Ile" "Ile" "Leu" "Ser"  
## [232] "Ala" "Gly" "Ile" "Phe" "Phe" "Val" "Ser" "Ala" "Gly" "Leu" "Ser"  
## [243] "Asn" "Ile" "Ile" "Gly" "Ile" "Met" "Val" "Tyr" "Met" "Ser" "Ala"  
## [254] "Asn" "Ala" "Gly" "Asp" "Pro" "Ser" "Lys" "Ser" "Asp" "Ser" "Lys"  
## [265] "Lys" "Asn" "Ser" "Tyr" "Ser" "Tyr" "Gly" "Trp" "Ser" "Phe" "Tyr"  
## [276] "Phe" "Gly" "Ala" "Leu" "Ser" "Phe" "Ile" "Ile" "Ala" "Glu" "Met"  
## [287] "Val" "Gly" "Val" "Leu" "Ala" "Val" "His" "Met" "Phe" "Ile" "Asp"  
## [298] "Arg" "His" "Lys" "Gln" "Leu" "Arg" "Ala" "Thr" "Ala" "Arg" "Ala"  
## [309] "Thr" "Asp" "Tyr" "Leu" "Gln" "Ala" "Ser" "Ala" "Ile" "Thr" "Arg"  
## [320] "Ile" "Pro" "Ser" "Tyr" "Arg" "Tyr" "Arg" "Tyr" "Gln" "Arg" "Arg"  
## [331] "Ser" "Arg" "Ser" "Ser" "Ser" "Arg" "Ser" "Thr" "Glu" "Pro" "Ser"  
## [342] "His" "Ser" "Stp" "Asp" "Ala" "Ser" "Pro" "Val" "Gly" "Ile" "Lys"  
## [353] "Gly" "Phe" "Asn" "Thr" "Leu" "Pro" "Ser" "Thr" "Glu" "Ile" "Ser"  
## [364] "Met" "Tyr" "Thr" "Leu" "Ser" "Stp" "Asp" "Pro" "Leu" "Lys" "Ala"  
## [375] "Ala" "Thr" "Thr" "Pro" "Thr" "Ala" "Thr" "Tyr" "Asn" "Ser" "Asp"  
## [386] "Stp" "Asp" "Asn" "Ser" "Phe" "Leu" "Gln" "Val" "His" "Asn" "Cys"  
## [397] "Ile" "Gln" "Lys" "Glu" "Asn" "Lys" "Asp" "Ser" "Leu" "His" "Ser"  
## [408] "Asn" "Thr" "Ala" "Asn" "Arg" "Arg" "Thr" "Thr" "Pro" "Val" "Stp"  
## [419] "Stp" "Pro" "Arg" "Ala" "Ser" "Pro" "Glu" "Asp" "Arg" "Gly" "Stp"  
## [430] "Stp" "Ala" "Arg" "Ser" "Pro" "Gly" "Ala" "Gly" "Arg" "Gly" "Gly"  
## [441] "Glu" "Thr" "Gln" "Thr" "Leu" "Arg" "Trp" "Glu" "Thr" "Phe" "Gln"  
## [452] "Lys" "Gln" "Lys" "Gln" "Lys" "Thr" "Lys" "Lys" "Thr" "Lys" "Lys"  
## [463] "Gln" "Lys" "Thr" "Lys" "Lys" "His" "Thr" "His" "Thr" "Lys" "Lys"  
## [474] "Glu" "Lys" "Lys" "His" "Asn" "Lys" "Stp" "Ile" "Leu" "Lys" "Lys"  
## [485] "Stp" "Thr" "Lys" "Tyr" "Lys" "Stp" "Asn" "Lys" "Glu" "Ala" "Lys"  
## [496] "Gln" "Gln" "Glu" "Met" "Trp" "Glu" "Asn" "Met" "Asn" "Glu" "Gly"  
## [507] "Stp" "Lys" "Gln" "Thr" "Leu" "Lys" "Lys" "Ser" "Glu" "Stp" "Asp"  
## [518] "Lys" "Lys" "Leu" "Lys" "Met" "Glu" "Asn" "Lys" "Ser" "Lys" "Stp"  
## [529] "Lys" "Cys" "Met" "Ile" "Ser" "His" "Val" "Pro" "Leu" "Phe" "Stp"  
## [540] "His" "Leu" "Met" "Lys" "Ile" "Asn" "Leu" "Asn" "Glu" "Lys" "Met"  
## [551] "Lys" "Gly" "Asn" "Gln" "Asp" "Asn" "Ile" "Lys" "Ala" "Lys" "Lys"  
## [562] "Lys" "Lys" "Met" "Stp" "Thr" "Glu" "Stp" "Lys" "Gly" "Asp" "Val"  
