Evidencia 02

Luis Gabriel Martínez Rentería

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Datos del alumno:

Luis Gabriel Martinez Rentería A01651812 Biología computacional

Liga al video. https://youtu.be/t488DvxqRaM (https://youtu.be/t488DvxqRaM)

Dentro del resultado de este entregable deberás demostrar avances en tu desarrollo de las siguientes subcompetencias y niveles de dominio:

- SICT0201A - Determinación de patrones
- SICT0402A - Aplicación de estándares y normas
- SEG0502A - Pensamiento científico
- SEG0603A - Comprensión de otros códigos

Consulta la descripción completa de los niveles de dominio en el documento: Niveles de dominio.pdf

Instrucciones:

1. Lee nuevamente y con detalle la situación problema.
2. Investiga información sobre el virus de la influenza en un contexto mundial.
3. Documéntate en fuentes confiables y científicas.
4. Realiza lo que se te pide a continuación.

PARTE 1 - Video

En un video, responde justificadamente las siguientes preguntas:

1. ¿Cuáles son las variantes del virus de la influenza en el mundo? Incluye una variante por continente y mencionando las referencias de los artículos consultados en PUBMED.
2. ¿Cuáles son los subtipos del virus de la influenza que existen en México?
3. En relación con la situación actual reflexiona, ¿qué harías durante la contingencia del SARS-COVID2 en comunidades de bajos recursos?

Justifica tu respuesta.

Importante:

- Tu video debe tener una duración máxima de 3 minutos. Debes salir en el video.
- Se debe dar respuesta a las 3 preguntas antes mencionadas.
- Puedes compartir algún documento o presentación de apoyo.
- Sube tu video a Youtube y comparte la liga. Revisa las políticas de privacidad y asegúrate que tu profesor pueda visualizarlo sin problemas. Puedes configurarlo como “No listado” para que no aparezca como visible al público.

PARTE 2 - Código

Realiza lo siguiente en un script de R y código:

Obtén las secuencias de las variantes mexicanas del virus desde el NCBI (Enlaces a un sitio externo.) y secuencias de las variantes de los continentes del mundo. El total de variantes que debes tener son: todas las variantes mexicanas y una variante por continente (de América incluir la de otro país).

```
#Debido a que al generar el pdf se me generaban problemas si dejaba los install, he tenido que comentarlos, pero son necesarios para el buen funcionamiento del codigo


#install.packages("ape")
#install.packages("phangorn")
#install.packages("phytools")
#install.packages("geiger")
#install.packages("BiocManager")
#BiocManager::install("Biostrings")
#install.packages("ggmsa")

#install.packages("tidyverse")
#install.packages("stringr")
#install.packages("remotes")
#BiocManager::install("treeio")
#BiocManager::install("ggtree")
#BiocManager::install("DECIPHER")
#BiocManager::install("S4Vectors")
#BiocManager::install("seqmagick")
```

```
library(ape)
library(phytools)
```

```
## Loading required package: maps
```

```
library(Biostrings)
```

```
## Loading required package: BiocGenerics
```

```
## Loading required package: parallel
```

```
##
## Attaching package: 'BiocGenerics'
```

```
## The following objects are masked from 'package:parallel':
##
##     clusterApply, clusterApplyLB, clusterCall, clusterEvalQ,
##     clusterExport, clusterMap, parApply, parCapply, parLapply,
##     parLapplyLB, parRapply, parSapply, parSapplyLB
```

```
## The following objects are masked from 'package:stats':
##
##     IQR, mad, sd, var, xtabs
```

```
## The following objects are masked from 'package:base':
##
##     anyDuplicated, append, as.data.frame, basename, cbind, colnames,
##     dirname, do.call, duplicated, eval, evalq, Filter, Find, get, grep,
##     grepl, intersect, is.unsorted, lapply, Map, mapply, match, mget,
##     order, paste, pmax, pmax.int, pmin, pmin.int, Position, rank,
##     rbind, Reduce, rownames, sapply, setdiff, sort, table, tapply,
##     union, unique, unsplit, which, which.max, which.min
```

```
## Loading required package: S4Vectors
```

```
## Loading required package: stats4
```

```
##
## Attaching package: 'S4Vectors'
```

```
## The following object is masked from 'package:base':
##
##     expand.grid
```

```
## Loading required package: IRanges
```

```
##
## Attaching package: 'IRanges'
```

```
## The following object is masked from 'package:grDevices':
##
##     windows
```

```
## Loading required package: XVector
```

```
##
## Attaching package: 'Biostrings'
```

```
## The following object is masked from 'package:ape':
##
##     complement
```

```
## The following object is masked from 'package:base':
##
##     strsplit
```

```
library(seqinr)
```

```
##
## Attaching package: 'seqinr'
```

```
## The following object is masked from 'package:Biostrings':
##
##     translate
```

```
## The following objects are masked from 'package:ape':
##
##     as.alignment, consensus
```

```
library(adegenet)
```

```
## Loading required package: ade4
```

```
##
## Attaching package: 'ade4'
```

```
## The following object is masked from 'package:Biostrings':
##
##     score
```

```
## The following object is masked from 'package:BiocGenerics':
##
##     score
```

```
## Registered S3 method overwritten by 'spdep':
##   method   from
##   plot.mst ape
```

```
##
##    /// adegenet 2.1.2 is loaded ////////////
##
##    > overview: '?adegenet'
##    > tutorials/doc/questions: 'adegenetWeb()'
##    > bug reports/feature requests: adegenetIssues()
```

```
library(ggtree)
```

```
## Registered S3 method overwritten by 'treeio':
##   method     from
##   root.phylo ape
```

```
## ggtree v2.0.4  For help: https://yulab-smu.github.io/treedata-book/
##
## If you use ggtree in published research, please cite the most appropriate paper
(s):
##
## [36m-[39m Guangchuang Yu, Tommy Tsan-Yuk Lam, Huachen Zhu, Yi Guan. Two methods
for mapping and visualizing associated data on phylogeny using ggtree. Molecular Bi
ology and Evolution 2018, 35(12):3041-3043. doi: 10.1093/molbev/msy194
## [36m-[39m Guangchuang Yu, David Smith, Huachen Zhu, Yi Guan, Tommy Tsan-Yuk La
m. ggtree: an R package for visualization and annotation of phylogenetic trees wit
h their covariates and other associated data. Methods in Ecology and Evolution 201
7, 8(1):28-36, doi:10.1111/2041-210X.12628
```

```
##
## Attaching package: 'ggtree'
```

```
## The following object is masked from 'package:Biostrings':
##
##     collapse
```

```
## The following object is masked from 'package:IRanges':
##
##     collapse
```

```
## The following object is masked from 'package:S4Vectors':
##
##     expand
```

```
## The following object is masked from 'package:ape':
##
##     rotate
```

```
library(DECIPHER)
```

```
## Loading required package: RSQLite
```

```
library(viridis)
```

```
## Loading required package: viridisLite
```

```
library(ggplot2)
```

```
#LAs variantes de influenza utilizando el segmento 4 del virus (HA)
virus <- c(  "KP456547.1", "CY072074.1", "AJ489860.1","EU501856.1","FR832667.1","CY
106568.1","KT889237.1","CY125728.1")

virus_sequences <- read.GenBank(virus)
```

```
attr(virus_sequences, "species")
```

```
## [1] "Influenza_A_virus_(A/Auckland/582/2000(H1N1))"
## [2] "Influenza_A_virus_(A/Alagoas/115/2010(H1N1))"
## [3] "Influenza_A_virus_(A/576/01(H1N2))"
## [4] "Influenza_A_virus_(A/AICHI/105/2006(H3N2))"
## [5] "Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))"
## [6] "Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))"
## [7] "Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))"
## [8] "Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))"
```

```
attr(virus_sequences, "description")
```

```
## [1] "KP456547.1 Influenza A virus (A/Auckland/582/2000(H1N1)) segment 4 hemagglu
tinin (HA) gene, partial cds"
## [2] "CY072074.1 Influenza A virus (A/Alagoas/115/2010(H1N1)) segment 4 sequenc
e"
## [3] "AJ489860.1 Influenza A virus partial HA gene for haemagglutinin subunit HA
1, strain A/576/01, genomic RNA"
## [4] "EU501856.1 Influenza A virus (A/AICHI/105/2006(H3N2)) segment 4 hemagglutin
in (HA) gene, partial cds"
## [5] "FR832667.1 Influenza A virus (A/Cameroon/08-200/2008(H1N1)) segment 4, HA g
ene for hemagglutinin, genomic RNA"
## [6] "CY106568.1 Influenza A virus (A/Merida/2189-CIR/2009(H1N1)) hemagglutinin
(HA) gene, complete cds"
## [7] "KT889237.1 Influenza A virus (A/Mexico City/1514A00905313N/2013(H3N2)) segm
ent 4 hemagglutinin (HA) gene, complete cds"
## [8] "CY125728.1 Influenza A virus (A/Mexico/InDRE7218/2012(H7N3)) hemagglutinin
(HA) gene, complete cds"
```

Calcula el número de bases de cada variante por continente.

```
contar <- function(secuencia, lugar){
  complement <- ""
  i <- 1
  for(nucleotido in secuencia[[lugar]]){
  if(nucleotido == '88'){
    complement[i] <- "a"
  }else if(nucleotido == '18'){
    complement[i] <- "t"
  }else if(nucleotido == '28'){
    complement[i] <- "c"
  }else if(nucleotido == '48'){
    complement[i] <- "g"
  }
    i <- i + 1
  }
count(complement,1)
}

print(contar(virus_sequences,1))
```

```
##
##   a   c   g   t
## 575 318 387 415
```

```
print(contar(virus_sequences,2))
```

```
##
##   a   c   g   t
## 601 313 379 408
```

```
print(contar(virus_sequences,3))
```

```
##
##   a   c   g   t
## 329 214 210 222
```

```
print(contar(virus_sequences,4))
```

```
##
##   a   c   g   t
## 345 218 199 225
```

```
print(contar(virus_sequences,5))
```

```
##
##   a   c   g   t
## 364 228 232 249
```

Crea una gráfica donde compares todas las variantes del virus y las bases de ADN que los componen (por continente).

NOTA: esto se puede compartir con los alumnos 1. Crear ids de cada virus.

```
virus_GenBank_IDs <- paste(attr(virus_sequences, "species"), names
(virus_sequences), sep ="_HA_")
virus_GenBank_IDs
```

```
## [1] "Influenza_A_virus_(A/Auckland/582/2000(H1N1))_HA_KP456547.1"
## [2] "Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.1"
## [3] "Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.1"
## [4] "Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.1"
## [5] "Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.1"
## [6] "Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.1"
## [7] "Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.1"
## [8] "Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.1"
```

2. Escribir el archivo del GenBank a FASTA con todas las secuencias:

```
write.dna(virus_sequences,  file ="virus_seqs.fasta", format = "fasta", append = FA
LSE)
```

3.Leer el archivo Fasta para procesarlo:

```
virus_seq_no_alineadas <- read.fasta("virus_seqs.fasta", seqtype = "DNA", as.string
= TRUE, forceDNAtolower = FALSE)

virus_seq_no_alineadas
```

```
## $KP456547.1
## [1] "atgaaagtaa aactactggt cctgttatgt acatttacag ctacatatgc agacacaatatgtataggg
t accatgccaa caactcaacc gacactgttg acacagtact tgagaagaatgtgacagtga cacactctgt caacc
tactt gaggacagtc acaatggaaa actatgtctactaaaaggaa tagccccatt acaattgggt aattgcagcg t
tgccggatg gatcttaggaaacccagaat gcgaattact gatttccaag gaatcatggt cctacattgt agaaacac
caaatcctgaga atggaacatg ttacccaggg tatttcgctg actatgagga actgagggagcaattgagtt cagta
tcttc atttgagaga ttcgaaatat tccccaaaga aagctcatggcccaaccaca ccgtaaccgg agtatcagca t
catgctccc ataatgggaa aagcagtttttacagaaatt tgctatggct gacggggaag aatggtttgt acccaaac
ct gagcaagtcctatgcaaaca acaaagagaa agaagtcctt gtactatggg gtgttcatca cccgcctaacatagg
ggacc aaagggccct ctatcataca gaaaatgctt atgtctctgt agtgtcttcacattatagca gaagattcac c
ccagaaata gccaaaagac ccaaagtaag agatcaggaaggaagaatca actactactg gactctgctg gaacccgg
gg atacaataat atttgaggcaaatggaaatc taatagcgcc acggtatgct ttcgcactga gtagaggctt tgga
tcaggaatcatcacct caaatgcacc aatggatgaa tgtgatgcga agtgtcaaac acctcagggagctataaaca g
cagtcttcc tttccagaac gtacacccag tcacaatagg agagtgtccaaagtatgtca ggagtgcaaa attaagga
tg gttacaggac taaggaacat cccatccattcaatccagag gtttgtttgg agccattgcc ggtttcattg aagg
ggggtg gactggaatggtagatgggt ggtatggtta tcatcatcag aatgagcaag gatctggcta tgccgcagatc
aaaaaagca cacaaaatgc cattaacggg attacaaaca aggtgaattc tgtaattgagaaaatgaaca ctcaattc
ac agctgtgggc aaagaattca acaaattgga aagaaggatggaaaacttaa ataaaaaagt tgatgatggg tttc
tagaca tttggacata taatgcagaattgttggttc tactggaaaa tgaaaggact ttggatttcc atgactccaa
tgtgaagaatctgtatgaga aagtaaaaag ccaattaaag aataatgcca aagaaatagg aaacgggtgttttgaatt
ct atcacaagtg taacaatgaa tgcatggaga gtgtgaaaaa tggaacttatgactatccaa aatattccga agaa
tcaaag ttaaacaggg agaaaattga tggagtgaaattggaatcaa tgggagtcta tcagattctg gcgatctact
caactgtcgc cagttccctggttcttttgg tctccctggg ggcaatcagc ttctggatgt gttccaatgg gtctttg
cagtgtagaatat gcatc"
## attr(,"name")
## [1] "KP456547.1"
## attr(,"Annot")
## [1] ">KP456547.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $CY072074.1
## [1] "atgaaggcaa tactagtagt tctgctatat acatttgcaa ccgcaaatgc agacacattatgtataggt
t atcatgcgaa caattcaaca gacactgtag acacagtact agaaaagaatgtaacagtaa cacactctgt taacc
ttcta gaagacaagc ataacgggaa actatgcaaactaagagggg tagccccatt gcatttgggt aaatgtaaca t
tgctggctg gatcctgggaaatccagagt gtgaatcact ctccacagca agctcatggt cctacattgt ggaaacat
ctagttcagaca atggaacgtg ttacccagga gatttcatcg attatgagga gctaagagagcaattgagct cagtg
tcatc atttgaaagg tttgagatat tccccaagac aagttcatggcccaatcatg actcgaacaa aggtgtaacg g
cagcatgtc ctcatgctgg agcaaaaagcttctacaaaa atttaatatg gctagttaaa aaaggaaatt catacca
aa gctcagcaaatcctacatta atgataaagg gaaagaagtc ctcgtgctat ggggcattca ccatcaatctactag
tgctg accaacaaag tctctatcag aatgcagatg catatgtttt tgtggggacatcaagataca gcaagaagtt c
aagccggaa atagcaataa gacccaaagt gagggatcaagaagggagaa tgaactatta ctggacacta gtagagcc
gg gagacaaaat aacattcgaagcaactggaa atctagtggt accgagatat gcattcgcaa tggaaagaaa tgct
ggatctggtattatca tttcagatac accagtccac gattgcaata caacttgtca gacacccaagggtgctataa a
caccagcct cccatttcag aatatacatc cgatcacaat tggaaaatgtccaaaatatg taaaaagcac aaaattga
ga ctggccacag gattgaggaa tgtcccgtctattcaatcta gaggcctatt tggggccatt gccggtttca ttga
aggggg gtggacagggatggtagatg gatggtacgg ttatcaccat caaaatgagc aggggtcagg atatgcagccg
acctgaaga gcacacagaa tgccattgac gagattacta acaaagtaaa ttctgttattgaaaagatga atacacag
tt cacagcagta ggtaaagagt tcaaccacct ggaaaaaagaatagagaatt taaataaaaa agttgatgat ggtt
tcctgg acatttggac ttacaatgccgaactgttgg ttctattgga aaatgaaaga actttggact accacgattc
aaatgtgaagaacttatatg aaaaggtaag aagccagtta aaaaacaatg ccaaggaaat tggaaacggctgctttga
at tttaccacaa atgcgataac acgtgcatgg aaagtgtcaa aaatgggacttatgactacc caaaatactc agag
```

```
gaagca aaattaaaca gagaagaaat agatggggtaaagctggaat caacaaggat ttaccagatt ttggcgatct
attcaactgt cgccagttcattggtactgg tagtctccct gggggcaatc agtttctgga tgtgctctaa tgggtct
ctacagtgtagaa tatgtattta a"
## attr(,"name")
## [1] "CY072074.1"
## attr(,"Annot")
## [1] ">CY072074.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $AJ489860.1
## [1] "gacacaatat gtataggcta ccatgccaac aactcaaccg acactgttga cacagtacttgagaagaat
g tgacagtgac acactctgtc aacctacttg aggacagtca caatggaaaactatgtctac taaaaggaat agccc
cccta caattgggta attgcagcgt tgccggatggatcttaggaa acccagaatg cgaattactg atttccaagg a
atcatggtc ctacattgtagaaacaccaa atcctgagaa tggaacatgt tacccagggt atttcgccga ctatgagg
agctaagggagc aattgagttc agtatcttca tttgagagat tcgaaatatt ccccaaagaaagctcatggc ccaac
cacac cgtaaccgga gtatcagcat catgctccca taatgggaaaagcagttttt acagaaattt gctatggctg a
cggggaaga atggtttgta cccaaacctgagcaagtcct atgcaaacaa caaagagaaa gaagtcctta tactatgg
gg tgttcatcacccgcctaaca taggggacca aaggactctc tatcatacag aaaatgctta tgtctctgtagtgtc
ttcac attatagcag aagattcacc ccagaaataa ccaaaaggcc caaagtaagagatcaggaag gaagaatcaa c
tactactgg actctgctgg aacccgggga tacaataatatttgaggcaa atggaaatct aatagcgcca tggtatgc
tt tcgcactgag tagaggctttggatcaggaa tcatcacctc aaatgcacca atggatgaat gtgatgcgaa gtgt
caaacacctcagggag ctataaacag cagtcttcct ttccagaatg tacacccagt cacaataggagagtgtccaa a
gtatgtcag gagtgcaaaa ttaaggatgg ttacaggact aaggaacatcccatccattc aatcc"
## attr(,"name")
## [1] "AJ489860.1"
## attr(,"Annot")
## [1] ">AJ489860.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $EU501856.1
## [1] "caaaaacttc ccggaaatga caacagcacg gcaacgctat gccttgggca ccatgcagtaccaaacgga
a cgatagtgaa aacaatcaca aatgaccaaa ttgaagttac taatgctactgagctggttc agagttcctc aacag
gtgga atatgcgaca gtcctcatca gatccttgatggagaaaact gcacactaat agatgctcta ttgggagacc c
tcagtgtga tgacttccaaaataagaaat gggacctttt tgttgaacgc agcaaagcct acagcaactg ttaccctt
atgacgtgccgg attatgcctc ccttaggtca ctagttgcct catccggcac actggagtttaacaatgaaa gcttc
aattg gactggagtc actcaaaatg gaacaagctc tgcttgcaaaaggagatcta ataacagttt ctttagtaga t
tgaattggt tgacccactt aaaattcaaatacccagcat tgaacgtgac tatgccaaac aatgaaaaat ttgacaaa
tt gtacatttgggggttcacc acccgggtac ggacaatgac caaatcttcc tgtatgctca aacatcaggaagaat
cacag tctctaccaa aagaagccaa caaactgtaa tcccgaatat cggatctagacccagggtaa ggaatatccc c
agcagaata agcatctatt ggacaatagt aaaaccgggagacatacttt tgattaacag cacagggaat ctaattgc
tc ctaggggtta cttcaaaatacgaagtggga aaagctcaat aatgagatca gatgcaccca ttggcaaatg caat
tctgaatgcatcactc caaatggaag cattcccaat gacaaaccat ttcaaaatgt aaacaggatcacatatgggg c
ctgtcccag atatgttagg caaaacactc tgaaattggc aacagggatgcgaaatgtac cagaaaaaca aactaga"
## attr(,"name")
## [1] "EU501856.1"
## attr(,"Annot")
## [1] ">EU501856.1"
## attr(,"class")
## [1] "SeqFastadna"
##
```

```
## $FR832667.1
## [1] "atgaaagtaa aactactgat cctgttatgc acatttacag ctacatatgc agacacaatatgtataggc
t accatgctaa caactcgacc gacactgttg acacagtact tgaaaagaatgtgacagtga cacactctgt caacc
tgctt gagaacagtc acaatggaaa actatgtctattaaaaggaa tagccccact acaattgggt aactgcagcg t
tgccgggtg gatcttaggaaacccagaat gcgaattact gatttccaag gagtcatggt cctacattgt agaaaaac
caaatcctgaga atggaacatg ttacccaggg catttcgctg actatgagga actgagggagcaattgagtt cagta
tcttc atttgagagg ttcgaaatat tccccaaaga aagctcatggcccaaccaca ccgtaaccgg agtgtcagca t
catgctccc ataatgggga aagcagtttttacagaaatt tgctatggct gacggggaag aatggtttgt acccaaac
ct gagcaagtcctatgcaaaca acaaagaaaa agaagtcctt gtactatggg gtgttcatca cccgccaaacatagg
tgacc aaaagaccct ctataataca gaaaatgctt atgtttctgt agtgtcttcacattatagca gaaaattcac c
ccagaaata gccaaaagac ccaaagtaag agatcaagaaggaagaatca actactactg gactctgctt gaacccgg
gg atacaataat atttgaggcaaatggaaatc taatagcgcc aagatatgct ttcgcactga gtagaggctc tgga
tcaggaatcatcaact caaatgcacc aatggataaa tgtgatgcaa agtgccaaac acctcagggagctataaaca g
cagtcttcc tttccagaac gtacacccag tcacaatagg agagtgtccaaagtatgtca ggagtgcaaa attaagga
tg gttacaggac taaggaacat cccatccattcaatccagag gtttgtttgg agccattgcc ggtttcattg aagg
gggatg gac"
## attr(,"name")
## [1] "FR832667.1"
## attr(,"Annot")
## [1] ">FR832667.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $CY106568.1
## [1] "aaaagcaaca aaaatgaagg caatactagt agttctgcta tatacatttg caaccgcaaatgcagacac
a ttatgtatag gttatcatgc gaacaattca acagacactg tagacacagtactagaaaag aatgtaacag taaca
cactc tgttaacctt ctagaagaca agcataacgggaaactatgc aaactaagag gggtagcccc attgcatttg g
gtaaatgta acattgctggctggatcctg ggaaatccag agtgtgaatc actctccaca gcaagctcat ggtcctac
attgtggaaaca tctagttcag acaatggaac gtgttaccca ggagatttca tcgattatgaggagctaaga gagca
attga gctcagtgtc atcatttgaa aggtttgaga tattccccaagacaagttca tggcccaatc atgactcgaa c
aaaggtgta acggcagcat gtcctcatgctggagcaaaa agcttctaca aaaatttaat atggctagtt aaaaaagg
ga attcatacccaaagctcagc aaatcctaca ttaatgataa agggaaagaa gtcctcgtgc tatggggcattcacc
atcca tctactagtg ctgaccaaca aagtctctat cagaatgcag atgcatatgtttttgtgggg acatcaagat a
cagcaagaa gttcaagccg gaaatagcaa taagacccaaagtgaggga caagaaggga gaatgaacta ttactgga
ca ctagtagagc cgggagacaaaataacattc gaagcaactg gaaatctagt ggtaccgaga tatgcattcg caat
ggaaagaaatgctgga tctggtatta tcatttcaga tacaccagtc cacgattgca atacaacttgtcagacaccc a
agggtgcta taaacaccag cctcccattt cagaatatac atccgatcacaattggaaaa tgtccaaaat atgtaaaa
ag cacaaaattg agactggcca caggattgaggaatgtcccg tctattcaat ctagaggcct atttggggcc attg
ccggtt tcattgaaggggggtggaca gggatggtag atggatggta cggttatcac catcaaaatg agcaggggtca
ggatatgca gccgacctga agagcacaca gaatgccatt gacaagatta ctaacaaagtaaattctgtt attgaaaa
ga tgaatacaca gttcacagca gtaggtaaag agttcaaccacctggaaaaa agaatagaga atttaaataa aaaa
gttgat gatggtttcc tggacatttggacttacaat gccgaactgt tggttctatt ggaaaatgaa agaactttgg
actaccacgattcaaatgtg aagaacttat atgaaaaggt aagaagccag ttaaaaaaca atgccaaggaaattggaa
ac ggctgctttg aattttacca caaatgcgat aacacgtgca tggaaagtgtcaaaaatggg acttatgact accc
aaaata ctcagaggaa gcaaaattaa acagagaagaaatagatggg gtaaagctgg aatcaacaag gatttaccag
attttggcga tctattcaactgtcgccagt tcattggtac tggtagtctc cctgggggca atcagtttct ggatgtg
ctctaatgggtct ctacagtgta gaatatgtat ttaacattag gatttcagaa gcat"
## attr(,"name")
## [1] "CY106568.1"
## attr(,"Annot")
## [1] ">CY106568.1"
## attr(,"class")
```

```
## [1] "SeqFastadna"
##
## $KT889237.1
## [1] "atgaagacta tcattgcttt gagctacatt ctatgtctgg ttttcgctca aaaacttcctggaaatgac
a atagcacggc aacgctgtgc cttgggcacc atgcagtacc aaacggaacgatagtgaaaa caatcacgaa tgacc
gaatt gaagttacta atgctactga gctggttcagaattcctcaa taggtgaaat atgcgacagt cctcatcaga t
ccttgatgg agaaaactgcacactaatag atgctctatt gggagaccct cagtgtgatg gctttcaaaa taagaaat
gggacctttttg ttgaacgaag caaagcctac agtaactgtt acccttatga tgtgccggattatgcctccc ttagg
tcact agttgcctca tccggcacac tggagtttaa caatgaaagcttcaattgga ctggagtcac tcaaaacgga a
caagttctg cttgcataag gaaatctaatagtagtttct ttagtagatt aaattggttg acccacttaa acttcaaa
ta cccagcattgaacgtgacta tgccaaacaa tgaacaattt gacaaattgt acatttgggg ggttcaccacccggg
tacgg acaaggacca aatcttcctg tatgctcaat catcaggaag aatcacagtatctaccaaaa gaagccaaca a
gctgtaatc ccgaatatcg gatctagacc cagaataaggaatatcccta gcagaataag catctattgg acaatagt
aa aaccgggaga catacttttgattaacagca cagggaatct aattgctcct aggggttact tcaaaatacg aagt
gggaaaagctcaataa tgagatcaga tgcacccatt ggcaaatgca agtctgaatg catcactccaaatggaagca t
tcccaatga caaaccattc caaaatgtaa acaggatcac atacggggcctgtcccagat atgttaagca aagcactc
tg aaattggcaa caggaatgcg aaatgtaccagagaaacaaa ctagaggcat atttggcgca atagcgggtt tcat
agaaaa tggttgggagggaatggtgg atggttggta cggtttcagg catcaaaatt ctgagggaag aggacaagcag
cagatctca aaagcactca agcagcaatc gatcaaatca atgggaagct gaatcgattgatcgggaaaa ccaacgag
aa attccatcag attgaaaaag aattctcaga agtagaagggagaattcagg accttgagaa atatgttgag gaca
ctaaaa tagatctctg gtcatacaacgcggagcttc ttgttgccct ggagaaccaa catacaattg atctaactga
ctcagaaatgaacaaactgt ttgaaaaaac aaagaagcaa ctgagggaaa atgctgagga tatgggcaatggttgttt
ca aaatatacca caaatgtgac aatgcctgca taggatcaat cagaaatggaacttatgacc acgatgtata cagg
gatgaa gcattaaaca accggtttca gatcaagggagttgagctga agtcagggta caaagattgg atcctatgga
tttccctttgc catatcatgttttttgcttt gtgttgcttt gttggggttc atcatgtggg cctgccaaaa gggcaac
attaggtgcaaca tttgcatttg a"
## attr(,"name")
## [1] "KT889237.1"
## attr(,"Annot")
## [1] ">KT889237.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $CY125728.1
## [1] "agcaaaagca ggggatacaa aatgaacact caaattttgg cactcattgc ttgtatgctgattggagct
a aaggagataa aatatgtctt gggcaccatg ctgtggcaaa tggaacaaaagtgaacacat taacagagag aggaa
tcgaa gtagtaaatg ccacagaaac ggtggagactgcaaatacta agaaaatatg cactcagggg aaaagaccaa c
agatctggg acaatgcggacttctaggaa ccctaatagg acctccccaa tgcgatcaat ttctggaatt tgacgctg
atttaataattg aacgaagaga aggaaccgat gtgtgttatc ccgggaagtt cacaaatgaagaatcactga ggcaa
atcct tcgagggtca ggaggaattg ataaagagtc aatgggtttcacctatagtg gaataagaac caatggggcg a
caagtgctt gcagaagatc aggttcttccttctatgcgg agatgaagtg gttactgtcg aattcagaca atgcggct
tt tccccaaatgactaagtcgt acagaaatcc caggaacaaa ccagctctga taatttgggg agtgcatcattctgg
atcgg ctactgagca gaccaaactc tatgggagtg gaaacaagtt gataacagtaggaagctcga aataccagca g
tcattcacc ccaagcccgg gggcacgacc acaggtgaatgggcaatcag gaaggattga ctttcactgg ctactcct
tg atcccaatga cacagtgaccttcacattca atggggcatt catagctcct gacagagcaa gtttctttag agga
gagtcaataggagttc agagtgatgt tcctttggat tctggttgtg agggggattg cttccacaatgggggtacga t
agtgagttc cctgccattc cagaacatca accctagaac agtgggaaaatgccctcgat atgtcaaaca gacaagcc
tc cttttggcta cagggatgag aaacgtcccagagaacccca aggataggaa gagccgacat cgaaggacca gagg
cctttt tggagcgattgctggattca tagagaatgg atgggaaggt ctcattgatg gatggtatgg tttcagacatc
aaaatgcac aaggagaagg aactgcagct gattacaaaa gcactcaatc tgcgatagatcagatcacag gcaaattg
aa tcgtctaatt gacaaaacaa atcagcagtt tgaactgatagacaacgaat tcagtgaaat agaacaacaa attg
ggaatg tcattaactg gacacgagattcaatgactg aggtatggtc gtacaatgct gaattgctgg tagctatgga
```

```
aaatcagcacacaatagatc ttgcagactc agaaatgaac aaactttatg agcgtgtaag gaaacaactgagggagaa
tg ctgaagagga tgggactgga tgctttgaaa tatttcataa gtgtgatgatcagtgcatgg agagcatcag gaac
aacact tatgaccata ctcaatacag agcggagtcattgcagaata gaatacagat agacccagtg aaattgagta
gtggatacaa agacataatcttatggttta gcttcggggc atcatgtttt cttcttctag ccattgcaat gggattg
gttttcatttgca taaagaatgg aaacatgcgg tgcactattt gtatatagtt tgagaaaaaaacacccttgt ttct
act"
## attr(,"name")
## [1] "CY125728.1"
## attr(,"Annot")
## [1] ">CY125728.1"
## attr(,"class")
## [1] "SeqFastadna"
```

4. Sobre escribir el archivo pero ahora con más datos:

```
write.fasta(sequences = virus_seq_no_alineadas, names = virus_GenBank_IDs,
nbchar = 10, file.out = "virus_seqs.fasta")
```