## [573] "Leu" "Cys" "Ile" "Phe" "Gln" "Gly" "Leu" "Cys" "Tyr" "Phe" "Phe"  
## [584] "Phe" "Phe" "Phe" "Leu" "Thr" "Arg" "Gly" "Glu" "Leu" "Leu" "Phe"  
## [595] "Cys" "Ser" "Leu" "Stp" "Pro" "Pro" "Ala" "Gly" "Pro" "Ala" "Ser"  
## [606] "Leu" "Gly" "Asp" "Trp" "Gly" "Ala" "Stp" "Leu" "Stp" "Gly" "Pro"  
## [617] "Gly" "Ala" "Stp" "Trp" "Ala" "Cys" "Ser" "His" "Cys" "Gln" "Val"  
## [628] "Pro" "Gly" "Ala" "Pro" "Gly" "Trp" "Val" "Pro" "Gln" "Glu" "Leu"  
## [639] "Gln" "Glu" "Gly" "Ser" "Glu" "Leu" "Glu" "Pro" "Ala" "Pro" "Pro"  
## [650] "Ser" "Ile" "Asp" "Gly" "Ala" "Ile" "Val" "Gly" "Leu" "Gln" "Val"  
## [661] "Thr" "Glu" "Pro" "Leu" "Ser" "Leu" "Leu" "Ser" "Val" "Stp" "Val"  
## [672] "Pro" "Gly" "Gly" "Gly" "Tyr" "Thr" "Trp" "Gly" "Leu" "Pro" "Gly"  
## [683] "Pro" "Stp" "Phe" "Pro" "Val" "Leu" "Asn" "Ala" "Pro" "Stp" "Pro"  
## [694] "Thr" "Val" "Met" "Thr" "Ser" "Stp" "Ala" "Leu" "Stp" "Lys" "Gly"  
## [705] "Lys" "Glu" "Stp" "Gly" "Gly" "Cys" "Arg" "Trp" "Leu" "Thr" "Lys"  
## [716] "Met" "Pro" "Glu" "Thr" "Pro" "Glu" "Ser" "Ser" "Gly" "Trp" "Ala"  
## [727] "Ser" "Trp" "Gly" "His" "Val" "Pro" "Lys" "Leu" "Leu" "Ser" "Leu"  
## [738] "Gly" "Ser" "Gly" "Asp" "Ala" "Thr" "Pro" "Pro" "Pro" "Gly" "Gly"  
## [749] "His" "Glu" "Thr" "Ala" "Leu" "Pro" "Pro" "His" "Pro" "Ser" "Pro"  
## [760] "Gln" "Gly" "His" "Leu" "Met" "Thr" "Leu" "Gly" "Arg" "Trp" "Trp"  
## [771] "Thr" "Pro" "Trp" "Leu" "Met" "Ser" "Pro" "Pro" "Val" "Pro" "Trp"  
## [782] "Glu" "Gly" "Gly" "Ser" "Leu" "Thr" "Leu" "Trp" "Gly" "Ser" "Leu"  
## [793] "Asp" "Ser" "Leu" "Met" "Pro" "Pro" "Trp" "Gly" "Pro" "Ala" "Gly"  
## [804] "Ser" "Thr" "Met" "Thr" "Leu" "Gln" "Lys" "Gly" "Phe" "Phe" "Leu"  
## [815] "Gln" "Lys" "Lys" "Lys" "Glu" "Lys" "Gln" "Val" "Val" "Ile" "Phe"  
## [826] "Phe" "Stp" "Stp" "Lys" "Asn" "His" "Stp" "Leu" "Stp" "Met" "Asn"  
## [837] "Val" "Asn" "Thr" "Lys" "Stp" "Val" "Asp" "Leu" "Leu" "Ala" "Stp"  
## [848] "Lys" "Ser" "Asp" "Ser" "Ile" "Phe" "Leu" "Leu" "Ile" "Leu" "Phe"  
## [859] "Gln" "Leu" "Stp" "Thr" "Val" "Lys" "Thr" "Lys" "Asn" "Gly" "Ala"  
## [870] "Gly" "Trp" "Gly" "Thr" "Stp" "Thr" "Leu" "Ala" "Gly" "Asn" "Leu"  
## [881] "Stp" "Stp" "Lys" "Lys" "Lys" "Gln" "Lys" "Thr" "Asn" "Met" "Gln"  
## [892] "Ile" "His" "Leu" "Gln" "Lys" "Gln" "Ser" "Lys" "Thr" "Val" "Val"  