5. Volver a cargar los datos en formato FASTA:

```
virus_seq_no_alineadas <- read.fasta("virus_seqs.fasta", seqtype = "DNA", as.string
= FALSE, forceDNAtolower = FALSE)

virus_seq_no_alineadas
```

```
## $`Influenza_A_virus_(A/Auckland/582/2000(H1N1))_HA_KP456547.1`
##    [1] "a" "t" "g" "a" "a" "a" "g" "t" "a" "a" " " "a" "a" "c" "t" "a" "c" "t"
##   [19] "g" "g" "t" " " "c" "c" "t" "g" "t" "t" "a" "t" "g" "t" " " "a" "c" "a"
##   [37] "t" "t" "t" "a" "c" "a" "g" " " "c" "t" "a" "c" "a" "t" "a" "t" "g" "c"
##   [55] " " "a" "g" "a" "c" "a" "c" "a" "a" "t" "a" "t" "g" "t" "a" "t" "a" "g"
##   [73] "g" "g" "t" " " "a" "c" "c" "a" "t" "g" "c" "c" "a" "a" " " "c" "a" "a"
##   [91] "c" "t" "c" "a" "a" "c" "c" " " "g" "a" "c" "a" "c" "t" "g" "t" "t" "g"
##  [109] " " "a" "c" "a" "c" "a" "g" "t" "a" "c" "t" " " "t" "g" "a" "g" "a" "a"
##  [127] "g" "a" "a" "t" "g" "t" "g" "a" "c" "a" "g" "t" "g" "a" " " "c" "a" "c"
##  [145] "a" "c" "t" "c" "t" "g" "t" " " "c" "a" "a" "c" "c" "t" "a" "c" "t" "t"
##  [163] " " "g" "a" "g" "g" "a" "c" "a" "g" "t" "c" " " "a" "c" "a" "a" "t" "g"
##  [181] "g" "a" "a" "a" " " "a" "c" "t" "a" "t" "g" "t" "c" "t" "a" "c" "t" "a"
##  [199] "a" "a" "a" "g" "g" "a" "a" " " "t" "a" "g" "c" "c" "c" "c" "a" "t" "t"
##  [217] " " "a" "c" "a" "a" "t" "t" "g" "g" "g" "t" " " "a" "a" "t" "t" "g" "c"
##  [235] "a" "g" "c" "g" " " "t" "t" "g" "c" "c" "g" "g" "a" "t" "g" " " "g" "a"
##  [253] "t" "c" "t" "t" "a" "g" "g" "a" "a" "a" "c" "c" "c" "a" "g" "a" "a" "t"
##  [271] " " "g" "c" "g" "a" "a" "t" "t" "a" "c" "t" " " "g" "a" "t" "t" "t" "c"
##  [289] "c" "a" "a" "g" " " "g" "a" "a" "t" "c" "a" "t" "g" "g" "t" " " "c" "c"
##  [307] "t" "a" "c" "a" "t" "t" "g" "t" " " "a" "g" "a" "a" "a" "c" "a" "c" "c"
##  [325] "a" "a" "a" "t" "c" "c" "t" "g" "a" "g" "a" " " "a" "t" "g" "g" "a" "a"
##  [343] "c" "a" "t" "g" " " "t" "t" "a" "c" "c" "c" "a" "g" "g" "g" " " "t" "a"
##  [361] "t" "t" "t" "c" "g" "c" "t" "g" " " "a" "c" "t" "a" "t" "g" "a" "g" "g"
##  [379] "a" " " "a" "c" "t" "g" "a" "g" "g" "g" "a" "g" "c" "a" "a" "t" "t" "g"
##  [397] "a" "g" "t" "t" " " "c" "a" "g" "t" "a" "t" "c" "t" "t" "c" " " "a" "t"
##  [415] "t" "t" "g" "a" "g" "a" "g" "a" " " "t" "t" "c" "g" "a" "a" "a" "t" "a"
##  [433] "t" " " "t" "c" "c" "c" "c" "a" "a" "a" "g" "a" " " "a" "a" "g" "c" "t"
##  [451] "c" "a" "t" "g" "g" "c" "c" "c" "a" "a" "c" "c" "a" "c" "a" " " "c" "c"
##  [469] "g" "t" "a" "a" "c" "c" "g" "g" " " "a" "g" "t" "a" "t" "c" "a" "g" "c"
##  [487] "a" " " "t" "c" "a" "t" "g" "c" "t" "c" "c" "c" " " "a" "t" "a" "a" "t"
##  [505] "g" "g" "g" "a" "a" " " "a" "a" "g" "c" "a" "g" "t" "t" "t" "t" "t" "a"
##  [523] "c" "a" "g" "a" "a" "a" "t" "t" " " "t" "g" "c" "t" "a" "t" "g" "g" "c"
##  [541] "t" " " "g" "a" "c" "g" "g" "g" "g" "a" "a" "g" " " "a" "a" "t" "g" "g"
##  [559] "t" "t" "t" "g" "t" " " "a" "c" "c" "c" "a" "a" "a" "c" "c" "t" " " "g"
##  [577] "a" "g" "c" "a" "a" "g" "t" "c" "c" "t" "a" "t" "g" "c" "a" "a" "a" "c"
##  [595] "a" " " "a" "c" "a" "a" "a" "g" "a" "g" "a" "a" " " "a" "g" "a" "a" "g"
##  [613] "t" "c" "c" "t" "t" " " "g" "t" "a" "c" "t" "a" "t" "g" "g" "g" " " "g"
##  [631] "t" "g" "t" "t" "c" "a" "t" "c" "a" " " "c" "c" "c" "g" "c" "c" "t" "a"
##  [649] "a" "c" "a" "t" "a" "g" "g" "g" "g" "a" "c" "c" " " "a" "a" "a" "g" "g"
##  [667] "g" "c" "c" "c" "t" " " "c" "t" "a" "t" "c" "a" "t" "a" "c" "a" " " "g"
##  [685] "a" "a" "a" "a" "t" "g" "c" "t" "t" " " "a" "t" "g" "t" "c" "t" "c" "t"
##  [703] "g" "t" " " "a" "g" "t" "g" "t" "c" "t" "t" "c" "a" "c" "a" "t" "t" "a"
##  [721] "t" "a" "g" "c" "a" " " "g" "a" "a" "g" "a" "t" "t" "c" "a" "c" " " "c"
##  [739] "c" "c" "a" "g" "a" "a" "a" "t" "a" " " "g" "c" "c" "a" "a" "a" "a" "g"
##  [757] "a" "c" " " "c" "c" "a" "a" "a" "g" "t" "a" "a" "g" " " "a" "g" "a" "t"
##  [775] "c" "a" "g" "g" "a" "a" "g" "g" "a" "a" "g" "a" "a" "t" "c" "a" " " "a"
##  [793] "c" "t" "a" "c" "t" "a" "c" "t" "g" " " "g" "a" "c" "t" "c" "t" "g" "c"
##  [811] "t" "g" " " "g" "a" "a" "c" "c" "c" "g" "g" "g" "g" " " "a" "t" "a" "c"
##  [829] "a" "a" "t" "a" "a" "t" " " "a" "t" "t" "t" "g" "a" "g" "g" "c" "a" "a"
##  [847] "a" "t" "g" "g" "a" "a" "a" "t" "c" " " "t" "a" "a" "t" "a" "g" "c" "g"
##  [865] "c" "c" " " "a" "c" "g" "g" "t" "a" "t" "g" "c" "t" " " "t" "t" "c" "g"
##  [883] "c" "a" "c" "t" "g" "a" " " "g" "t" "a" "g" "a" "g" "g" "c" "t" "t" " "
##  [901] "t" "g" "g" "a" "t" "c" "a" "g" "g" "a" "a" "t" "c" "a" "t" "c" "a" "c"
```

```
##  [919] "c" "t" " " "c" "a" "a" "a" "t" "g" "c" "a" "c" "c" " " "a" "a" "t" "g"
##  [937] "g" "a" "t" "g" "a" "a" " " "t" "g" "t" "g" "a" "t" "g" "c" "g" "a" " "
##  [955] "a" "g" "t" "g" "t" "c" "a" "a" "a" "c" " " "a" "c" "c" "t" "c" "a" "g"
##  [973] "g" "g" "a" "g" "c" "t" "a" "t" "a" "a" "a" "c" "a" " " "g" "c" "a" "g"
##  [991] "t" "c" "t" "t" "c" "c" " " "t" "t" "t" "c" "c" "a" "g" "a" "a" "c" " "
## [1009] "g" "t" "a" "c" "a" "c" "c" "c" "a" "g" " " "t" "c" "a" "c" "a" "a" "t"
## [1027] "a" "g" "g" " " "a" "g" "a" "g" "t" "g" "t" "c" "c" "a" "a" "a" "g" "t"
## [1045] "a" "t" "g" "t" "c" "a" " " "g" "g" "a" "g" "t" "g" "c" "a" "a" "a" " "
## [1063] "a" "t" "t" "a" "a" "g" "g" "a" "t" "g" " " "g" "t" "t" "a" "c" "a" "g"
## [1081] "g" "a" "c" " " "t" "a" "a" "g" "g" "a" "a" "c" "a" "t" " " "c" "c" "c"
## [1099] "a" "t" "c" "c" "a" "t" "t" "c" "a" "a" "t" "c" "c" "a" "g" "a" "g" " "
## [1117] "g" "t" "t" "t" "g" "t" "t" "t" "g" "g" " " "a" "g" "c" "c" "a" "t" "t"
## [1135] "g" "c" "c" " " "g" "g" "t" "t" "t" "c" "a" "t" "t" "g" " " "a" "a" "g"
## [1153] "g" "g" "g" "g" "g" "t" "g" " " "g" "a" "c" "t" "g" "g" "a" "a" "t" "g"
## [1171] "g" "t" "a" "g" "a" "t" "g" "g" "g" "t" " " "g" "g" "t" "a" "t" "g" "g"
## [1189] "t" "t" "a" " " "t" "c" "a" "t" "c" "a" "t" "c" "a" "g" " " "a" "a" "t"
## [1207] "g" "a" "g" "c" "a" "a" "g" " " "g" "a" "t" "c" "t" "g" "g" "c" "t" "a"
## [1225] " " "t" "g" "c" "c" "g" "c" "a" "g" "a" "t" "c" "a" "a" "a" "a" "a" "a"
## [1243] "g" "c" "a" " " "c" "a" "c" "a" "a" "a" "a" "t" "g" "c" " " "c" "a" "t"
## [1261] "t" "a" "a" "c" "g" "g" "g" " " "a" "t" "t" "a" "c" "a" "a" "a" "c" "a"
## [1279] " " "a" "g" "g" "t" "g" "a" "a" "t" "t" "c" " " "t" "g" "t" "a" "a" "t"
## [1297] "t" "g" "a" "g" "a" "a" "a" "a" "t" "g" "a" "a" "c" "a" " " "c" "t" "c"
## [1315] "a" "a" "t" "t" "c" "a" "c" " " "a" "g" "c" "t" "g" "t" "g" "g" "g" "c"
## [1333] " " "a" "a" "a" "g" "a" "a" "t" "t" "c" "a" " " "a" "c" "a" "a" "a" "t"
## [1351] "t" "g" "g" "a" " " "a" "a" "g" "a" "a" "g" "g" "a" "t" "g" "g" "a" "a"
## [1369] "a" "a" "c" "t" "t" "a" "a" " " "a" "t" "a" "a" "a" "a" "a" "a" "g" "t"
## [1387] " " "t" "g" "a" "t" "g" "a" "t" "g" "g" "g" " " "t" "t" "t" "c" "t" "a"
## [1405] "g" "a" "c" "a" " " "t" "t" "t" "g" "g" "a" "c" "a" "t" "a" " " "t" "a"
## [1423] "a" "t" "g" "c" "a" "g" "a" "a" "t" "t" "g" "t" "t" "g" "g" "t" "t" "c"
## [1441] " " "t" "a" "c" "t" "g" "g" "a" "a" "a" "a" " " "t" "g" "a" "a" "a" "g"
## [1459] "g" "a" "c" "t" " " "t" "t" "g" "g" "a" "t" "t" "t" "c" "c" " " "a" "t"
## [1477] "g" "a" "c" "t" "c" "c" "a" "a" " " "t" "g" "t" "g" "a" "a" "g" "a" "a"
## [1495] "t" "c" "t" "g" "t" "a" "t" "g" "a" "g" "a" " " "a" "a" "g" "t" "a" "a"
## [1513] "a" "a" "a" "g" " " "c" "c" "a" "a" "t" "t" "a" "a" "a" "g" " " "a" "a"
## [1531] "t" "a" "a" "t" "g" "c" "c" "a" " " "a" "a" "g" "a" "a" "a" "t" "a" "g"
## [1549] "g" " " "a" "a" "a" "c" "g" "g" "g" "t" "g" "t" "t" "t" "t" "g" "a" "a"
## [1567] "t" "t" "c" "t" " " "a" "t" "c" "a" "c" "a" "a" "g" "t" "g" " " "t" "a"
## [1585] "a" "c" "a" "a" "t" "g" "a" "a" " " "t" "g" "c" "a" "t" "g" "g" "a" "g"
## [1603] "a" " " "g" "t" "g" "t" "g" "a" "a" "a" "a" "a" " " "t" "g" "g" "a" "a"
## [1621] "c" "t" "t" "a" "t" "g" "a" "c" "t" "a" "t" "c" "c" "a" "a" " " "a" "a"
## [1639] "t" "a" "t" "t" "c" "c" "g" "a" " " "a" "g" "a" "a" "t" "c" "a" "a" "a"
## [1657] "g" " " "t" "t" "a" "a" "a" "c" "a" "g" "g" "g" " " "a" "g" "a" "a" "a"
## [1675] "a" "t" "t" "g" "a" " " "t" "g" "g" "a" "g" "t" "g" "a" "a" "a" "t" "t"
## [1693] "g" "g" "a" "a" "t" "c" "a" "a" " " "t" "g" "g" "g" "a" "g" "t" "c" "t"
## [1711] "a" " " "t" "c" "a" "g" "a" "t" "t" "c" "t" "g" " " "g" "c" "g" "a" "t"
## [1729] "c" "t" "a" "c" "t" " " "c" "a" "a" "c" "t" "g" "t" "c" "g" "c" " " "c"
## [1747] "a" "g" "t" "t" "c" "c" "c" "t" "g" "g" "t" "t" "c" "t" "t" "t" "t" "g"
## [1765] "g" " " "t" "c" "t" "c" "c" "c" "t" "g" "g" "g" " " "g" "g" "c" "a" "a"
## [1783] "t" "c" "a" "g" "c" " " "t" "t" "c" "t" "g" "g" "a" "t" "g" "t" " " "g"
## [1801] "t" "t" "c" "c" "a" "a" "t" "g" "g" " " "g" "t" "c" "t" "t" "t" "g" "c"
## [1819] "a" "g" "t" "g" "t" "a" "g" "a" "a" "t" "a" "t" " " "g" "c" "a" "t" "c"
## attr(,"name")
```

```
## [1] "Influenza_A_virus_(A/Auckland/582/2000(H1N1))_HA_KP456547.1"
## attr(,"Annot")
## [1] ">Influenza_A_virus_(A/Auckland/582/2000(H1N1))_HA_KP456547.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $`Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.1`
##    [1] "a" "t" "g" "a" "a" "g" "g" "c" "a" "a" " " "t" "a" "c" "t" "a" "g" "t"
##   [19] "a" "g" "t" " " "t" "c" "t" "g" "c" "t" "a" "t" "a" "t" " " "a" "c" "a"
##   [37] "t" "t" "t" "g" "c" "a" "a" " " "c" "c" "g" "c" "a" "a" "a" "t" "g" "c"
##   [55] " " "a" "g" "a" "c" "a" "c" "a" "t" "t" "a" "t" "g" "t" "a" "t" "a" "g"
##   [73] "g" "t" "t" " " "a" "t" "c" "a" "t" "g" "c" "g" "a" "a" " " "c" "a" "a"
##   [91] "t" "t" "c" "a" "a" "c" "a" " " "g" "a" "c" "a" "c" "t" "g" "t" "a" "g"
##  [109] " " "a" "c" "a" "c" "a" "g" "t" "a" "c" "t" " " "a" "g" "a" "a" "a" "a"
##  [127] "g" "a" "a" "t" "g" "t" "a" "a" "c" "a" "g" "t" "a" "a" " " "c" "a" "c"
##  [145] "a" "c" "t" "c" "t" "g" "t" " " "t" "a" "a" "c" "c" "t" "t" "c" "t" "a"
##  [163] " " "g" "a" "a" "g" "a" "c" "a" "a" "g" "c" " " "a" "t" "a" "a" "c" "g"
##  [181] "g" "g" "a" "a" " " "a" "c" "t" "a" "t" "g" "c" "a" "a" "a" "c" "t" "a"
##  [199] "a" "g" "a" "g" "g" "g" "g" " " "t" "a" "g" "c" "c" "c" "c" "a" "t" "t"
##  [217] " " "g" "c" "a" "t" "t" "t" "g" "g" "g" "t" " " "a" "a" "a" "t" "g" "t"
##  [235] "a" "a" "c" "a" " " "t" "t" "g" "c" "t" "g" "g" "c" "t" "g" " " "g" "a"
##  [253] "t" "c" "c" "t" "g" "g" "g" "a" "a" "a" "t" "c" "c" "a" "g" "a" "g" "t"
##  [271] " " "g" "t" "g" "a" "a" "t" "c" "a" "c" "t" " " "c" "t" "c" "c" "a" "c"
##  [289] "a" "g" "c" "a" " " "a" "g" "c" "t" "c" "a" "t" "g" "g" "t" " " "c" "c"
##  [307] "t" "a" "c" "a" "t" "t" "g" "t" " " "g" "g" "a" "a" "a" "c" "a" "t" "c"
##  [325] "t" "a" "g" "t" "t" "c" "a" "g" "a" "c" "a" " " "a" "t" "g" "g" "a" "a"
##  [343] "c" "g" "t" "g" " " "t" "t" "a" "c" "c" "c" "a" "g" "g" "a" " " "g" "a"
##  [361] "t" "t" "t" "c" "a" "t" "c" "g" " " "a" "t" "t" "a" "t" "g" "a" "g" "g"
##  [379] "a" " " "g" "c" "t" "a" "a" "g" "a" "g" "a" "g" "c" "a" "a" "t" "t" "g"
##  [397] "a" "g" "c" "t" " " "c" "a" "g" "t" "g" "t" "c" "a" "t" "c" " " "a" "t"
##  [415] "t" "t" "g" "a" "a" "a" "g" "g" " " "t" "t" "t" "g" "a" "g" "a" "t" "a"
##  [433] "t" " " "t" "c" "c" "c" "c" "a" "a" "g" "a" "c" " " "a" "a" "g" "t" "t"
##  [451] "c" "a" "t" "g" "g" "c" "c" "c" "a" "a" "t" "c" "a" "t" "g" " " "a" "c"
##  [469] "t" "c" "g" "a" "a" "c" "a" "a" " " "a" "g" "g" "t" "g" "t" "a" "a" "c"
##  [487] "g" " " "g" "c" "a" "g" "c" "a" "t" "g" "t" "c" " " "c" "t" "c" "a" "t"
##  [505] "g" "c" "t" "g" "g" " " "a" "g" "c" "a" "a" "a" "a" "a" "g" "c" "t" "t"
##  [523] "c" "t" "a" "c" "a" "a" "a" "a" " " "a" "t" "t" "t" "a" "a" "t" "a" "t"
##  [541] "g" " " "g" "c" "t" "a" "g" "t" "t" "a" "a" "a" " " "a" "a" "a" "g" "g"
##  [559] "a" "a" "a" "t" "t" " " "c" "a" "t" "a" "c" "c" "c" "a" "a" "a" " " "g"
##  [577] "c" "t" "c" "a" "g" "c" "a" "a" "a" "t" "c" "c" "t" "a" "c" "a" "t" "t"
##  [595] "a" " " "a" "t" "g" "a" "t" "a" "a" "a" "g" "g" " " "g" "a" "a" "a" "g"
##  [613] "a" "a" "g" "t" "c" " " "c" "t" "c" "g" "t" "g" "c" "t" "a" "t" " " "g"
##  [631] "g" "g" "g" "c" "a" "t" "t" "c" "a" " " "c" "c" "a" "t" "c" "a" "a" "t"
##  [649] "c" "t" "a" "c" "t" "a" "g" "t" "g" "c" "t" "g" " " "a" "c" "c" "a" "a"
##  [667] "c" "a" "a" "a" "g" " " "t" "c" "t" "c" "t" "a" "t" "c" "a" "g" " " "a"
##  [685] "a" "t" "g" "c" "a" "g" "a" "t" "g" " " "c" "a" "t" "a" "t" "g" "t" "t"
##  [703] "t" "t" " " "t" "g" "t" "g" "g" "g" "g" "a" "c" "a" "t" "c" "a" "a" "g"
##  [721] "a" "t" "a" "c" "a" " " "g" "c" "a" "a" "g" "a" "a" "g" "t" "t" " " "c"
##  [739] "a" "a" "g" "c" "c" "g" "g" "a" "a" " " "a" "t" "a" "g" "c" "a" "a" "t"
##  [757] "a" "a" " " "g" "a" "c" "c" "c" "a" "a" "a" "g" "t" " " "g" "a" "g" "g"
##  [775] "g" "a" "t" "c" "a" "a" "g" "a" "a" "g" "g" "g" "a" "g" "a" "a" " " "t"
##  [793] "g" "a" "a" "c" "t" "a" "t" "t" "a" " " "c" "t" "g" "g" "a" "c" "a" "c"
```

```
##  [811] "t" "a" " " "g" "t" "a" "g" "a" "g" "c" "c" "g" "g" " " "g" "a" "g" "a"
##  [829] "c" "a" "a" "a" "a" "t" " " "a" "a" "c" "a" "t" "t" "c" "g" "a" "a" "g"
##  [847] "c" "a" "a" "c" "t" "g" "g" "a" "a" " " "a" "t" "c" "t" "a" "g" "t" "g"
##  [865] "g" "t" " " "a" "c" "c" "g" "a" "g" "a" "t" "a" "t" " " "g" "c" "a" "t"
##  [883] "t" "c" "g" "c" "a" "a" " " "t" "g" "g" "a" "a" "a" "g" "a" "a" "a" " "
##  [901] "t" "g" "c" "t" "g" "g" "a" "t" "c" "t" "g" "g" "t" "a" "t" "t" "a" "t"
##  [919] "c" "a" " " "t" "t" "t" "c" "a" "g" "a" "t" "a" "c" " " "a" "c" "c" "a"
##  [937] "g" "t" "c" "c" "a" "c" " " "g" "a" "t" "t" "g" "c" "a" "a" "t" "a" " "
##  [955] "c" "a" "a" "c" "t" "t" "g" "t" "c" "a" " " "g" "a" "c" "a" "c" "c" "c"
##  [973] "a" "a" "g" "g" "g" "t" "g" "c" "t" "a" "t" "a" "a" " " "a" "c" "a" "c"
##  [991] "c" "a" "g" "c" "c" "t" " " "c" "c" "c" "a" "t" "t" "t" "c" "a" "g" " "
## [1009] "a" "a" "t" "a" "t" "a" "c" "a" "t" "c" " " "c" "g" "a" "t" "c" "a" "c"
## [1027] "a" "a" "t" " " "t" "g" "g" "a" "a" "a" "a" "t" "g" "t" "c" "c" "a" "a"
## [1045] "a" "a" "t" "a" "t" "g" " " "t" "a" "a" "a" "a" "a" "g" "c" "a" "c" " "
## [1063] "a" "a" "a" "a" "t" "t" "g" "a" "g" "a" " " "c" "t" "g" "g" "c" "c" "a"
## [1081] "c" "a" "g" " " "g" "a" "t" "t" "g" "a" "g" "g" "a" "a" " " "t" "g" "t"
## [1099] "c" "c" "c" "g" "t" "c" "t" "a" "t" "t" "c" "a" "a" "t" "c" "t" "a" " "
## [1117] "g" "a" "g" "g" "c" "c" "t" "a" "t" "t" " " "t" "g" "g" "g" "g" "c" "c"
## [1135] "a" "t" "t" " " "g" "c" "c" "g" "g" "t" "t" "t" "c" "a" " " "t" "t" "g"
## [1153] "a" "a" "g" "g" "g" "g" "g" " " "g" "t" "g" "g" "a" "c" "a" "g" "g" "g"
## [1171] "a" "t" "g" "g" "t" "a" "g" "a" "t" "g" " " "g" "a" "t" "g" "g" "t" "a"
## [1189] "c" "g" "g" " " "t" "t" "a" "t" "c" "a" "c" "c" "a" "t" " " "c" "a" "a"
## [1207] "a" "a" "t" "g" "a" "g" "c" " " "a" "g" "g" "g" "g" "t" "c" "a" "g" "g"
## [1225] " " "a" "t" "a" "t" "g" "c" "a" "g" "c" "c" "g" "a" "c" "c" "t" "g" "a"
## [1243] "a" "g" "a" " " "g" "c" "a" "c" "a" "c" "a" "g" "a" "a" " " "t" "g" "c"
## [1261] "c" "a" "t" "t" "g" "a" "c" " " "g" "a" "g" "a" "t" "t" "a" "c" "t" "a"
## [1279] " " "a" "c" "a" "a" "a" "g" "t" "a" "a" "a" " " "t" "t" "c" "t" "g" "t"
## [1297] "t" "a" "t" "t" "g" "a" "a" "a" "a" "g" "a" "t" "g" "a" " " "a" "t" "a"
## [1315] "c" "a" "c" "a" "g" "t" "t" " " "c" "a" "c" "a" "g" "c" "a" "g" "t" "a"
## [1333] " " "g" "g" "t" "a" "a" "a" "g" "a" "g" "t" " " "t" "c" "a" "a" "c" "c"
## [1351] "a" "c" "c" "t" " " "g" "g" "a" "a" "a" "a" "a" "a" "g" "a" "a" "t" "a"
## [1369] "g" "a" "g" "a" "a" "t" "t" " " "t" "a" "a" "a" "t" "a" "a" "a" "a" "a"
## [1387] " " "a" "g" "t" "t" "g" "a" "t" "g" "a" "t" " " "g" "g" "t" "t" "t" "c"
## [1405] "c" "t" "g" "g" " " "a" "c" "a" "t" "t" "t" "g" "g" "a" "c" " " "t" "t"
## [1423] "a" "c" "a" "a" "t" "g" "c" "c" "g" "a" "a" "c" "t" "g" "t" "t" "g" "g"
## [1441] " " "t" "t" "c" "t" "a" "t" "t" "g" "g" "a" " " "a" "a" "a" "t" "g" "a"
## [1459] "a" "a" "g" "a" " " "a" "c" "t" "t" "t" "g" "g" "a" "c" "t" " " "a" "c"
## [1477] "c" "a" "c" "g" "a" "t" "t" "c" " " "a" "a" "a" "t" "g" "t" "g" "a" "a"
## [1495] "g" "a" "a" "c" "t" "t" "a" "t" "a" "t" "g" " " "a" "a" "a" "a" "g" "g"
## [1513] "t" "a" "a" "g" " " "a" "a" "g" "c" "c" "a" "g" "t" "t" "a" " " "a" "a"
## [1531] "a" "a" "a" "c" "a" "a" "t" "g" " " "c" "c" "a" "a" "g" "g" "a" "a" "a"
## [1549] "t" " " "t" "g" "g" "a" "a" "a" "c" "g" "g" "c" "t" "g" "c" "t" "t" "t"
## [1567] "g" "a" "a" "t" " " "t" "t" "t" "a" "c" "c" "a" "c" "a" "a" " " "a" "t"
## [1585] "g" "c" "g" "a" "t" "a" "a" "c" " " "a" "c" "g" "t" "g" "c" "a" "t" "g"
## [1603] "g" " " "a" "a" "a" "g" "t" "g" "t" "c" "a" "a" " " "a" "a" "a" "t" "g"
## [1621] "g" "g" "a" "c" "t" "t" "a" "t" "g" "a" "c" "t" "a" "c" "c" " " "c" "a"
## [1639] "a" "a" "a" "t" "a" "c" "t" "c" " " "a" "g" "a" "g" "g" "a" "a" "g" "c"
## [1657] "a" " " "a" "a" "a" "t" "t" "a" "a" "a" "c" "a" " " "g" "a" "g" "a" "a"
## [1675] "g" "a" "a" "a" "t" " " "a" "g" "a" "t" "g" "g" "g" "g" "t" "a" "a" "a"
## [1693] "g" "c" "t" "g" "g" "a" "a" "t" " " "c" "a" "a" "c" "a" "a" "g" "g" "a"
## [1711] "t" " " "t" "t" "a" "c" "c" "a" "g" "a" "t" "t" " " "t" "t" "g" "g" "c"
## [1729] "g" "a" "t" "c" "t" " " "a" "t" "t" "c" "a" "a" "c" "t" "g" "t" " " "c"
```

```
## [1747] "g" "c" "c" "a" "g" "t" "t" "c" "a" "t" "t" "g" "g" "t" "a" "c" "t" "g"
## [1765] "g" " " "t" "a" "g" "t" "c" "t" "c" "c" "c" "t" " " "g" "g" "g" "g" "g"
## [1783] "c" "a" "a" "t" "c" " " "a" "g" "t" "t" "t" "c" "t" "g" "g" "a" " " "t"
## [1801] "g" "t" "g" "c" "t" "c" "t" "a" "a" " " "t" "g" "g" "g" "t" "c" "t" "c"
## [1819] "t" "a" "c" "a" "g" "t" "g" "t" "a" "g" "a" "a" " " "t" "a" "t" "g" "t"
## [1837] "a" "t" "t" "t" "a" " " "a"
## attr(,"name")
## [1] "Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.1"
## attr(,"Annot")
## [1] ">Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $`Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.1`
##    [1] "g" "a" "c" "a" "c" "a" "a" "t" "a" "t" " " "g" "t" "a" "t" "a" "g" "g"
##   [19] "c" "t" "a" " " "c" "c" "a" "t" "g" "c" "c" "a" "a" "c" " " "a" "a" "c"
##   [37] "t" "c" "a" "a" "c" "c" "g" " " "a" "c" "a" "c" "t" "g" "t" "t" "g" "a"
##   [55] " " "c" "a" "c" "a" "g" "t" "a" "c" "t" "t" "g" "a" "g" "a" "a" "g" "a"
##   [73] "a" "t" "g" " " "t" "g" "a" "c" "a" "g" "t" "g" "a" "c" " " "a" "c" "a"
##   [91] "c" "t" "c" "t" "g" "t" "c" " " "a" "a" "c" "c" "t" "a" "c" "t" "t" "g"
##  [109] " " "a" "g" "g" "a" "c" "a" "g" "t" "c" "a" " " "c" "a" "a" "t" "g" "g"
##  [127] "a" "a" "a" "a" "c" "t" "a" "t" "g" "t" "c" "t" "a" "c" " " "t" "a" "a"
##  [145] "a" "a" "g" "g" "a" "a" "t" " " "a" "g" "c" "c" "c" "c" "c" "c" "t" "a"
##  [163] " " "c" "a" "a" "t" "t" "g" "g" "g" "t" "a" " " "a" "t" "t" "g" "c" "a"
##  [181] "g" "c" "g" "t" " " "t" "g" "c" "c" "g" "g" "a" "t" "g" "g" "a" "t" "c"
##  [199] "t" "t" "a" "g" "g" "a" "a" " " "a" "c" "c" "c" "a" "g" "a" "a" "t" "g"
##  [217] " " "c" "g" "a" "a" "t" "t" "a" "c" "t" "g" " " "a" "t" "t" "t" "c" "c"
##  [235] "a" "a" "g" "g" " " "a" "a" "t" "c" "a" "t" "g" "g" "t" "c" " " "c" "t"
##  [253] "a" "c" "a" "t" "t" "g" "t" "a" "g" "a" "a" "a" "c" "a" "c" "c" "a" "a"
##  [271] " " "a" "t" "c" "c" "t" "g" "a" "g" "a" "a" " " "t" "g" "g" "a" "a" "c"
##  [289] "a" "t" "g" "t" " " "t" "a" "c" "c" "c" "a" "g" "g" "g" "t" " " "a" "t"
##  [307] "t" "t" "c" "g" "c" "c" "g" "a" " " "c" "t" "a" "t" "g" "a" "g" "g" "a"
##  [325] "g" "c" "t" "a" "a" "g" "g" "g" "a" "g" "c" " " "a" "a" "t" "t" "g" "a"
##  [343] "g" "t" "t" "c" " " "a" "g" "t" "a" "t" "c" "t" "t" "c" "a" " " "t" "t"
##  [361] "t" "g" "a" "g" "a" "g" "a" "t" " " "t" "c" "g" "a" "a" "a" "t" "a" "t"
##  [379] "t" " " "c" "c" "c" "c" "a" "a" "a" "g" "a" "a" "a" "g" "c" "t" "c" "a"
##  [397] "t" "g" "g" "c" " " "c" "c" "a" "a" "c" "c" "a" "c" "a" "c" " " "c" "g"
##  [415] "t" "a" "a" "c" "c" "g" "g" "a" " " "g" "t" "a" "t" "c" "a" "g" "c" "a"
##  [433] "t" " " "c" "a" "t" "g" "c" "t" "c" "c" "c" "a" " " "t" "a" "a" "t" "g"
##  [451] "g" "g" "a" "a" "a" "a" "g" "c" "a" "g" "t" "t" "t" "t" "t" " " "a" "c"
##  [469] "a" "g" "a" "a" "a" "t" "t" "t" " " "g" "c" "t" "a" "t" "g" "g" "c" "t"
##  [487] "g" " " "a" "c" "g" "g" "g" "g" "a" "a" "g" "a" " " "a" "t" "g" "g" "t"
##  [505] "t" "t" "g" "t" "a" " " "c" "c" "c" "a" "a" "a" "c" "c" "t" "g" "a" "g"
##  [523] "c" "a" "a" "g" "t" "c" "c" "t" " " "a" "t" "g" "c" "a" "a" "a" "c" "a"
##  [541] "a" " " "c" "a" "a" "a" "g" "a" "g" "a" "a" "a" " " "g" "a" "a" "g" "t"
##  [559] "c" "c" "t" "t" "a" " " "t" "a" "c" "t" "a" "t" "g" "g" "g" "g" " " "t"
##  [577] "g" "t" "t" "c" "a" "t" "c" "a" "c" "c" "c" "g" "c" "c" "t" "a" "a" "c"
##  [595] "a" " " "t" "a" "g" "g" "g" "g" "a" "c" "c" "a" " " "a" "a" "g" "g" "a"
##  [613] "c" "t" "c" "t" "c" " " "t" "a" "t" "c" "a" "t" "a" "c" "a" "g" " " "a"
##  [631] "a" "a" "a" "t" "g" "c" "t" "t" "a" " " "t" "g" "t" "c" "t" "c" "t" "g"
##  [649] "t" "a" "g" "t" "g" "t" "c" "t" "t" "c" "a" "c" " " "a" "t" "t" "a" "t"
##  [667] "a" "g" "c" "a" "g" " " "a" "a" "g" "a" "t" "t" "c" "a" "c" "c" " " "c"
```