## [903] "Stp" "Gly" "Glu" "Ser" "Trp" "Ala" "Trp" "Stp" "Leu" "Glu" "Gly"  
## [914] "Val" "Ala" "Glu" "Gly" "Pro" "Ser" "Glu" "Leu" "Gln" "Gly" "Val"  
## [925] "Ser" "Val" "Met" "Glu" "Stp" "Trp" "Leu" "Pro" "Gln" "Thr" "Stp"  
## [936] "Lys" "Val" "Leu" "Arg" "Met" "Gly" "Glu" "Asp" "Stp" "Ile" "Gln"  
## [947] "Gln" "Stp" "Lys" "Stp" "Pro" "His" "Thr" "Pro" "His" "Ala" "His"  
## [958] "Stp" "His" "Val" "His" "Thr" "His" "Met" "His" "Ser" "Pro" "Leu"  
## [969] "Ser" "Pro" "Ala" "Leu" "Gln" "Ser" "Leu" "Thr" "Gly" "Thr" "His"  
## [980] "Ser" "Val" "Ser" "Thr" "Leu" "Pro" "Ser" "His" "Thr" "Arg" "Pro"  
## [991] "Gly" "Ala" "Trp" "Leu" "Lys" "Gly" "Asn" "Trp" "Leu" "Met" "Pro"  
## [1002] "Ser" "Lys" "Ala" "Met" "Asp" "Asp" "Asn" "Asn" "Ser" "Thr" "Leu"  
## [1013] "Ala" "Phe" "Val" "Phe" "Ile" "His" "Asn" "Leu" "Pro" "Thr" "Glu"  
## [1024] "His" "Thr" "His" "Glu" "His" "Thr" "His" "Ala" "His" "Met" "Pro"  
## [1035] "Thr" "His" "Ala" "His" "Met" "Pro" "Thr" "His" "Thr" "His" "Thr"  
## [1046] "Pro" "Leu" "Ala" "Cys" "Met" "Gly" "Stp" "Ala" "Pro" "Val" "Stp"  
## [1057] "Asn" "Pro" "Gly" "Leu" "Asp" "Ser" "Gly" "Ile" "Pro" "Cys" "Cys"  
## [1068] "Met" "Ala" "Ser" "Leu" "Gly" "Leu" "Asn" "Phe" "Pro" "Pro" "Met"  
## [1079] "Stp" "Ala" "Cys" "Gly" "Leu" "Thr" "Gln" "Stp" "Ser" "Thr" "Lys"  
## [1090] "Gly" "Pro" "Phe" "Leu" "Leu" "Tyr" "Val" "Ser" "Val" "Thr" "Stp"  
## [1101] "Asp" "Leu" "Pro" "Pro" "Ala" "Pro" "Stp" "Met" "Cys" "Gln" "Gly"  
## [1112] "Trp" "Pro" "Gly" "Gln" "Leu" "Pro" "Pro" "Ser" "Pro" "Gln" "Ala"  
## [1123] "His" "His" "Gln" "Ser" "Ala" "Ser" "Gln" "Thr" "His" "Thr" "His"  
## [1134] "Thr" "His" "Thr" "Met" "Tyr" "Leu" "Leu" "Thr" "Val" "Leu" "Pro"  
## [1145] "Glu" "His" "Leu" "Pro" "Pro" "His" "Pro" "Met" "Ser" "Lys" "Gln"  
## [1156] "Lys" "Tyr" "Thr" "His" "Val" "Ser" "Lys" "His" "Lys" "Ala" "Val"  
## [1167] "Gln" "Ala" "Lys" "Stp" "Gly" "Lys" "Thr" "Gln" "Gly" "Ser" "Pro"  
## [1178] "Lys" "Pro" "Phe" "Phe" "Thr" "Leu" "Cys" "Pro" "Leu" "Ala" "Ala"  
## [1189] "Ile" "Met" "Glu" "Ser" "Stp" "Stp" "Gly" "Phe" "Leu" "Gly" "Stp"  
## [1200] "Stp" "Ala" "Leu" "Pro" "Pro" "Gly" "Leu" "Pro" "Gln" "Cys" "Leu"  
## [1211] "Trp" "Gly" "Ser" "Val" "Lys" "Lys" "Stp" "Ile" "Leu" "Trp" "Gly"  
## [1222] "Leu" "Leu" "Gly" "Gly" "Leu" "Lys" "Ala" "Glu" "Gly" "Met" "Glu"  
## [1233] "Stp" "Lys" "Ile" "Leu" "Ala" "Val" "Pro" "Ser" "Gln" "Cys" "Lys"  