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##  [685] "c" "a" "g" "a" "a" "a" "t" "a" "a" " " "c" "c" "a" "a" "a" "a" "g" "g"
##  [703] "c" "c" " " "c" "a" "a" "a" "g" "t" "a" "a" "g" "a" "g" "a" "t" "c" "a"
##  [721] "g" "g" "a" "a" "g" " " "g" "a" "a" "g" "a" "a" "t" "c" "a" "a" " " "c"
##  [739] "t" "a" "c" "t" "a" "c" "t" "g" "g" " " "a" "c" "t" "c" "t" "g" "c" "t"
##  [757] "g" "g" " " "a" "a" "c" "c" "c" "g" "g" "g" "g" "a" " " "t" "a" "c" "a"
##  [775] "a" "t" "a" "a" "t" "a" "t" "t" "t" "g" "a" "g" "g" "c" "a" "a" " " "a"
##  [793] "t" "g" "g" "a" "a" "a" "t" "c" "t" " " "a" "a" "t" "a" "g" "c" "g" "c"
##  [811] "c" "a" " " "t" "g" "g" "t" "a" "t" "g" "c" "t" "t" " " "t" "c" "g" "c"
##  [829] "a" "c" "t" "g" "a" "g" " " "t" "a" "g" "a" "g" "g" "c" "t" "t" "t" "g"
##  [847] "g" "a" "t" "c" "a" "g" "g" "a" "a" " " "t" "c" "a" "t" "c" "a" "c" "c"
##  [865] "t" "c" " " "a" "a" "a" "t" "g" "c" "a" "c" "c" "a" " " "a" "t" "g" "g"
##  [883] "a" "t" "g" "a" "a" "t" " " "g" "t" "g" "a" "t" "g" "c" "g" "a" "a" " "
##  [901] "g" "t" "g" "t" "c" "a" "a" "a" "c" "a" "c" "c" "t" "c" "a" "g" "g" "g"
##  [919] "a" "g" " " "c" "t" "a" "t" "a" "a" "a" "c" "a" "g" " " "c" "a" "g" "t"
##  [937] "c" "t" "t" "c" "c" "t" " " "t" "t" "c" "c" "a" "g" "a" "a" "t" "g" " "
##  [955] "t" "a" "c" "a" "c" "c" "c" "a" "g" "t" " " "c" "a" "c" "a" "a" "t" "a"
##  [973] "g" "g" "a" "g" "a" "g" "t" "g" "t" "c" "c" "a" "a" " " "a" "g" "t" "a"
##  [991] "t" "g" "t" "c" "a" "g" " " "g" "a" "g" "t" "g" "c" "a" "a" "a" "a" " "
## [1009] "t" "t" "a" "a" "g" "g" "a" "t" "g" "g" " " "t" "t" "a" "c" "a" "g" "g"
## [1027] "a" "c" "t" " " "a" "a" "g" "g" "a" "a" "c" "a" "t" "c" "c" "c" "a" "t"
## [1045] "c" "c" "a" "t" "t" "c" " " "a" "a" "t" "c" "c"
## attr(,"name")
## [1] "Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.1"
## attr(,"Annot")
## [1] ">Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.1"
## attr(,"class")
## [1] "SeqFastadna"
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## $`Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.1`
##    [1] "c" "a" "a" "a" "a" "a" "c" "t" "t" "c" " " "c" "c" "g" "g" "a" "a" "a"
##   [19] "t" "g" "a" " " "c" "a" "a" "c" "a" "g" "c" "a" "c" "g" " " "g" "c" "a"
##   [37] "a" "c" "g" "c" "t" "a" "t" " " "g" "c" "c" "t" "t" "g" "g" "g" "c" "a"
##   [55] " " "c" "c" "a" "t" "g" "c" "a" "g" "t" "a" "c" "c" "a" "a" "a" "c" "g"
##   [73] "g" "a" "a" " " "c" "g" "a" "t" "a" "g" "t" "g" "a" "a" " " "a" "a" "c"
##   [91] "a" "a" "t" "c" "a" "c" "a" " " "a" "a" "t" "g" "a" "c" "c" "a" "a" "a"
##  [109] " " "t" "t" "g" "a" "a" "g" "t" "t" "a" "c" " " "t" "a" "a" "t" "g" "c"
##  [127] "t" "a" "c" "t" "g" "a" "g" "c" "t" "g" "g" "t" "t" "c" " " "a" "g" "a"
##  [145] "g" "t" "t" "c" "c" "t" "c" " " "a" "a" "c" "a" "g" "g" "t" "g" "g" "a"
##  [163] " " "a" "t" "a" "t" "g" "c" "g" "a" "c" "a" " " "g" "t" "c" "c" "t" "c"
##  [181] "a" "t" "c" "a" " " "g" "a" "t" "c" "c" "t" "t" "g" "a" "t" "g" "g" "a"
##  [199] "g" "a" "a" "a" "a" "c" "t" " " "g" "c" "a" "c" "a" "c" "t" "a" "a" "t"
##  [217] " " "a" "g" "a" "t" "g" "c" "t" "c" "t" "a" " " "t" "t" "g" "g" "g" "a"
##  [235] "g" "a" "c" "c" " " "c" "t" "c" "a" "g" "t" "g" "t" "g" "a" " " "t" "g"
##  [253] "a" "c" "t" "t" "c" "c" "a" "a" "a" "a" "t" "a" "a" "g" "a" "a" "a" "t"
##  [271] " " "g" "g" "g" "a" "c" "c" "t" "t" "t" "t" " " "t" "g" "t" "t" "g" "a"
##  [289] "a" "c" "g" "c" " " "a" "g" "c" "a" "a" "a" "g" "c" "c" "t" " " "a" "c"
##  [307] "a" "g" "c" "a" "a" "c" "t" "g" " " "t" "t" "a" "c" "c" "c" "t" "t" "a"
##  [325] "t" "g" "a" "c" "g" "t" "g" "c" "c" "g" "g" " " "a" "t" "t" "a" "t" "g"
##  [343] "c" "c" "t" "c" " " "c" "c" "t" "t" "a" "g" "g" "t" "c" "a" " " "c" "t"
##  [361] "a" "g" "t" "t" "g" "c" "c" "t" " " "c" "a" "t" "c" "c" "g" "g" "c" "a"
##  [379] "c" " " "a" "c" "t" "g" "g" "a" "g" "t" "t" "t" "a" "a" "c" "a" "a" "t"
##  [397] "g" "a" "a" "a" " " "g" "c" "t" "t" "c" "a" "a" "t" "t" "g" " " "g" "a"
```

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##  [415] "c" "t" "g" "g" "a" "g" "t" "c" " " "a" "c" "t" "c" "a" "a" "a" "a" "t"
##  [433] "g" " " "g" "a" "a" "c" "a" "a" "g" "c" "t" "c" " " "t" "g" "c" "t" "t"
##  [451] "g" "c" "a" "a" "a" "a" "g" "g" "a" "g" "a" "t" "c" "t" "a" " " "a" "t"
##  [469] "a" "a" "c" "a" "g" "t" "t" "t" " " "c" "t" "t" "t" "a" "g" "t" "a" "g"
##  [487] "a" " " "t" "t" "g" "a" "a" "t" "t" "g" "g" "t" " " "t" "g" "a" "c" "c"
##  [505] "c" "a" "c" "t" "t" " " "a" "a" "a" "a" "t" "t" "c" "a" "a" "a" "t" "a"
##  [523] "c" "c" "c" "a" "g" "c" "a" "t" " " "t" "g" "a" "a" "c" "g" "t" "g" "a"
##  [541] "c" " " "t" "a" "t" "g" "c" "c" "a" "a" "a" "c" " " "a" "a" "t" "g" "a"
##  [559] "a" "a" "a" "a" "t" " " "t" "t" "g" "a" "c" "a" "a" "a" "t" "t" " " "g"
##  [577] "t" "a" "c" "a" "t" "t" "t" "g" "g" "g" "g" "g" "g" "t" "t" "c" "a" "c"
##  [595] "c" " " "a" "c" "c" "c" "g" "g" "g" "t" "a" "c" " " "g" "g" "a" "c" "a"
##  [613] "a" "t" "g" "a" "c" " " "c" "a" "a" "a" "t" "c" "t" "t" "c" "c" " " "t"
##  [631] "g" "t" "a" "t" "g" "c" "t" "c" "a" " " "a" "a" "c" "a" "t" "c" "a" "g"
##  [649] "g" "a" "a" "g" "a" "a" "t" "c" "a" "c" "a" "g" " " "t" "c" "t" "c" "t"
##  [667] "a" "c" "c" "a" "a" " " "a" "a" "g" "a" "a" "g" "c" "c" "a" "a" " " "c"
##  [685] "a" "a" "a" "c" "t" "g" "t" "a" "a" " " "t" "c" "c" "c" "g" "a" "a" "t"
##  [703] "a" "t" " " "c" "g" "g" "a" "t" "c" "t" "a" "g" "a" "c" "c" "c" "a" "g"
##  [721] "g" "g" "t" "a" "a" " " "g" "g" "a" "a" "t" "a" "t" "c" "c" "c" " " "c"
##  [739] "a" "g" "c" "a" "g" "a" "a" "t" "a" " " "a" "g" "c" "a" "t" "c" "t" "a"
##  [757] "t" "t" " " "g" "g" "a" "c" "a" "a" "t" "a" "g" "t" " " "a" "a" "a" "a"
##  [775] "c" "c" "g" "g" "g" "a" "g" "a" "c" "a" "t" "a" "c" "t" "t" "t" " " "t"
##  [793] "g" "a" "t" "t" "a" "a" "c" "a" "g" " " "c" "a" "c" "a" "g" "g" "g" "a"
##  [811] "a" "t" " " "c" "t" "a" "a" "t" "t" "g" "c" "t" "c" " " "c" "t" "a" "g"
##  [829] "g" "g" "g" "t" "t" "a" " " "c" "t" "t" "c" "a" "a" "a" "a" "t" "a" "c"
##  [847] "g" "a" "a" "g" "t" "g" "g" "g" "a" " " "a" "a" "a" "g" "c" "t" "c" "a"
##  [865] "a" "t" " " "a" "a" "t" "g" "a" "g" "a" "t" "c" "a" " " "g" "a" "t" "g"
##  [883] "c" "a" "c" "c" "c" "a" " " "t" "t" "g" "g" "c" "a" "a" "a" "t" "g" " "
##  [901] "c" "a" "a" "t" "t" "c" "t" "g" "a" "a" "t" "g" "c" "a" "t" "c" "a" "c"
##  [919] "t" "c" " " "c" "a" "a" "a" "t" "g" "g" "a" "a" "g" " " "c" "a" "t" "t"
##  [937] "c" "c" "c" "a" "a" "t" " " "g" "a" "c" "a" "a" "a" "c" "c" "a" "t" " "
##  [955] "t" "t" "c" "a" "a" "a" "a" "t" "g" "t" " " "a" "a" "a" "c" "a" "g" "g"
##  [973] "a" "t" "c" "a" "c" "a" "t" "a" "t" "g" "g" "g" "g" " " "c" "c" "t" "g"
##  [991] "t" "c" "c" "c" "a" "g" " " "a" "t" "a" "t" "g" "t" "t" "a" "g" "g" " "
## [1009] "c" "a" "a" "a" "a" "c" "a" "c" "t" "c" " " "t" "g" "a" "a" "a" "t" "t"
## [1027] "g" "g" "c" " " "a" "a" "c" "a" "g" "g" "g" "a" "t" "g" "c" "g" "a" "a"
## [1045] "a" "t" "g" "t" "a" "c" " " "c" "a" "g" "a" "a" "a" "a" "a" "c" "a" " "
## [1063] "a" "a" "c" "t" "a" "g" "a"
## attr(,"name")
## [1] "Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.1"
## attr(,"Annot")
## [1] ">Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $`Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.1`
##    [1] "a" "t" "g" "a" "a" "a" "g" "t" "a" "a" " " " " "a" "a" "c" "t" "a" "c" "t"
##   [19] "g" "a" "t" " " " " "c" "c" "t" "g" "t" "t" "a" "t" "g" "c" " " " " "a" "c" "a"
##   [37] "t" "t" "t" "a" "c" "a" "g" " " " " "c" "t" "a" "c" "a" "t" "a" "t" "g" "c"
##   [55] " " " " "a" "g" "a" "c" "a" "c" "a" "a" "t" "a" "t" "g" "t" "a" "t" "a" "g"
##   [73] "g" "c" "t" " " " " "a" "c" "c" "a" "t" "g" "c" "t" "a" "a" " " " " "c" "a" "a"
##   [91] "c" "t" "c" "g" "a" "c" "c" " " " " "g" "a" "c" "a" "c" "t" "g" "t" "t" "g"
##  [109] " " " " "a" "c" "a" "c" "a" "g" "t" "a" "c" "t" " " " " "t" "g" "a" "a" "a" "a"
```

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##  [127] "g" "a" "a" "t" "g" "t" "g" "a" "c" "a" "g" "t" "g" "a" " " "c" "a" "c"
##  [145] "a" "c" "t" "c" "t" "g" "t" " " "c" "a" "a" "c" "c" "t" "g" "c" "t" "t"
##  [163] " " "g" "a" "g" "a" "a" "c" "a" "g" "t" "c" " " "a" "c" "a" "a" "t" "g"
##  [181] "g" "a" "a" "a" " " "a" "c" "t" "a" "t" "g" "t" "c" "t" "a" "t" "t" "a"
##  [199] "a" "a" "a" "g" "g" "a" "a" " " "t" "a" "g" "c" "c" "c" "c" "a" "c" "t"
##  [217] " " "a" "c" "a" "a" "t" "t" "g" "g" "g" "t" " " "a" "a" "c" "t" "g" "c"
##  [235] "a" "g" "c" "g" " " "t" "t" "g" "c" "c" "g" "g" "g" "t" "g" " " "g" "a"
##  [253] "t" "c" "t" "t" "a" "g" "g" "a" "a" "a" "c" "c" "c" "a" "g" "a" "a" "t"
##  [271] " " "g" "c" "g" "a" "a" "t" "t" "a" "c" "t" " " "g" "a" "t" "t" "t" "c"
##  [289] "c" "a" "a" "g" " " "g" "a" "g" "t" "c" "a" "t" "g" "g" "t" " " "c" "c"
##  [307] "t" "a" "c" "a" "t" "t" "g" "t" " " "a" "g" "a" "a" "a" "a" "a" "c" "c"
##  [325] "a" "a" "a" "t" "c" "c" "t" "g" "a" "g" "a" " " "a" "t" "g" "g" "a" "a"
##  [343] "c" "a" "t" "g" " " "t" "t" "a" "c" "c" "c" "a" "g" "g" "g" " " "c" "a"
##  [361] "t" "t" "t" "c" "g" "c" "t" "g" " " "a" "c" "t" "a" "t" "g" "a" "g" "g"
##  [379] "a" " " "a" "c" "t" "g" "a" "g" "g" "g" "a" "g" "c" "a" "a" "t" "t" "g"
##  [397] "a" "g" "t" "t" " " "c" "a" "g" "t" "a" "t" "c" "t" "t" "c" " " "a" "t"
##  [415] "t" "t" "g" "a" "g" "a" "g" "g" " " "t" "t" "c" "g" "a" "a" "a" "t" "a"
##  [433] "t" " " "t" "c" "c" "c" "c" "a" "a" "a" "g" "a" " " "a" "a" "g" "c" "t"
##  [451] "c" "a" "t" "g" "g" "c" "c" "c" "a" "a" "c" "c" "a" "c" "a" " " "c" "c"
##  [469] "g" "t" "a" "a" "c" "c" "g" "g" " " "a" "g" "t" "g" "t" "c" "a" "g" "c"
##  [487] "a" " " "t" "c" "a" "t" "g" "c" "t" "c" "c" "c" " " "a" "t" "a" "a" "t"
##  [505] "g" "g" "g" "g" "a" " " "a" "a" "g" "c" "a" "g" "t" "t" "t" "t" "t" "a"
##  [523] "c" "a" "g" "a" "a" "a" "t" "t" " " "t" "g" "c" "t" "a" "t" "g" "g" "c"
##  [541] "t" " " "g" "a" "c" "g" "g" "g" "g" "a" "a" "g" " " "a" "a" "t" "g" "g"
##  [559] "t" "t" "t" "g" "t" " " "a" "c" "c" "c" "a" "a" "a" "c" "c" "t" " " "g"
##  [577] "a" "g" "c" "a" "a" "g" "t" "c" "c" "t" "a" "t" "g" "c" "a" "a" "a" "c"
##  [595] "a" " " "a" "c" "a" "a" "a" "g" "a" "a" "a" "a" " " "a" "g" "a" "a" "g"
##  [613] "t" "c" "c" "t" "t" " " "g" "t" "a" "c" "t" "a" "t" "g" "g" "g" " " "g"
##  [631] "t" "g" "t" "t" "c" "a" "t" "c" "a" " " "c" "c" "c" "g" "c" "c" "a" "a"
##  [649] "a" "c" "a" "t" "a" "g" "g" "t" "g" "a" "c" "c" " " "a" "a" "a" "a" "g"
##  [667] "a" "c" "c" "c" "t" " " "c" "t" "a" "t" "a" "a" "t" "a" "c" "a" " " "g"
##  [685] "a" "a" "a" "a" "t" "g" "c" "t" "t" " " "a" "t" "g" "t" "t" "t" "c" "t"
##  [703] "g" "t" " " "a" "g" "t" "g" "t" "c" "t" "t" "c" "a" "c" "a" "t" "t" "a"
##  [721] "t" "a" "g" "c" "a" " " "g" "a" "a" "a" "a" "t" "t" "c" "a" "c" " " "c"
##  [739] "c" "c" "a" "g" "a" "a" "a" "t" "a" " " "g" "c" "c" "a" "a" "a" "a" "g"
##  [757] "a" "c" " " "c" "c" "a" "a" "a" "g" "t" "a" "a" "g" " " "a" "g" "a" "t"
##  [775] "c" "a" "a" "g" "a" "a" "g" "g" "a" "a" "g" "a" "a" "t" "c" "a" " " "a"
##  [793] "c" "t" "a" "c" "t" "a" "c" "t" "g" " " "g" "a" "c" "t" "c" "t" "g" "c"
##  [811] "t" "t" " " "g" "a" "a" "c" "c" "c" "g" "g" "g" "g" " " "a" "t" "a" "c"
##  [829] "a" "a" "t" "a" "a" "t" " " "a" "t" "t" "t" "g" "a" "g" "g" "c" "a" "a"
##  [847] "a" "t" "g" "g" "a" "a" "a" "t" "c" " " "t" "a" "a" "t" "a" "g" "c" "g"
##  [865] "c" "c" " " "a" "a" "g" "a" "t" "a" "t" "g" "c" "t" " " "t" "t" "c" "g"
##  [883] "c" "a" "c" "t" "g" "a" " " "g" "t" "a" "g" "a" "g" "g" "c" "t" "c" " "
##  [901] "t" "g" "g" "a" "t" "c" "a" "g" "g" "a" "a" "t" "c" "a" "t" "c" "a" "a"
##  [919] "c" "t" " " "c" "a" "a" "a" "t" "g" "c" "a" "c" "c" " " "a" "a" "t" "g"
##  [937] "g" "a" "t" "a" "a" "a" " " "t" "g" "t" "g" "a" "t" "g" "c" "a" "a" " "
##  [955] "a" "g" "t" "g" "c" "c" "a" "a" "a" "c" " " "a" "c" "c" "t" "c" "a" "g"
##  [973] "g" "g" "a" "g" "c" "t" "a" "t" "a" "a" "a" "c" "a" " " "g" "c" "a" "g"
##  [991] "t" "c" "t" "t" "c" "c" " " "t" "t" "t" "c" "c" "a" "g" "a" "a" "c" " "
## [1009] "g" "t" "a" "c" "a" "c" "c" "c" "a" "g" " " "t" "c" "a" "c" "a" "a" "t"
## [1027] "a" "g" "g" " " "a" "g" "a" "g" "t" "g" "t" "c" "c" "a" "a" "a" "g" "t"
## [1045] "a" "t" "g" "t" "c" "a" " " "g" "g" "a" "g" "t" "g" "c" "a" "a" "a" " "
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## [1063] "a" "t" "t" "a" "a" "g" "g" "a" "t" "g" " " "g" "t" "t" "a" "c" "a" "g"
## [1081] "g" "a" "c" " " "t" "a" "a" "g" "g" "a" "a" "c" "a" "t" " " "c" "c" "c"
## [1099] "a" "t" "c" "c" "a" "t" "t" "c" "a" "a" "t" "c" "c" "a" "g" "a" "g" " "
## [1117] "g" "t" "t" "t" "g" "t" "t" "t" "g" "g" " " "a" "g" "c" "c" "a" "t" "t"
## [1135] "g" "c" "c" " " "g" "g" "t" "t" "t" "c" "a" "t" "t" "g" " " "a" "a" "g"
## [1153] "g" "g" "g" "g" "a" "t" "g" " " "g" "a" "c"
## attr(,"name")
## [1] "Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.1"
## attr(,"Annot")
## [1] ">Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $`Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.1`
##    [1] "a" "a" "a" "a" "g" "c" "a" "a" "c" "a" " " "a" "a" "a" "a" "t" "g" "a"
##   [19] "a" "g" "g" " " "c" "a" "a" "t" "a" "c" "t" "a" "g" "t" " " "a" "g" "t"
##   [37] "t" "c" "t" "g" "c" "t" "a" " " "t" "a" "t" "a" "c" "a" "t" "t" "t" "g"
##   [55] " " "c" "a" "a" "c" "c" "g" "c" "a" "a" "a" "t" "g" "c" "a" "g" "a" "c"
##   [73] "a" "c" "a" " " "t" "t" "a" "t" "g" "t" "a" "t" "a" "g" " " "g" "t" "t"
##   [91] "a" "t" "c" "a" "t" "g" "c" " " "g" "a" "a" "c" "a" "a" "t" "t" "c" "a"
##  [109] " " "a" "c" "a" "g" "a" "c" "a" "c" "t" "g" " " "t" "a" "g" "a" "c" "a"
##  [127] "c" "a" "g" "t" "a" "c" "t" "a" "g" "a" "a" "a" "a" "g" " " "a" "a" "t"
##  [145] "g" "t" "a" "a" "c" "a" "g" " " "t" "a" "a" "c" "a" "c" "a" "c" "t" "c"
##  [163] " " "t" "g" "t" "t" "a" "a" "c" "c" "t" "t" " " "c" "t" "a" "g" "a" "a"
##  [181] "g" "a" "c" "a" " " "a" "g" "c" "a" "t" "a" "a" "c" "g" "g" "g" "a" "a"
##  [199] "a" "c" "t" "a" "t" "g" "c" " " "a" "a" "a" "c" "t" "a" "a" "g" "a" "g"
##  [217] " " "g" "g" "g" "t" "a" "g" "c" "c" "c" "c" " " "a" "t" "t" "g" "c" "a"
##  [235] "t" "t" "t" "g" " " "g" "g" "t" "a" "a" "a" "t" "g" "t" "a" " " "a" "c"
##  [253] "a" "t" "t" "g" "c" "t" "g" "g" "c" "t" "g" "g" "a" "t" "c" "c" "t" "g"
##  [271] " " "g" "g" "a" "a" "a" "t" "c" "c" "a" "g" " " "a" "g" "t" "g" "t" "g"
##  [289] "a" "a" "t" "c" " " "a" "c" "t" "c" "t" "c" "c" "a" "c" "a" " " "g" "c"
##  [307] "a" "a" "g" "c" "t" "c" "a" "t" " " "g" "g" "t" "c" "c" "t" "a" "c" "a"
##  [325] "t" "t" "g" "t" "g" "g" "a" "a" "a" "c" "a" " " "t" "c" "t" "a" "g" "t"
##  [343] "t" "c" "a" "g" " " "a" "c" "a" "a" "t" "g" "g" "a" "a" "c" " " "g" "t"
##  [361] "g" "t" "t" "a" "c" "c" "c" "a" " " "g" "g" "a" "g" "a" "t" "t" "t" "c"
##  [379] "a" " " "t" "c" "g" "a" "t" "t" "a" "t" "g" "a" "g" "g" "a" "g" "c" "t"
##  [397] "a" "a" "g" "a" " " "g" "a" "g" "c" "a" "a" "t" "t" "g" "a" " " "g" "c"
##  [415] "t" "c" "a" "g" "t" "g" "t" "c" " " "a" "t" "c" "a" "t" "t" "t" "g" "a"
##  [433] "a" " " "a" "g" "g" "t" "t" "t" "g" "a" "g" "a" " " "t" "a" "t" "t" "c"
##  [451] "c" "c" "c" "a" "a" "g" "a" "c" "a" "a" "g" "t" "t" "c" "a" " " "t" "g"
##  [469] "g" "c" "c" "c" "a" "a" "t" "c" " " "a" "t" "g" "a" "c" "t" "c" "g" "a"
##  [487] "a" " " "c" "a" "a" "a" "g" "g" "t" "g" "t" "a" " " "a" "c" "g" "g" "c"
##  [505] "a" "g" "c" "a" "t" " " "g" "t" "c" "c" "t" "c" "a" "t" "g" "c" "t" "g"
##  [523] "g" "a" "g" "c" "a" "a" "a" "a" " " "a" "g" "c" "t" "t" "c" "t" "a" "c"
##  [541] "a" " " "a" "a" "a" "a" "t" "t" "t" "a" "a" "t" " " "a" "t" "g" "g" "c"
##  [559] "t" "a" "g" "t" "t" " " "a" "a" "a" "a" "a" "a" "g" "g" "g" "a" " " "a"
##  [577] "t" "t" "c" "a" "t" "a" "c" "c" "c" "a" "a" "a" "g" "c" "t" "c" "a" "g"
##  [595] "c" " " "a" "a" "a" "t" "c" "c" "t" "a" "c" "a" " " "t" "t" "a" "a" "t"
##  [613] "g" "a" "t" "a" "a" " " "a" "g" "g" "g" "a" "a" "a" "g" "a" "a" " " "g"
##  [631] "t" "c" "c" "t" "c" "g" "t" "g" "c" " " "t" "a" "t" "g" "g" "g" "g" "c"
##  [649] "a" "t" "t" "c" "a" "c" "c" "a" "t" "c" "c" "a" " " "t" "c" "t" "a" "c"
##  [667] "t" "a" "g" "t" "g" " " "c" "t" "g" "a" "c" "c" "a" "a" "c" "a" " " "a"
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##  [685] "a" "g" "t" "c" "t" "c" "t" "a" "t" " " "c" "a" "g" "a" "a" "t" "g" "c"
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##  [721] "t" "g" "g" "g" "g" " " "a" "c" "a" "t" "c" "a" "a" "g" "a" "t" " " "a"
##  [739] "c" "a" "g" "c" "a" "a" "g" "a" "a" " " "g" "t" "t" "c" "a" "a" "g" "c"
##  [757] "c" "g" " " "g" "a" "a" "a" "t" "a" "g" "c" "a" "a" " " "t" "a" "a" "g"
##  [775] "a" "c" "c" "c" "a" "a" "a" "g" "t" "g" "a" "g" "g" "g" "a" "t" " " "c"
##  [793] "a" "a" "g" "a" "a" "g" "g" "g" "a" " " "g" "a" "a" "t" "g" "a" "a" "c"
##  [811] "t" "a" " " "t" "t" "a" "c" "t" "g" "g" "a" "c" "a" " " "c" "t" "a" "g"
##  [829] "t" "a" "g" "a" "g" "c" " " "c" "g" "g" "g" "a" "g" "a" "c" "a" "a" "a"
##  [847] "a" "t" "a" "a" "c" "a" "t" "t" "c" " " "g" "a" "a" "g" "c" "a" "a" "c"
##  [865] "t" "g" " " "g" "a" "a" "a" "t" "c" "t" "a" "g" "t" " " "g" "g" "t" "a"
##  [883] "c" "c" "g" "a" "g" "a" " " "t" "a" "t" "g" "c" "a" "t" "t" "c" "g" " "
##  [901] "c" "a" "a" "t" "g" "g" "a" "a" "a" "g" "a" "a" "a" "t" "g" "c" "t" "g"
##  [919] "g" "a" " " "t" "c" "t" "g" "g" "t" "a" "t" "t" "a" " " "t" "c" "a" "t"
##  [937] "t" "t" "c" "a" "g" "a" " " "t" "a" "c" "a" "c" "c" "a" "g" "t" "c" " "
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##  [973] "t" "t" "g" "t" "c" "a" "g" "a" "c" "a" "c" "c" "c" " " "a" "a" "g" "g"
##  [991] "g" "t" "g" "c" "t" "a" " " "t" "a" "a" "a" "c" "a" "c" "c" "a" "g" " "
## [1009] "c" "c" "t" "c" "c" "c" "a" "t" "t" "t" " " "c" "a" "g" "a" "a" "t" "a"
## [1027] "t" "a" "c" " " "a" "t" "c" "c" "g" "a" "t" "c" "a" "c" "a" "a" "t" "t"
## [1045] "g" "g" "a" "a" "a" "a" " " "t" "g" "t" "c" "c" "a" "a" "a" "a" "t" " "
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## [1081] "t" "t" "g" " " "a" "g" "a" "c" "t" "g" "g" "c" "c" "a" " " "c" "a" "g"
## [1099] "g" "a" "t" "t" "g" "a" "g" "g" "a" "a" "t" "g" "t" "c" "c" "c" "g" " "
## [1117] "t" "c" "t" "a" "t" "t" "c" "a" "a" "t" " " "c" "t" "a" "g" "a" "g" "g"
## [1135] "c" "c" "t" " " "a" "t" "t" "t" "g" "g" "g" "g" "c" "c" " " "a" "t" "t"
## [1153] "g" "c" "c" "g" "g" "t" "t" " " "t" "c" "a" "t" "t" "g" "a" "a" "g" "g"
## [1171] "g" "g" "g" "g" "t" "g" "g" "a" "c" "a" " " "g" "g" "g" "a" "t" "g" "g"
## [1189] "t" "a" "g" " " "a" "t" "g" "g" "a" "t" "g" "g" "t" "a" " " "c" "g" "g"
## [1207] "t" "t" "a" "t" "c" "a" "c" " " "c" "a" "t" "c" "a" "a" "a" "a" "t" "g"
## [1225] " " "a" "g" "c" "a" "g" "g" "g" "g" "t" "c" "a" "g" "g" "a" "t" "a" "t"
## [1243] "g" "c" "a" " " "g" "c" "c" "g" "a" "c" "c" "t" "g" "a" " " "a" "g" "a"
## [1261] "g" "c" "a" "c" "a" "c" "a" " " "g" "a" "a" "t" "g" "c" "c" "a" "t" "t"
## [1279] " " "g" "a" "c" "a" "a" "g" "a" "t" "t" "a" " " "c" "t" "a" "a" "c" "a"
## [1297] "a" "a" "g" "t" "a" "a" "a" "t" "t" "c" "t" "g" "t" "t" " " "a" "t" "t"
## [1315] "g" "a" "a" "a" "a" "g" "a" " " "t" "g" "a" "a" "t" "a" "c" "a" "c" "a"
## [1333] " " "g" "t" "t" "c" "a" "c" "a" "g" "c" "a" " " "g" "t" "a" "g" "g" "t"
## [1351] "a" "a" "a" "g" " " "a" "g" "t" "t" "c" "a" "a" "c" "c" "a" "c" "c" "t"
## [1369] "g" "g" "a" "a" "a" "a" "a" " " "a" "g" "a" "a" "t" "a" "g" "a" "g" "a"
## [1387] " " "a" "t" "t" "t" "a" "a" "a" "t" "a" "a" " " "a" "a" "a" "a" "g" "t"
## [1405] "t" "g" "a" "t" " " "g" "a" "t" "g" "g" "t" "t" "t" "c" "c" " " "t" "g"
## [1423] "g" "a" "c" "a" "t" "t" "t" "g" "g" "a" "c" "t" "t" "a" "c" "a" "a" "t"
## [1441] " " "g" "c" "c" "g" "a" "a" "c" "t" "g" "t" " " "t" "g" "g" "t" "t" "c"
## [1459] "t" "a" "t" "t" " " "g" "g" "a" "a" "a" "a" "t" "g" "a" "a" " " "a" "g"
## [1477] "a" "a" "c" "t" "t" "t" "g" "g" " " "a" "c" "t" "a" "c" "c" "a" "c" "g"
## [1495] "a" "t" "t" "c" "a" "a" "a" "t" "g" "t" "g" " " "a" "a" "g" "a" "a" "c"
## [1513] "t" "t" "a" "t" " " "a" "t" "g" "a" "a" "a" "a" "g" "g" "t" " " "a" "a"
## [1531] "g" "a" "a" "g" "c" "c" "a" "g" " " "t" "t" "a" "a" "a" "a" "a" "a" "c"
## [1549] "a" " " "a" "t" "g" "c" "c" "a" "a" "g" "g" "a" "a" "a" "t" "t" "g" "g"
## [1567] "a" "a" "a" "c" " " "g" "g" "c" "t" "g" "c" "t" "t" "t" "g" " " "a" "a"
## [1585] "t" "t" "t" "t" "a" "c" "c" "a" " " "c" "a" "a" "a" "t" "g" "c" "g" "a"
## [1603] "t" " " "a" "a" "c" "a" "c" "g" "t" "g" "c" "a" " " "t" "g" "g" "a" "a"
```

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## [1621] "a" "g" "t" "g" "t" "c" "a" "a" "a" "a" "a" "t" "g" "g" "g" " " "a" "c"
## [1639] "t" "t" "a" "t" "g" "a" "c" "t" " " "a" "c" "c" "c" "a" "a" "a" "a" "t"
## [1657] "a" " " "c" "t" "c" "a" "g" "a" "g" "g" "a" "a" " " "g" "c" "a" "a" "a"
## [1675] "a" "t" "t" "a" "a" " " "a" "c" "a" "g" "a" "g" "a" "a" "g" "a" "a" "a"
## [1693] "t" "a" "g" "a" "t" "g" "g" "g" " " "g" "t" "a" "a" "a" "g" "c" "t" "g"
## [1711] "g" " " "a" "a" "t" "c" "a" "a" "c" "a" "a" "g" " " "g" "a" "t" "t" "t"
## [1729] "a" "c" "c" "a" "g" " " "a" "t" "t" "t" "t" "g" "g" "c" "g" "a" " " "t"
## [1747] "c" "t" "a" "t" "t" "c" "a" "a" "c" "t" "g" "t" "c" "g" "c" "c" "a" "g"
## [1765] "t" " " "t" "c" "a" "t" "t" "g" "g" "t" "a" "c" " " "t" "g" "g" "t" "a"
## [1783] "g" "t" "c" "t" "c" " " "c" "c" "t" "g" "g" "g" "g" "g" "c" "a" " " "a"
## [1801] "t" "c" "a" "g" "t" "t" "t" "c" "t" " " "g" "g" "a" "t" "g" "t" "g" "c"
## [1819] "t" "c" "t" "a" "a" "t" "g" "g" "g" "t" "c" "t" " " "c" "t" "a" "c" "a"
## [1837] "g" "t" "g" "t" "a" " " "g" "a" "a" "t" "a" "t" "g" "t" "a" "t" " " "t"
## [1855] "t" "a" "a" "c" "a" "t" "t" "a" "g" " " "g" "a" "t" "t" "t" "c" "a" "g"
## [1873] "a" "a" " " "g" "c" "a" "t"
## attr(,"name")
## [1] "Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.1"
## attr(,"Annot")
## [1] ">Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $`Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.1`
##    [1] "a" "t" "g" "a" "a" "g" "a" "c" "t" "a" " " "t" "c" "a" "t" "t" "g" "c"
##   [19] "t" "t" "t" " " "g" "a" "g" "c" "t" "a" "c" "a" "t" "t" " " "c" "t" "a"
##   [37] "t" "g" "t" "c" "t" "g" "g" " " "t" "t" "t" "t" "c" "g" "c" "t" "c" "a"
##   [55] " " "a" "a" "a" "a" "c" "t" "t" "c" "c" "t" "g" "g" "a" "a" "a" "t" "g"
##   [73] "a" "c" "a" " " "a" "t" "a" "g" "c" "a" "c" "g" "g" "c" " " "a" "a" "c"
##   [91] "g" "c" "t" "g" "t" "g" "c" " " "c" "t" "t" "g" "g" "g" "c" "a" "c" "c"
##  [109] " " "a" "t" "g" "c" "a" "g" "t" "a" "c" "c" " " "a" "a" "a" "c" "g" "g"
##  [127] "a" "a" "c" "g" "a" "t" "a" "g" "t" "g" "a" "a" "a" "a" " " "c" "a" "a"
##  [145] "t" "c" "a" "c" "g" "a" "a" " " "t" "g" "a" "c" "c" "g" "a" "a" "t" "t"
##  [163] " " "g" "a" "a" "g" "t" "t" "a" "c" "t" "a" " " "a" "t" "g" "c" "t" "a"
##  [181] "c" "t" "g" "a" " " "g" "c" "t" "g" "g" "t" "t" "c" "a" "g" "a" "a" "t"
##  [199] "t" "c" "c" "t" "c" "a" "a" " " "t" "a" "g" "g" "t" "g" "a" "a" "a" "t"
##  [217] " " "a" "t" "g" "c" "g" "a" "c" "a" "g" "t" " " "c" "c" "t" "c" "a" "t"
##  [235] "c" "a" "g" "a" " " "t" "c" "c" "t" "t" "g" "a" "t" "g" "g" " " "a" "g"
##  [253] "a" "a" "a" "a" "c" "t" "g" "c" "a" "c" "a" "c" "t" "a" "a" "t" "a" "g"
##  [271] " " "a" "t" "g" "c" "t" "c" "t" "a" "t" "t" " " "g" "g" "g" "a" "g" "a"
##  [289] "c" "c" "c" "t" " " "c" "a" "g" "t" "g" "t" "g" "a" "t" "g" " " "g" "c"
##  [307] "t" "t" "t" "c" "a" "a" "a" "a" " " "t" "a" "a" "g" "a" "a" "a" "t" "g"
##  [325] "g" "g" "a" "c" "c" "t" "t" "t" "t" "t" "g" " " "t" "t" "g" "a" "a" "c"
##  [343] "g" "a" "a" "g" " " "c" "a" "a" "a" "g" "c" "c" "t" "a" "c" " " "a" "g"
##  [361] "t" "a" "a" "c" "t" "g" "t" "t" " " "a" "c" "c" "c" "t" "t" "a" "t" "g"
##  [379] "a" " " "t" "g" "t" "g" "c" "c" "g" "g" "a" "t" "t" "a" "t" "g" "c" "c"
##  [397] "t" "c" "c" "c" " " "t" "t" "a" "g" "g" "t" "c" "a" "c" "t" " " "a" "g"
##  [415] "t" "t" "g" "c" "c" "t" "c" "a" " " "t" "c" "c" "g" "g" "c" "a" "c" "a"
##  [433] "c" " " "t" "g" "g" "a" "g" "t" "t" "t" "a" "a" " " "c" "a" "a" "t" "g"
##  [451] "a" "a" "a" "g" "c" "t" "t" "c" "a" "a" "t" "t" "g" "g" "a" " " "c" "t"
##  [469] "g" "g" "a" "g" "t" "c" "a" "c" " " "t" "c" "a" "a" "a" "a" "c" "g" "g"
##  [487] "a" " " "a" "c" "a" "a" "g" "t" "t" "c" "t" "g" " " "c" "t" "t" "g" "c"
##  [505] "a" "t" "a" "a" "g" " " "g" "a" "a" "a" "t" "c" "t" "a" "a" "t" "a" "g"
```