## [1244] "Asp" "Gln" "Pro" "Gln" "Lys" "Leu" "Asn" "Leu" "His" "His" "Stp"  
## [1255] "Leu" "Lys" "Val" "Lys" "Gly" "Ile" "Leu" "Cys" "Phe" "Ser" "Pro"  
## [1266] "Phe" "Phe" "Pro" "Stp" "Val" "Thr" "Stp" "Ala" "Ser" "Ser" "Asp"  
## [1277] "Trp" "Gln" "Lys" "Ser" "Asn" "Ser" "Phe" "Pro" "Glu" "Leu" "Glu"  
## [1288] "Ile" "Ser" "Glu" "Gln" "Ser" "Ala" "Ser" "Tyr" "Ser" "Gln" "Val"  
## [1299] "Thr" "Glu" "Gly" "Gln" "Gly" "Glu" "Ala" "Pro" "Leu" "Pro" "Leu"  
## [1310] "Pro" "Ala" "Ser" "Leu" "Pro" "Arg" "Phe" "Ala" "Phe" "Phe" "Leu"  
## [1321] "Thr" "Pro" "Ala" "Phe" "Pro" "Glu" "Val" "Glu" "Leu" "Ser" "Gly"  
## [1332] "Glu" "Phe" "Stp" "Stp" "Met" "Ala" "Ser" "Lys" "Ala" "Phe" "Trp"  
## [1343] "Ala" "Cys" "Thr" "Ser" "His" "Leu" "Pro" "Phe" "Leu" "Ser" "Phe"  
## [1354] "Ala" "Trp" "Glu" "Stp" "Lys" "Val" "Ile" "Phe" "Pro" "Gly" "Gln"  
## [1365] "Gln" "Gly" "Ala" "Glu" "His" "Arg" "Pro" "Ala" "Gln" "Pro" "Stp"  
## [1376] "Ser" "Thr" "Gly" "Gly" "Gly" "His" "Gly" "Pro" "Trp" "Gly" "Stp"  
## [1387] "Thr" "Met" "Gly" "Asp" "Asn" "Ser" "Stp" "Cys" "Gly" "Asn" "Asn"  
## [1398] "Asn" "Gln" "Val" "Ala" "Leu" "Ser" "Leu" "Gly" "Stp" "Asn" "Trp"  
## [1409] "Thr" "Leu" "Pro" "Leu" "Ser" "His" "Pro" "Asn" "Leu" "Ala" "Arg"  
## [1420] "His" "Pro" "Thr" "Stp" "Phe" "Gln" "Thr" "Stp" "Stp" "Asp" "Gln"  
## [1431] "Gly" "Trp" "Glu" "Arg" "Stp" "Glu" "Lys" "Gly" "Gly" "Ser" "Pro"  
## [1442] "Stp" "Lys" "Pro" "His" "Pro" "Ser" "Glu" "His" "Cys" "Leu" "Lys"  
## [1453] "Stp" "Lys" "Thr" "Ser" "Ser" "Ser" "Ser" "Pro" "Asn" "Ser" "Gly"  
## [1464] "Stp" "Ala" "Ser" "Gly" "Lys" "Ala" "Ile" "Ser" "Ala" "Ser" "Phe"  
## [1475] "His" "Gly" "Ala" "Stp" "Pro" "Gly" "Phe" "Trp" "Val" "Cys" "Leu"  
## [1486] "Lys" "Lys" "Ala" "Thr" "Gly" "Val" "Trp" "Gly" "Asp" "Ile" "Ala"  
## [1497] "Met" "Ala" "Glu" "Lys" "Gly" "Leu" "Gly" "Gly" "Pro" "Glu" "Gly"  
## [1508] "Stp" "Ser" "Gln" "Asp" "Arg" "Asn" "Cys" "Lys" "Gly" "Val" "Ala"  
## [1519] "Ala" "Gln" "Gly" "Cys" "Gly" "Trp" "Leu" "Leu" "Met" "Ser" "Ser"  
## [1530] "Ser" "Asp" "Gln" "Phe" "Lys" "Lys" "Leu" "Thr" "Ser" "Ile" "Tyr"  
## [1541] "Phe" "Leu" "Gly" "Glu" "Ser" "Phe" "Phe" "Phe" "Phe" "Ser" "Asp"  
## [1552] "Cys" "Stp" "Gln" "Lys" "Lys" "Asn" "Phe" "Lys" "Lys" "Gln" "Lys"  
## [1563] "Thr" "Glu" "Lys" "Lys" "Asn" "Pro" "Gly" "Thr" "Trp" "Asn" "Lys"  
## [1574] "Asp" "Phe" "Phe" "Phe" "Leu"