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##  [523] "t" "a" "g" "t" "t" "t" "c" "t" " " "t" "t" "a" "g" "t" "a" "g" "a" "t"
##  [541] "t" " " "a" "a" "a" "t" "t" "g" "g" "t" "t" "g" " " "a" "c" "c" "c" "a"
##  [559] "c" "t" "t" "a" "a" " " "a" "c" "t" "t" "c" "a" "a" "a" "t" "a" " " "c"
##  [577] "c" "c" "a" "g" "c" "a" "t" "t" "g" "a" "a" "c" "g" "t" "g" "a" "c" "t"
##  [595] "a" " " "t" "g" "c" "c" "a" "a" "a" "c" "a" "a" " " "t" "g" "a" "a" "c"
##  [613] "a" "a" "t" "t" "t" " " "g" "a" "c" "a" "a" "a" "t" "t" "g" "t" " " "a"
##  [631] "c" "a" "t" "t" "t" "g" "g" "g" "g" " " "g" "g" "t" "t" "c" "a" "c" "c"
##  [649] "a" "c" "c" "c" "g" "g" "g" "t" "a" "c" "g" "g" " " "a" "c" "a" "a" "g"
##  [667] "g" "a" "c" "c" "a" " " "a" "a" "t" "c" "t" "t" "c" "c" "t" "g" " " "t"
##  [685] "a" "t" "g" "c" "t" "c" "a" "a" "t" " " "c" "a" "t" "c" "a" "g" "g" "a"
##  [703] "a" "g" " " "a" "a" "t" "c" "a" "c" "a" "g" "t" "a" "t" "c" "t" "a" "c"
##  [721] "c" "a" "a" "a" "a" " " "g" "a" "a" "g" "c" "c" "a" "a" "c" "a" " " "a"
##  [739] "g" "c" "t" "g" "t" "a" "a" "t" "c" " " "c" "c" "g" "a" "a" "t" "a" "t"
##  [757] "c" "g" " " "g" "a" "t" "c" "t" "a" "g" "a" "c" "c" " " "c" "a" "g" "a"
##  [775] "a" "t" "a" "a" "g" "g" "a" "a" "t" "a" "t" "c" "c" "c" "t" "a" " " "g"
##  [793] "c" "a" "g" "a" "a" "t" "a" "a" "g" " " "c" "a" "t" "c" "t" "a" "t" "t"
##  [811] "g" "g" " " "a" "c" "a" "a" "t" "a" "g" "t" "a" "a" " " "a" "a" "c" "c"
##  [829] "g" "g" "g" "a" "g" "a" " " "c" "a" "t" "a" "c" "t" "t" "t" "t" "g" "a"
##  [847] "t" "t" "a" "a" "c" "a" "g" "c" "a" " " "c" "a" "g" "g" "g" "a" "a" "t"
##  [865] "c" "t" " " "a" "a" "t" "t" "g" "c" "t" "c" "c" "t" " " "a" "g" "g" "g"
##  [883] "g" "t" "t" "a" "c" "t" " " "t" "c" "a" "a" "a" "a" "t" "a" "c" "g" " "
##  [901] "a" "a" "g" "t" "g" "g" "g" "a" "a" "a" "a" "g" "c" "t" "c" "a" "a" "t"
##  [919] "a" "a" " " "t" "g" "a" "g" "a" "t" "c" "a" "g" "a" " " "t" "g" "c" "a"
##  [937] "c" "c" "c" "a" "t" "t" " " "g" "g" "c" "a" "a" "a" "t" "g" "c" "a" " "
##  [955] "a" "g" "t" "c" "t" "g" "a" "a" "t" "g" " " "c" "a" "t" "c" "a" "c" "t"
##  [973] "c" "c" "a" "a" "a" "t" "g" "g" "a" "a" "g" "c" "a" " " "t" "t" "c" "c"
##  [991] "c" "a" "a" "t" "g" "a" " " "c" "a" "a" "a" "c" "c" "a" "t" "t" "c" " "
## [1009] "c" "a" "a" "a" "a" "t" "g" "t" "a" "a" " " "a" "c" "a" "g" "g" "a" "t"
## [1027] "c" "a" "c" " " "a" "t" "a" "c" "g" "g" "g" "g" "c" "c" "t" "g" "t" "c"
## [1045] "c" "c" "a" "g" "a" "t" " " "a" "t" "g" "t" "t" "a" "a" "g" "c" "a" " "
## [1063] "a" "a" "g" "c" "a" "c" "t" "c" "t" "g" " " "a" "a" "a" "t" "t" "g" "g"
## [1081] "c" "a" "a" " " "c" "a" "g" "g" "a" "a" "t" "g" "c" "g" " " "a" "a" "a"
## [1099] "t" "g" "t" "a" "c" "c" "a" "g" "a" "g" "a" "a" "a" "c" "a" "a" "a" " "
## [1117] "c" "t" "a" "g" "a" "g" "g" "c" "a" "t" " " "a" "t" "t" "t" "g" "g" "c"
## [1135] "g" "c" "a" " " "a" "t" "a" "g" "c" "g" "g" "g" "t" "t" " " "t" "c" "a"
## [1153] "t" "a" "g" "a" "a" "a" "a" " " "t" "g" "g" "t" "t" "g" "g" "g" "a" "g"
## [1171] "g" "g" "a" "a" "t" "g" "g" "t" "g" "g" " " "a" "t" "g" "g" "t" "t" "g"
## [1189] "g" "t" "a" " " "c" "g" "g" "t" "t" "t" "c" "a" "g" "g" " " "c" "a" "t"
## [1207] "c" "a" "a" "a" "a" "t" "t" " " "c" "t" "g" "a" "g" "g" "g" "a" "a" "g"
## [1225] " " "a" "g" "g" "a" "c" "a" "a" "g" "c" "a" "g" "c" "a" "g" "a" "t" "c"
## [1243] "t" "c" "a" " " "a" "a" "a" "g" "c" "a" "c" "t" "c" "a" " " "a" "g" "c"
## [1261] "a" "g" "c" "a" "a" "t" "c" " " "g" "a" "t" "c" "a" "a" "a" "t" "c" "a"
## [1279] " " "a" "t" "g" "g" "g" "a" "a" "g" "c" "t" " " "g" "a" "a" "t" "c" "g"
## [1297] "a" "t" "t" "g" "a" "t" "c" "g" "g" "g" "a" "a" "a" "a" " " "c" "c" "a"
## [1315] "a" "c" "g" "a" "g" "a" "a" " " "a" "t" "t" "c" "c" "a" "t" "c" "a" "g"
## [1333] " " "a" "t" "t" "g" "a" "a" "a" "a" "a" "g" " " "a" "a" "t" "t" "c" "t"
## [1351] "c" "a" "g" "a" " " "a" "g" "t" "a" "g" "a" "a" "g" "g" "g" "a" "g" "a"
## [1369] "a" "t" "t" "c" "a" "g" "g" " " "a" "c" "c" "t" "t" "g" "a" "g" "a" "a"
## [1387] " " "a" "t" "a" "t" "g" "t" "t" "g" "a" "g" " " "g" "a" "c" "a" "c" "t"
## [1405] "a" "a" "a" "a" " " "t" "a" "g" "a" "t" "c" "t" "c" "t" "g" " " "g" "t"
## [1423] "c" "a" "t" "a" "c" "a" "a" "c" "g" "c" "g" "g" "a" "g" "c" "t" "t" "c"
## [1441] " " "t" "t" "g" "t" "t" "g" "c" "c" "c" "t" " " "g" "g" "a" "g" "a" "a"
```

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## [1459] "c" "c" "a" "a" " " "c" "a" "t" "a" "c" "a" "a" "t" "t" "g" " " "a" "t"
## [1477] "c" "t" "a" "a" "c" "t" "g" "a" " " "c" "t" "c" "a" "g" "a" "a" "a" "t"
## [1495] "g" "a" "a" "c" "a" "a" "a" "c" "t" "g" "t" " " "t" "t" "g" "a" "a" "a"
## [1513] "a" "a" "a" "c" " " "a" "a" "a" "g" "a" "a" "g" "c" "a" "a" " " "c" "t"
## [1531] "g" "a" "g" "g" "g" "a" "a" "a" " " "a" "t" "g" "c" "t" "g" "a" "g" "g"
## [1549] "a" " " "t" "a" "t" "g" "g" "g" "c" "a" "a" "t" "g" "g" "t" "t" "g" "t"
## [1567] "t" "t" "c" "a" " " "a" "a" "a" "t" "a" "t" "a" "c" "c" "a" " " "c" "a"
## [1585] "a" "a" "t" "g" "t" "g" "a" "c" " " "a" "a" "t" "g" "c" "c" "t" "g" "c"
## [1603] "a" " " "t" "a" "g" "g" "a" "t" "c" "a" "a" "t" " " "c" "a" "g" "a" "a"
## [1621] "a" "t" "g" "g" "a" "a" "c" "t" "t" "a" "t" "g" "a" "c" "c" " " "a" "c"
## [1639] "g" "a" "t" "g" "t" "a" "t" "a" " " "c" "a" "g" "g" "g" "a" "t" "g" "a"
## [1657] "a" " " "g" "c" "a" "t" "t" "a" "a" "a" "c" "a" " " "a" "c" "c" "g" "g"
## [1675] "t" "t" "t" "c" "a" " " "g" "a" "t" "c" "a" "a" "g" "g" "g" "a" "g" "t"
## [1693] "t" "g" "a" "g" "c" "t" "g" "a" " " "a" "g" "t" "c" "a" "g" "g" "g" "t"
## [1711] "a" " " "c" "a" "a" "a" "g" "a" "t" "t" "g" "g" " " "a" "t" "c" "c" "t"
## [1729] "a" "t" "g" "g" "a" " " "t" "t" "t" "c" "c" "t" "t" "t" "g" "c" " " "c"
## [1747] "a" "t" "a" "t" "c" "a" "t" "g" "t" "t" "t" "t" "t" "t" "g" "c" "t" "t"
## [1765] "t" " " "g" "t" "g" "t" "t" "g" "c" "t" "t" "t" " " "g" "t" "t" "g" "g"
## [1783] "g" "g" "t" "t" "c" " " "a" "t" "c" "a" "t" "g" "t" "g" "g" "g" " " "c"
## [1801] "c" "t" "g" "c" "c" "a" "a" "a" "a" " " "g" "g" "g" "c" "a" "a" "c" "a"
## [1819] "t" "t" "a" "g" "g" "t" "g" "c" "a" "a" "c" "a" " " "t" "t" "t" "g" "c"
## [1837] "a" "t" "t" "t" "g" " " "a"
## attr(,"name")
## [1] "Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.1"
## attr(,"Annot")
## [1] ">Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.1"
## attr(,"class")
## [1] "SeqFastadna"
##
## $`Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.1`
##    [1] "a" "g" "c" "a" "a" "a" "a" "g" "c" "a" " " "g" "g" "g" "g" "a" "t" "a"
##   [19] "c" "a" "a" " " "a" "a" "t" "g" "a" "a" "c" "a" "c" "t" " " "c" "a" "a"
##   [37] "a" "t" "t" "t" "t" "g" "g" " " "c" "a" "c" "t" "c" "a" "t" "t" "g" "c"
##   [55] " " "t" "t" "g" "t" "a" "t" "g" "c" "t" "g" "a" "t" "t" "g" "g" "a" "g"
##   [73] "c" "t" "a" " " "a" "a" "g" "g" "a" "g" "a" "t" "a" "a" " " "a" "a" "t"
##   [91] "a" "t" "g" "t" "c" "t" "t" " " "g" "g" "g" "c" "a" "c" "c" "a" "t" "g"
##  [109] " " "c" "t" "g" "t" "g" "g" "c" "a" "a" "a" " " "t" "g" "g" "a" "a" "c"
##  [127] "a" "a" "a" "a" "g" "t" "g" "a" "a" "c" "a" "c" "a" "t" " " "t" "a" "a"
##  [145] "c" "a" "g" "a" "g" "a" "g" " " "a" "g" "g" "a" "a" "t" "c" "g" "a" "a"
##  [163] " " "g" "t" "a" "g" "t" "a" "a" "a" "t" "g" " " "c" "c" "a" "c" "a" "g"
##  [181] "a" "a" "a" "c" " " "g" "g" "t" "g" "g" "a" "g" "a" "c" "t" "g" "c" "a"
##  [199] "a" "a" "t" "a" "c" "t" "a" " " "a" "g" "a" "a" "a" "a" "t" "a" "t" "g"
##  [217] " " "c" "a" "c" "t" "c" "a" "g" "g" "g" "g" " " "a" "a" "a" "a" "g" "a"
##  [235] "c" "c" "a" "a" " " "c" "a" "g" "a" "t" "c" "t" "g" "g" "g" " " "a" "c"
##  [253] "a" "a" "t" "g" "c" "g" "g" "a" "c" "t" "t" "c" "t" "a" "g" "g" "a" "a"
##  [271] " " "c" "c" "c" "t" "a" "a" "t" "a" "g" "g" " " "a" "c" "c" "t" "c" "c"
##  [289] "c" "c" "a" "a" " " "t" "g" "c" "g" "a" "t" "c" "a" "a" "t" " " "t" "t"
##  [307] "c" "t" "g" "g" "a" "a" "t" "t" " " "t" "g" "a" "c" "g" "c" "t" "g" "a"
##  [325] "t" "t" "t" "a" "a" "t" "a" "a" "t" "t" "g" " " "a" "a" "c" "g" "a" "a"
##  [343] "g" "a" "g" "a" " " "a" "g" "g" "a" "a" "c" "c" "g" "a" "t" " " "g" "t"
##  [361] "g" "t" "g" "t" "t" "a" "t" "c" " " "c" "c" "g" "g" "g" "a" "a" "g" "t"
##  [379] "t" " " "c" "a" "c" "a" "a" "a" "t" "g" "a" "a" "g" "a" "a" "t" "c" "a"
```
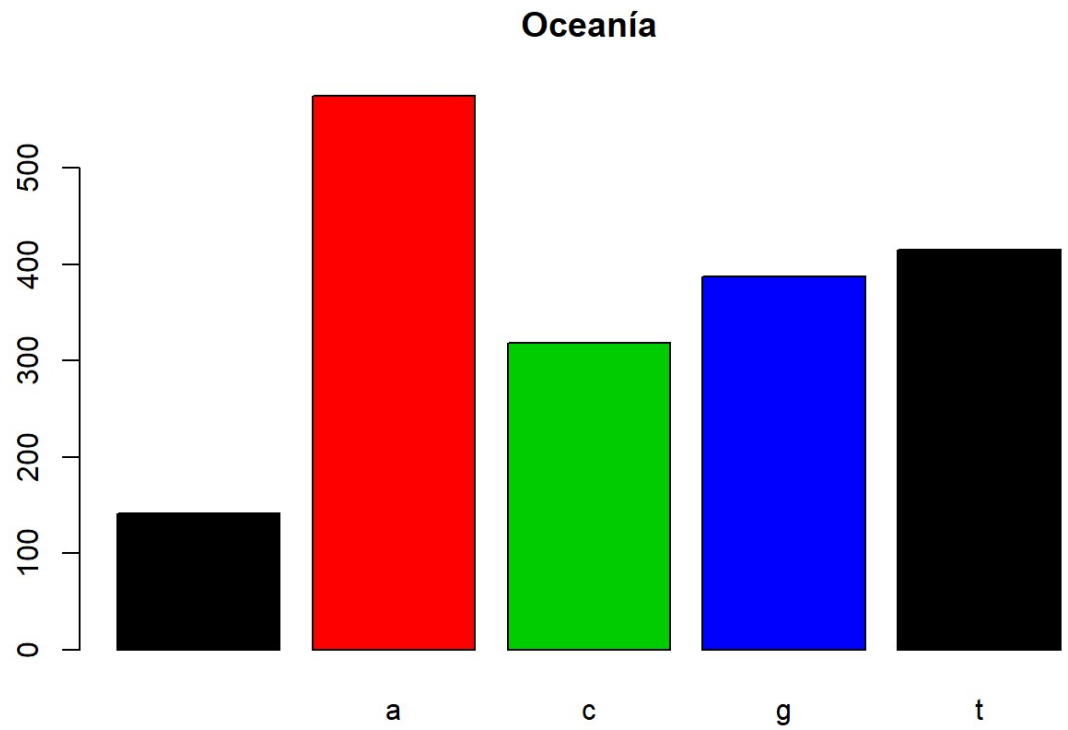
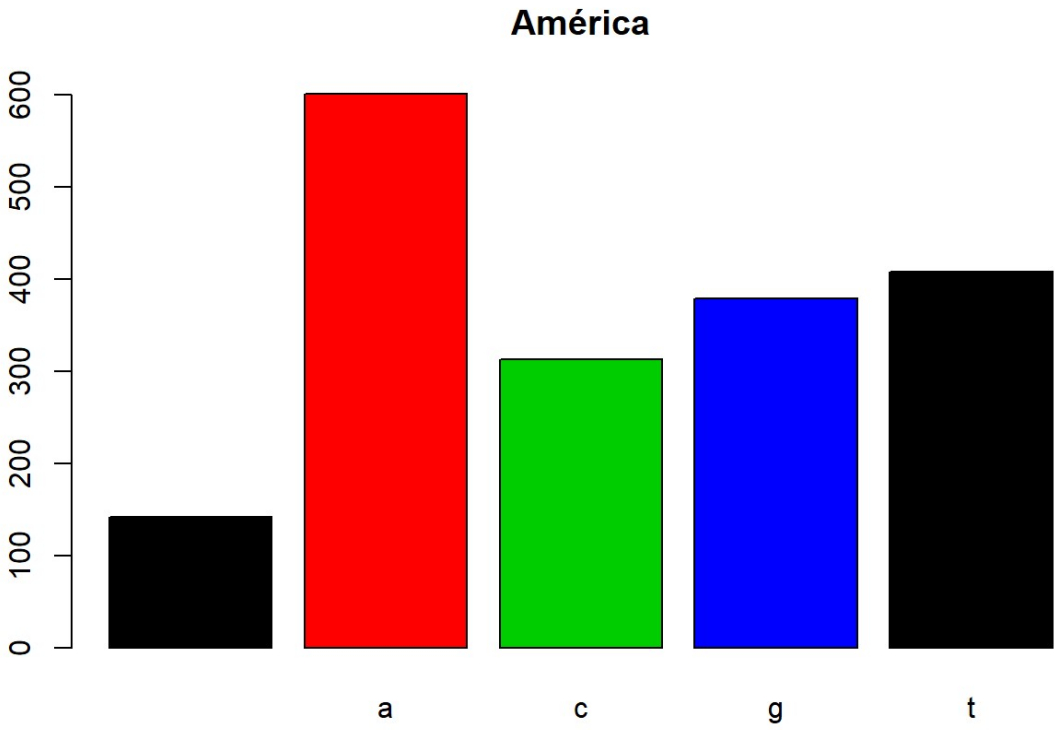

```
##  [397] "c" "t" "g" "a" " " "g" "g" "c" "a" "a" "a" "t" "c" "c" "t" " " "t" "c"
##  [415] "g" "a" "g" "g" "g" "t" "c" "a" " " "g" "g" "a" "g" "g" "a" "a" "t" "t"
##  [433] "g" " " "a" "t" "a" "a" "a" "g" "a" "g" "t" "c" " " "a" "a" "t" "g" "g"
##  [451] "g" "t" "t" "t" "c" "a" "c" "c" "t" "a" "t" "a" "g" "t" "g" " " "g" "a"
##  [469] "a" "t" "a" "a" "g" "a" "a" "c" " " "c" "a" "a" "t" "g" "g" "g" "g" "c"
##  [487] "g" " " "a" "c" "a" "a" "g" "t" "g" "c" "t" "t" " " "g" "c" "a" "g" "a"
##  [505] "a" "g" "a" "t" "c" " " "a" "g" "g" "t" "t" "c" "t" "t" "c" "c" "t" "t"
##  [523] "c" "t" "a" "t" "g" "c" "g" "g" " " "a" "g" "a" "t" "g" "a" "a" "g" "t"
##  [541] "g" " " "g" "t" "t" "a" "c" "t" "g" "t" "c" "g" " " "a" "a" "t" "t" "c"
##  [559] "a" "g" "a" "c" "a" " " "a" "t" "g" "c" "g" "g" "c" "t" "t" "t" " " "t"
##  [577] "c" "c" "c" "c" "a" "a" "a" "t" "g" "a" "c" "t" "a" "a" "g" "t" "c" "g"
##  [595] "t" " " "a" "c" "a" "g" "a" "a" "a" "t" "c" "c" " " "c" "a" "g" "g" "a"
##  [613] "a" "c" "a" "a" "a" " " "c" "c" "a" "g" "c" "t" "c" "t" "g" "a" " " "t"
##  [631] "a" "a" "t" "t" "t" "g" "g" "g" "g" " " "a" "g" "t" "g" "c" "a" "t" "c"
##  [649] "a" "t" "t" "c" "t" "g" "g" "a" "t" "c" "g" "g" " " "c" "t" "a" "c" "t"
##  [667] "g" "a" "g" "c" "a" " " "g" "a" "c" "c" "a" "a" "a" "c" "t" "c" " " "t"
##  [685] "a" "t" "g" "g" "g" "a" "g" "t" "g" " " "g" "a" "a" "a" "c" "a" "a" "g"
##  [703] "t" "t" " " "g" "a" "t" "a" "a" "c" "a" "g" "t" "a" "g" "g" "a" "a" "g"
##  [721] "c" "t" "c" "g" "a" " " "a" "a" "t" "a" "c" "c" "a" "g" "c" "a" " " "g"
##  [739] "t" "c" "a" "t" "t" "c" "a" "c" "c" " " "c" "c" "a" "a" "g" "c" "c" "c"
##  [757] "g" "g" " " "g" "g" "g" "c" "a" "c" "g" "a" "c" "c" " " "a" "c" "a" "g"
##  [775] "g" "t" "g" "a" "a" "t" "g" "g" "g" "c" "a" "a" "t" "c" "a" "g" " " "g"
##  [793] "a" "a" "g" "g" "a" "t" "t" "g" "a" " " "c" "t" "t" "t" "c" "a" "c" "t"
##  [811] "g" "g" " " "c" "t" "a" "c" "t" "c" "c" "t" "t" "g" " " "a" "t" "c" "c"
##  [829] "c" "a" "a" "t" "g" "a" " " "c" "a" "c" "a" "g" "t" "g" "a" "c" "c" "t"
##  [847] "t" "c" "a" "c" "a" "t" "t" "c" "a" " " "a" "t" "g" "g" "g" "g" "c" "a"
##  [865] "t" "t" " " "c" "a" "t" "a" "g" "c" "t" "c" "c" "t" " " "g" "a" "c" "a"
##  [883] "g" "a" "g" "c" "a" "a" " " "g" "t" "t" "t" "c" "t" "t" "t" "a" "g" " "
##  [901] "a" "g" "g" "a" "g" "a" "g" "t" "c" "a" "a" "t" "a" "g" "g" "a" "g" "t"
##  [919] "t" "c" " " "a" "g" "a" "g" "t" "g" "a" "t" "g" "t" " " "t" "c" "c" "t"
##  [937] "t" "t" "g" "g" "a" "t" " " "t" "c" "t" "g" "g" "t" "t" "g" "t" "g" " "
##  [955] "a" "g" "g" "g" "g" "g" "a" "t" "t" "g" " " "c" "t" "t" "c" "c" "a" "c"
##  [973] "a" "a" "t" "g" "g" "g" "g" "g" "t" "a" "c" "g" "a" " " "t" "a" "g" "t"
##  [991] "g" "a" "g" "t" "t" "c" " " "c" "c" "t" "g" "c" "c" "a" "t" "t" "c" " "
## [1009] "c" "a" "g" "a" "a" "c" "a" "t" "c" "a" " " "a" "c" "c" "c" "t" "a" "g"
## [1027] "a" "a" "c" " " "a" "g" "t" "g" "g" "g" "a" "a" "a" "a" "t" "g" "c" "c"
## [1045] "c" "t" "c" "g" "a" "t" " " "a" "t" "g" "t" "c" "a" "a" "a" "c" "a" " "
## [1063] "g" "a" "c" "a" "a" "g" "c" "c" "t" "c" " " "c" "t" "t" "t" "t" "g" "g"
## [1081] "c" "t" "a" " " "c" "a" "g" "g" "g" "a" "t" "g" "a" "g" " " "a" "a" "a"
## [1099] "c" "g" "t" "c" "c" "c" "a" "g" "a" "g" "a" "a" "c" "c" "c" "c" "a" " "
## [1117] "a" "g" "g" "a" "t" "a" "g" "g" "a" "a" " " "g" "a" "g" "c" "c" "g" "a"
## [1135] "c" "a" "t" " " "c" "g" "a" "a" "g" "g" "a" "c" "c" "a" " " "g" "a" "g"
## [1153] "g" "c" "c" "t" "t" "t" "t" " " "t" "g" "g" "a" "g" "c" "g" "a" "t" "t"
## [1171] "g" "c" "t" "g" "g" "a" "t" "t" "c" "a" " " "t" "a" "g" "a" "g" "a" "a"
## [1189] "t" "g" "g" " " "a" "t" "g" "g" "g" "a" "a" "g" "g" "t" " " "c" "t" "c"
## [1207] "a" "t" "t" "g" "a" "t" "g" " " "g" "a" "t" "g" "g" "t" "a" "t" "g" "g"
## [1225] " " "t" "t" "t" "c" "a" "g" "a" "c" "a" "t" "c" "a" "a" "a" "a" "t" "g"
## [1243] "c" "a" "c" " " "a" "a" "g" "g" "a" "g" "a" "a" "g" "g" " " "a" "a" "c"
## [1261] "t" "g" "c" "a" "g" "c" "t" " " "g" "a" "t" "t" "a" "c" "a" "a" "a" "a"
## [1279] " " "g" "c" "a" "c" "t" "c" "a" "a" "t" "c" " " "t" "g" "c" "g" "a" "t"
## [1297] "a" "g" "a" "t" "c" "a" "g" "a" "t" "c" "a" "c" "a" "g" " " "g" "c" "a"
## [1315] "a" "a" "t" "t" "g" "a" "a" " " "t" "c" "g" "t" "c" "t" "a" "a" "t" "t"
```