Read a Fasta File in your current directory and do frame 1 translation into amino acid sequences and create a string of amino acid sequences from the vector.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
Amino<-getTrans(sequences, sens = "F", Frame = 1,numcode = 2,NAstring = "X", ambiguous = FALSE)  
AminoSeq<-c2s(Amino)  
print(AminoSeq)

## [1] "SFSF\*KKNTATGTVSDLK\*QASSRVIFMIYTLFRELSYLPFFMTLHILYSYMYPLY\*\*WNNFYFYLFFLALVLAPSHTLSREPEVGWVFM\*W\*IMGLFDRGVQMLLTTVGAFAAFSLMTMAVGTDYWLYS\*GVCKTKSVSENETSKKNEEVMTHSGLW\*TCCLEGNFKGLCKQIDHFPEDADYEADTAEYFLRAV\*ASSIFPILSVILLFMGGLCIAASEFYKTRHNIILSAGIFFVSAGLSNIIGIMVYMSANAGDPSKSDSKKNSYSYGWSFYFGALSFIIAEMVGVLAVHMFIDRHKQLRATARATDYLQASAITRIPSYRYRYQRRSRSSSRSTEPSHS\*DASPVGIKGFNTLPSTEISMYTLS\*DPLKAATTPTATYNSD\*DNSFLQVHNCIQKENKDSLHSNTANRRTTPV\*\*PRASPEDRG\*\*ARSPGAGRGGETQTLRWETFQKQKQKTKKTKKQKTKKHTHTKKEKKHNK\*ILKK\*TKYK\*NKEAKQQEMWENMNEG\*KQTLKKSE\*DKKLKMENKSK\*KCMISHVPLF\*HLMKINLNEKMKGNQDNIKAKKKKM\*TE\*KGDVLCIFQGLCYFFFFFLTRGELLFCSL\*PPAGPASLGDWGA\*L\*GPGA\*WACSHCQVPGAPGWVPQELQEGSELEPAPPSIDGAIVGLQVTEPLSLLSV\*VPGGGYTWGLPGP\*FPVLNAP\*PTVMTS\*AL\*KGKE\*GGCRWLTKMPETPESSGWASWGHVPKLLSLGSGDATPPPGGHETALPPHPSPQGHLMTLGRWWTPWLMSPPVPWEGGSLTLWGSLDSLMPPWGPAGSTMTLQKGFFLQKKKEKQVVIFF\*\*KNH\*L\*MNVNTK\*VDLLA\*KSDSIFLLILFQL\*TVKTKNGAGWGT\*TLAGNL\*\*KKKQKTNMQIHLQKQSKTVV\*GESWAW\*LEGVAEGPSELQGVSVME\*WLPQT\*KVLRMGED\*IQQ\*K\*PHTPHAH\*HVHTHMHSPLSPALQSLTGTHSVSTLPSHTRPGAWLKGNWLMPSKAMDDNNSTLAFVFIHNLPTEHTHEHTHAHMPTHAHMPTHTHTPLACMG\*APV\*NPGLDSGIPCCMASLGLNFPPM\*ACGLTQ\*STKGPFLLYVSVT\*DLPPAP\*MCQGWPGQLPPSPQAHHQSASQTHTHTHTMYLLTVLPEHLPPHPMSKQKYTHVSKHKAVQAK\*GKTQGSPKPFFTLCPLAAIMES\*\*GFLG\*\*ALPPGLPQCLWGSVKK\*ILWGLLGGLKAEGME\*KILAVPSQCKDQPQKLNLHH\*LKVKGILCFSPFFP\*VT\*ASSDWQKSNSFPELEISEQSASYSQVTEGQGEAPLPLPASLPRFAFFLTPAFPEVELSGEF\*\*MASKAFWACTSHLPFLSFAWE\*KVIFPGQQGAEHRPAQP\*STGGGHGPWG\*TMGDNS\*CGNNNQVALSLG\*NWTLPLSHPNLARHPT\*FQT\*\*DQGWER\*EKGGSP\*KPHPSEHCLK\*KTSSSSPNSG\*ASGKAISASFHGA\*PGFWVCLKKATGVWGDIAMAEKGLGGPEG\*SQDRNCKGVAAQGCGWLLMSSSDQFKKLTSIYFLGESFFFFSDC\*QKKNFKKQKTEKKNPGTWNKDFFFL"

Read a Fasta File in your current directory and do translation into amino acid sequences and find the Iso Electric Point of the translated sequence.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
Amino<-getTrans(sequences, sens = "F", NAstring = "X", ambiguous = FALSE)  
print("Iso Electric Point")

## [1] "Iso Electric Point"

pi<-computePI(Amino)  
print(pi)

## [1] 10.01812

Read a Fasta File in your current directory and do frame 1 translation into amino acid sequences and find the Molecular Weight of the translated sequence.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
Amino<-getTrans(sequences, sens = "F", Frame = 1,numcode = 2,NAstring = "X", ambiguous = FALSE)  
print("Molecular Weight")

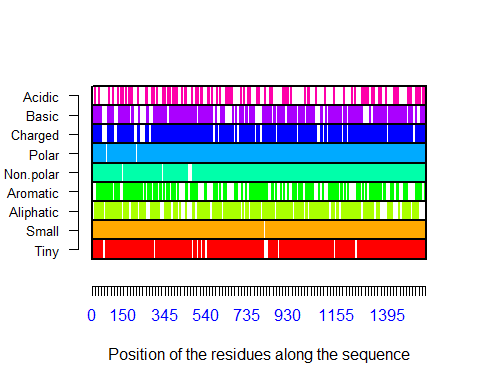
## [1] "Molecular Weight"

print(pmw(Amino))

## [1] 164719.6

Open the Nucleotide Fasta file and translate the sequences to Amino acids and plot a graph based on different categories of amino acids in the sequence.

library("seqinr")  
seq1<-read.fasta(file="seq1.fasta")  
sequences<-getSequence(seq1[[1]])  
Amino<-getTrans(sequences, sens = "F", NAstring = "X", ambiguous = FALSE)  
AAstat(Amino,plot=TRUE)



## $Compo  
##   
## \* A C D E F G H I K L M N P Q R S T   
## 38 100 29 40 69 77 125 60 65 119 145 30 52 114 64 95 133 102   
## V W Y   
## 64 26 31   
##   
## $Prop  
## $Prop$Tiny  
## [1] 0.3098859  
##   
## $Prop$Small  
## [1] 0.4809886  
##   
## $Prop$Aliphatic  
## [1] 0.1736375  
##   
## $Prop$Aromatic  
## [1] 0.1229404  
##   
## $Prop$Non.polar  
## [1] 0.5107731  
##   
## $Prop$Polar  
## [1] 0.4651458  
##   
## $Prop$Charged  
## [1] 0.2427123  
##   
## $Prop$Basic  
## [1] 0.1736375  
##   
## $Prop$Acidic  
## [1] 0.06907478  
##   
##   
## $Pi  
## [1] 10.01812