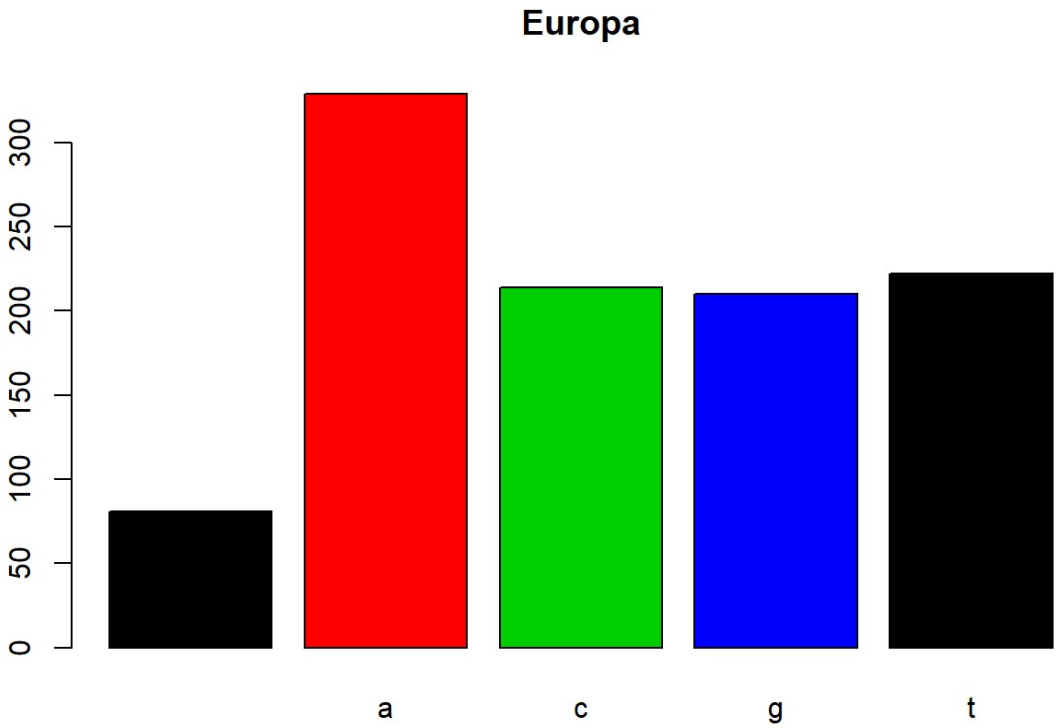
```
## [1333] " " "g" "a" "c" "a" "a" "a" "a" "c" "a" "a" " " "a" "t" "c" "a" "g" "c"
## [1351] "a" "g" "t" "t" " " "t" "g" "a" "a" "c" "t" "g" "a" "t" "a" "g" "a" "c"
## [1369] "a" "a" "c" "g" "a" "a" "t" " " "t" "c" "a" "g" "t" "g" "a" "a" "a" "t"
## [1387] " " "a" "g" "a" "a" "c" "a" "a" "c" "a" "a" " " "a" "t" "t" "g" "g" "g"
## [1405] "a" "a" "t" "g" " " "t" "c" "a" "t" "t" "a" "a" "c" "t" "g" " " "g" "a"
## [1423] "c" "a" "c" "g" "a" "g" "a" "t" "t" "c" "a" "a" "t" "g" "a" "c" "t" "g"
## [1441] " " "a" "g" "g" "t" "a" "t" "g" "g" "t" "c" " " "g" "t" "a" "c" "a" "a"
## [1459] "t" "g" "c" "t" " " "g" "a" "a" "t" "t" "g" "c" "t" "g" "g" " " "t" "a"
## [1477] "g" "c" "t" "a" "t" "g" "g" "a" " " "a" "a" "a" "t" "c" "a" "g" "c" "a"
## [1495] "c" "a" "c" "a" "a" "t" "a" "g" "a" "t" "c" " " "t" "t" "g" "c" "a" "g"
## [1513] "a" "c" "t" "c" " " "a" "g" "a" "a" "a" "t" "g" "a" "a" "c" " " "a" "a"
## [1531] "a" "c" "t" "t" "t" "a" "t" "g" " " "a" "g" "c" "g" "t" "g" "t" "a" "a"
## [1549] "g" " " "g" "a" "a" "a" "c" "a" "a" "c" "t" "g" "a" "g" "g" "g" "a" "g"
## [1567] "a" "a" "t" "g" " " "c" "t" "g" "a" "a" "g" "a" "g" "g" "a" " " "t" "g"
## [1585] "g" "g" "a" "c" "t" "g" "g" "a" " " "t" "g" "c" "t" "t" "t" "g" "a" "a"
## [1603] "a" " " "t" "a" "t" "t" "t" "c" "a" "t" "a" "a" " " "g" "t" "g" "t" "g"
## [1621] "a" "t" "g" "a" "t" "c" "a" "g" "t" "g" "c" "a" "t" "g" "g" " " "a" "g"
## [1639] "a" "g" "c" "a" "t" "c" "a" "g" " " "g" "a" "a" "c" "a" "a" "c" "a" "c"
## [1657] "t" " " "t" "a" "t" "g" "a" "c" "c" "a" "t" "a" " " "c" "t" "c" "a" "a"
## [1675] "t" "a" "c" "a" "g" " " "a" "g" "c" "g" "g" "a" "g" "t" "c" "a" "t" "t"
## [1693] "g" "c" "a" "g" "a" "a" "t" "a" " " "g" "a" "a" "t" "a" "c" "a" "g" "a"
## [1711] "t" " " "a" "g" "a" "c" "c" "c" "a" "g" "t" "g" " " "a" "a" "a" "t" "t"
## [1729] "g" "a" "g" "t" "a" " " "g" "t" "g" "g" "a" "t" "a" "c" "a" "a" " " "a"
## [1747] "g" "a" "c" "a" "t" "a" "a" "t" "c" "t" "t" "a" "t" "g" "g" "t" "t" "t"
## [1765] "a" " " "g" "c" "t" "t" "c" "g" "g" "g" "g" "c" " " "a" "t" "c" "a" "t"
## [1783] "g" "t" "t" "t" "t" " " "c" "t" "t" "c" "t" "t" "c" "t" "a" "g" " " "c"
## [1801] "c" "a" "t" "t" "g" "c" "a" "a" "t" " " "g" "g" "g" "a" "t" "t" "g" "g"
## [1819] "t" "t" "t" "t" "c" "a" "t" "t" "t" "g" "c" "a" " " "t" "a" "a" "a" "g"
## [1837] "a" "a" "t" "g" "g" " " "a" "a" "a" "c" "a" "t" "g" "c" "g" "g" " " "t"
## [1855] "g" "c" "a" "c" "t" "a" "t" "t" "t" " " "g" "t" "a" "t" "a" "t" "a" "g"
## [1873] "t" "t" " " "t" "g" "a" "g" "a" "a" "a" "a" "a" "a" "a" "c" "a" "c" "c"
## [1891] "c" "t" "t" "g" "t" " " "t" "t" "c" "t" "a" "c" "t"
## attr(,"name")
## [1] "Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.1"
## attr(,"Annot")
## [1] ">Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.1"
## attr(,"class")
## [1] "SeqFastadna"
```

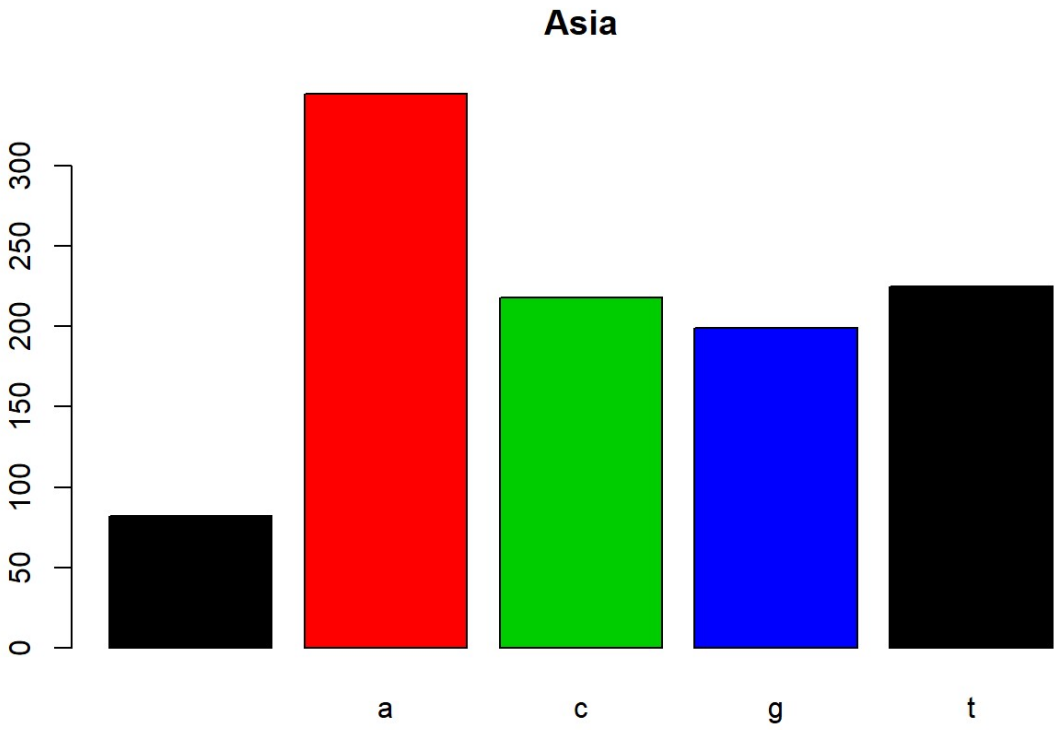
6. Crear función para la gráfica:

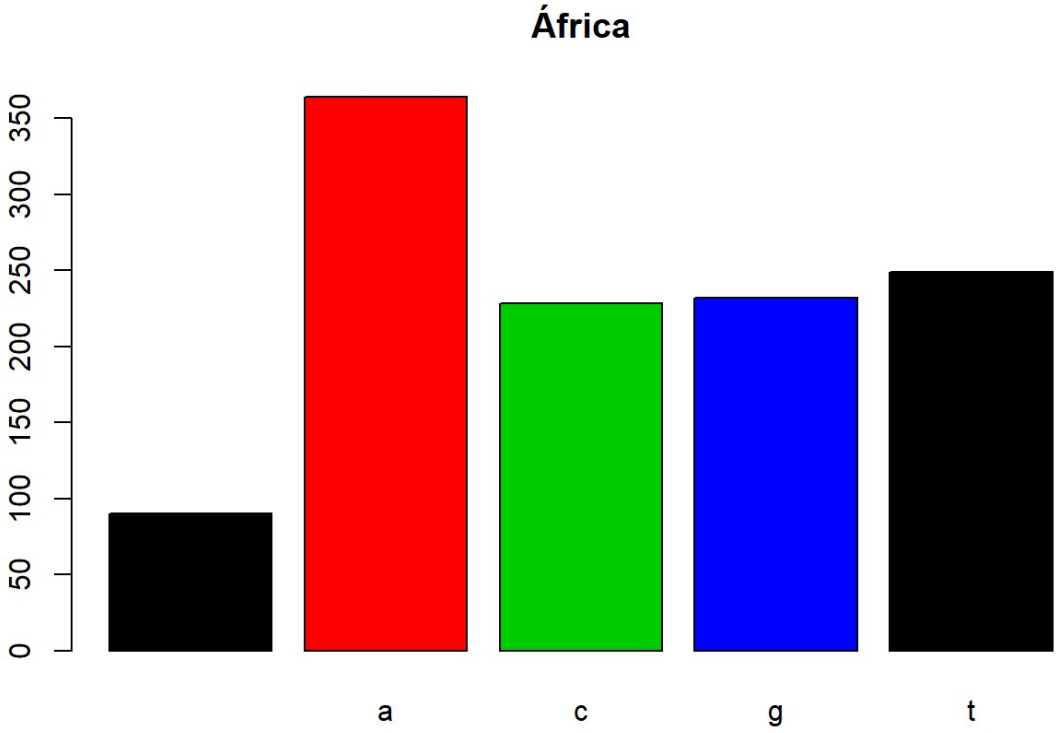
```
crear_graficas = function(secuencia){
par(mfrow=c(1,1))
  barplot(table(secuencia[[1]]), col = 1:4)
  title("Oceanía")
  barplot(table(secuencia[[2]]), col = 1:4)
  title("América")
  barplot(table(secuencia[[3]]), col = 1:4)
  title("Europa")
  barplot(table(secuencia[[4]]), col = 1:4)
  title("Asia")
  barplot(table(secuencia[[5]]), col = 1:4)
  title("África")
  barplot(table(secuencia[[6]]), col = 1:4)
  title("México (Mérida)")
  barplot(table(secuencia[[7]]), col = 1:4)
  title("México (Ciudad de México)")
  barplot(table(secuencia[[8]]), col = 1:4)
  title("México (México)")
}


crear_graficas(virus_seq_no_alineadas)
```

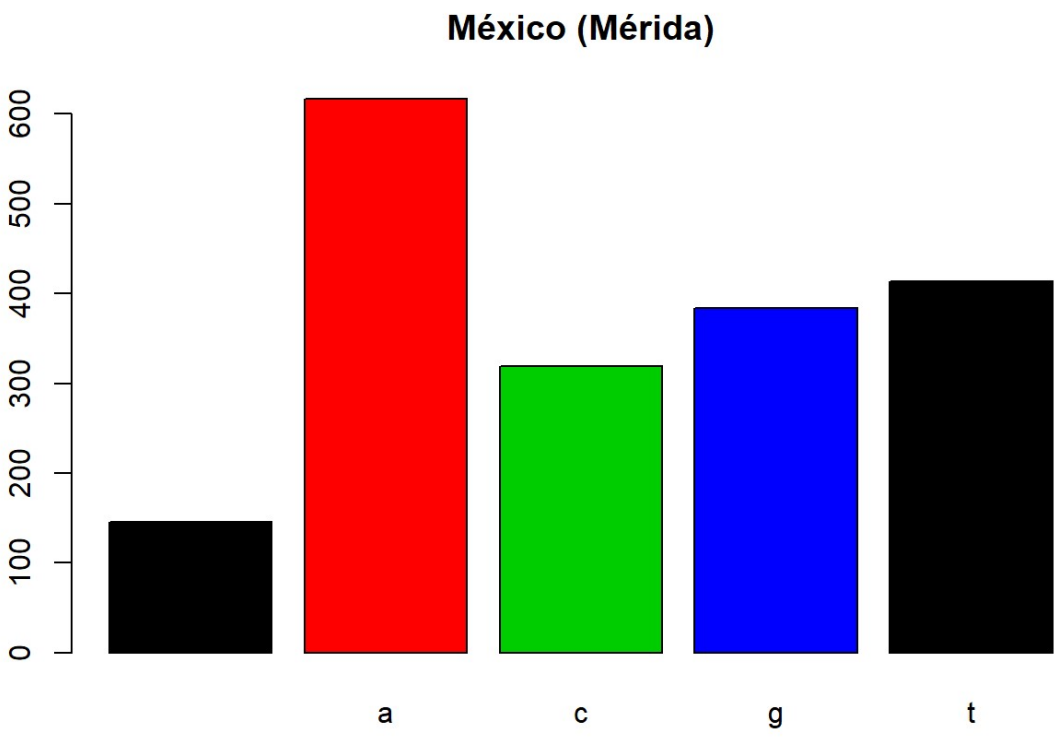


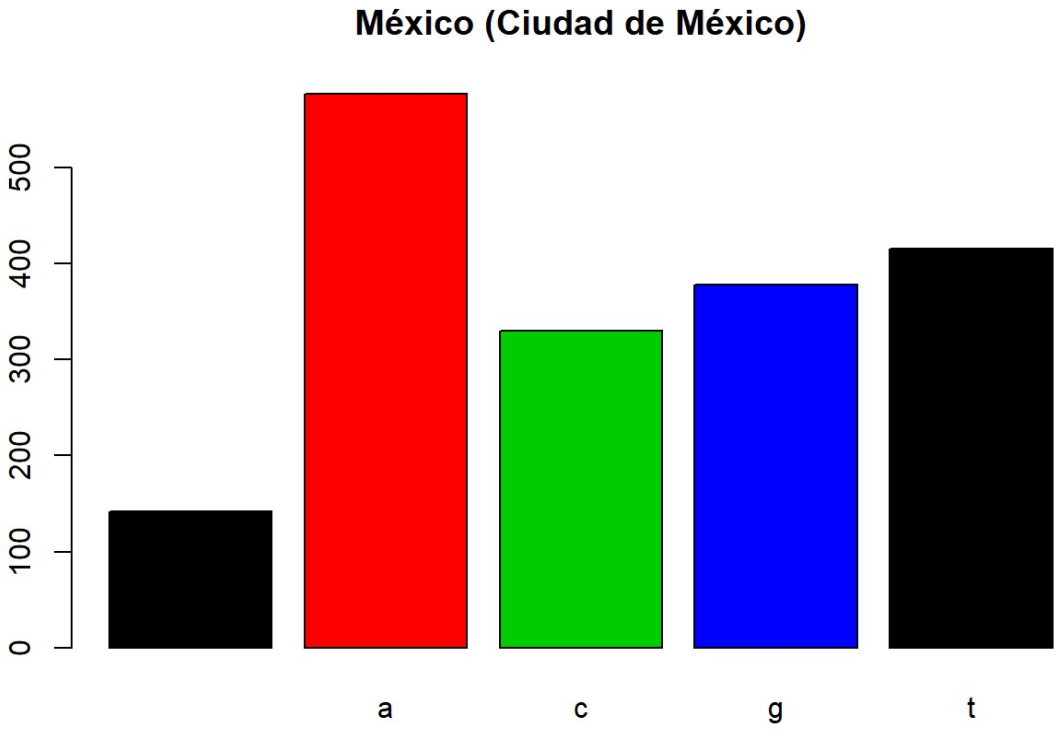

América
0
100
200
300
400
500
600
a
c
g
t

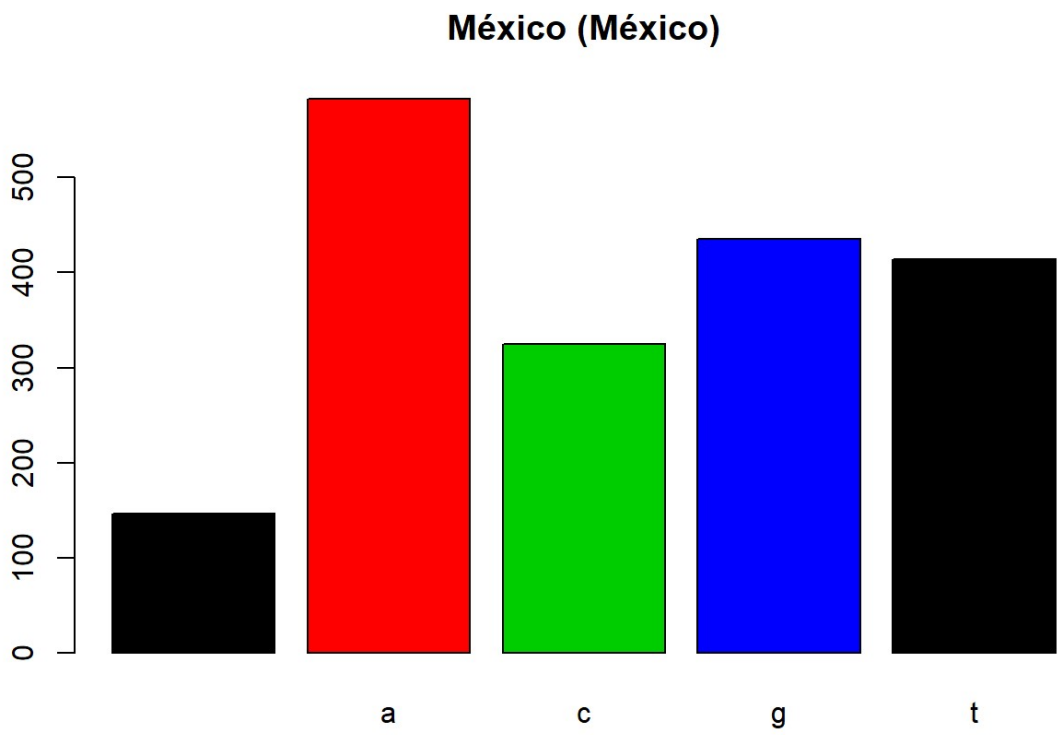

Europa
0
50
100
150
200
250
300
a
c
g
t


Asia
0
50
100
150
200
250
300
a
c
g
t


África
0
50
100
150
200
250
300
350
a
c
g
t


México (Mérida)
0
100
200
300
400
500
600
a
c
g
t


México (Ciudad de México)
0
100
200
300
400
500
a
c
g
t



Aquí podemos ver la representación gráfica de las proporciones de los nucleótidos en cada variación del virus de influenza. Se analizaron 8 variaciones del virus, una por cada continente y tres en México. Los nucleótidos que se ven son adenina (a), citosina (c), guanina (g) y timina (t).

Podemos ver que en todas las variaciones de las gráficas, la proporción de adenina con respecto a la longitud de la cadena es la misma, mientras que la que más varia es la de citosina. Se puede ver tambien que hay una rama de más en las graficas de barras, esta no se muy bien a que se refiere, pero puede ser información que esta presente en la cadena y que no respresenta nada de valor en esta. Por último podemos agregar que las variaciones no son iguales ninguna de la otra.

Agrega un análisis jerárquico global obtenido de las secuencias que seleccionaron para estudiar (árbol filogenético).

1. Cargar el archivo en formato DNAStringSet

```
virus_seq_no_alineadas <- readDNAStringSet("virus_seqs.fasta")
```

```
## Warning in .Call2("fasta_index", filexp_list, nrec, skip, seek.first.rec, :
## reading FASTA file virus_seqs.fasta: ignored 969 invalid one-letter sequence
## codes
```

```
virus_seq_no_alineadas
```

```
##   A DNAStringSet instance of length 8
##     width seq                                                names
## [1]  1695 ATGAAAGTAAAACTACTGGTCCT...CTTTGCAGTGTAGAATATGCATC Influenza_A_virus...
## [2]  1701 ATGAAGGCAATACTAGTAGTTCT...TACAGTGTAGAATATGTATTTAA Influenza_A_virus...
## [3]   975 GACACAATATGTATAGGCTACCA...GGAACATCCCATCCATTCAATCC Influenza_A_virus...
## [4]   987 CAAAAACTTCCCGGAAATGACAA...ATGTACCAGAAAAACAAACTAGA Influenza_A_virus...
## [5]  1073 ATGAAAGTAAAACTACTGATCCT...GGTTTCATTGAAGGGGGATGGAC Influenza_A_virus...
## [6]  1734 AAAAGCAACAAAAATGAAGGCAA...TAACATTAGGATTTCAGAAGCAT Influenza_A_virus...
## [7]  1701 ATGAAGACTATCATTGCTTTGAG...TTAGGTGCAACATTTGCATTTGA Influenza_A_virus...
## [8]  1757 AGCAAAAGCAGGGGATACAAAAT...AAAAAAACACCCTTGTTTCTACT Influenza_A_virus...
```

2. Orientación de secuencias:

```
virus_seq_no_alineadas <- OrientNucleotides(virus_seq_no_alineadas)
```

```
## ================================================================================
================================================================================
====================================
##
## Time difference of 0.04 secs
```

3. Realizar el alineamiento de las secuencias:

```
virus_secuencias_alineadas <- AlignSeqs(virus_seq_no_alineadas)
```

```
## Determining distance matrix based on shared 9-mers:
## ================================================================================
##
## Time difference of 0 secs
##
## Clustering into groups by similarity:
## ================================================================================
##
## Time difference of 0 secs
##
## Aligning Sequences:
## ================================================================================
##
## Time difference of 0.79 secs
##
## Iteration 1 of 2:
##
## Determining distance matrix based on alignment:
## ================================================================================
##
## Time difference of 0 secs
##
## Reclustering into groups by similarity:
## ================================================================================
##
## Time difference of 0 secs
##
## Realigning Sequences:
## ================================================================================
##
## Time difference of 0.45 secs
##
## Iteration 2 of 2:
##
## Determining distance matrix based on alignment:
## ================================================================================
##
## Time difference of 0 secs
##
## Reclustering into groups by similarity:
## ================================================================================
##
## Time difference of 0 secs
##
## Realigning Sequences:
## ================================================================================
##
## Time difference of 0 secs
##
## Refining the alignment:
## ================================================================================
```

```
##
## Time difference of 0.8 secs
```

4. Guardar el archivo y leer las secuencias alineadas.

```
writeXStringSet(virus_secuencias_alineadas, file = "virus_align_seq.fasta")

virus_alineado <- read.alignment("virus_align_seq.fasta", format = "fasta")
```

5. Crear la matriz de distancia entre las secuencias.

```
distancias_matrices <- dist.alignment(virus_alineado, matrix = "similarity")
distancias_matrices
```

```
##                                                                      Influe
nza_A_virus_(A/Auckland/582/2000(H1N1))_HA_KP456547.1
## Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.
1                                                                 0.48639302
## Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.
1                                                                      0.11547
005
## Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.
1                                                                   0.72237623
## Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.
1                                                                   0.18316875
## Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.
1                                                                   0.48639302
## Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.
1                                                  0.69273363
## Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.
1                                                               0.70262800
##                                                                      Influe
nza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.1
## Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.
1
## Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.
1                                                                        0.523303
12
## Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.
1                                                                  0.72518158
## Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.
1                                                               0.51627745
## Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.
1                                                               0.04199605
## Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.
1                                                 0.70114671
## Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.
1                                                              0.70668222
##                                                                      Influe
nza_A_virus_(A/576/01(H1N2))_HA_AJ489860.1
## Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.
1
## Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.
1
## Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.
1                                                            0.72326291
## Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.
1                                                  0.20000000
## Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.
1                                                  0.52232223
## Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.
1                                        0.72180912
## Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.
1                                                  0.73236197
##                                                                      Influe
nza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.1
```

```
## Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.
1
## Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.
1
## Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.
1
## Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.
1                                                    0.72026504
## Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.
1                                                    0.72518158
## Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.
1                                             0.19098210
## Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.
1                                                  0.72764795
##                                                                 Influe
nza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.1
## Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.
1
## Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.
1

## Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.
1
## Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.
1
## Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.
1                                                     0.51537408
## Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.
1                                               0.71517290
## Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.
1                                                    0.71451830
##                                                                 Influe
nza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.1
## Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.
1
## Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.
1

## Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.
1
## Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.
1
## Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.
1
## Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.
1                                               0.70098087
## Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.
1                                                    0.70689866
##                                                                 Influe
nza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.1
## Influenza_A_virus_(A/Alagoas/115/2010(H1N1))_HA_CY072074.
1
```

```
## Influenza_A_virus_(A/576/01(H1N2))_HA_AJ489860.
1

## Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.
1

## Influenza_A_virus_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.
1

## Influenza_A_virus_(A/Merida/2189-CIR/2009(H1N1))_HA_CY106568.
1

## Influenza_A_virus_(A/Mexico_City/1514A00905313N/2013(H3N2))_HA_KT889237.
1
## Influenza_A_virus_(A/Mexico/InDRE7218/2012(H7N3))_HA_CY125728.
1                                                                        0.682034
60
```

6. Crear el árbol filogenético

```
virus_str_filogenetico <- nj(distancias_matrices)
virus_str_filogenetico
```

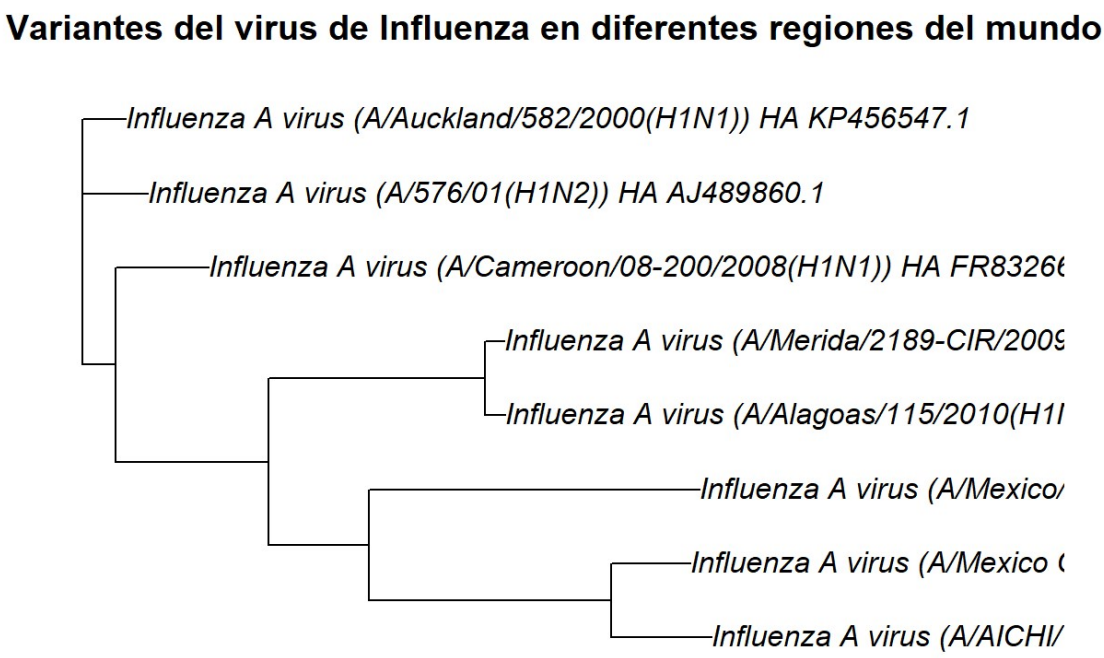
```
##
## Phylogenetic tree with 8 tips and 6 internal nodes.
##
## Tip labels:
##  Influenza_A_virus_(A/Auckland/582/2000(H1N1))_HA_KP456547.1, Influenza_A_virus_
(A/Alagoas/115/2010(H1N1))_HA_CY072074.1, Influenza_A_virus_(A/576/01(H1N2))_HA_AJ4
89860.1, Influenza_A_virus_(A/AICHI/105/2006(H3N2))_HA_EU501856.1, Influenza_A_viru
s_(A/Cameroon/08-200/2008(H1N1))_HA_FR832667.1, Influenza_A_virus_(A/Merida/2189-CI
R/2009(H1N1))_HA_CY106568.1, ...
##
## Unrooted; includes branch lengths.
```

```
class(virus_str_filogenetico)
```

```
## [1] "phylo"
```

7. Crear la visualización del árbol

```
arbol <- ladderize((virus_str_filogenetico))
plot(arbol)
title("Variantes del virus de Influenza en diferentes regiones del mundo")
```



Agrega una interpretación escrita de las gráficas que integras (una por continente y la del análisis jerárquico).

En el árbol podemos ver que todas las variaciones nacen de un mismo nodo, por lo que todas tienen un mismo padre. podmeos ver tambien que ninguna de las variaciones de México vienen de un mismo padre cercano, aunque todos se encuentran en la parte de abajo. Tambien se puede ver que la variación Japonesa y una de las Mexicanas son las que más ramas se llevan, por lo que son las más alejadas en similitud con las variaciones Europea y la de Oceania.

Podemos concluir con esto que las variaciones son similares entre si, pero hay más similitudes entre pares de variaciones que entre combinaciones de H y N similiares, ya que casi todas las variaciones que comparten el mismo número en H y el mismo en N se encuentran en diferentes partes del árbol (No se ven juntas).

Citas de paquetes utilizados

```
citation("ape")
```

```
##
## To cite ape in a publication use:
##
##   Paradis E. & Schliep K. 2018. ape 5.0: an environment for modern
##   phylogenetics and evolutionary analyses in R. Bioinformatics 35:
##   526-528.
##
## A BibTeX entry for LaTeX users is
##
##   @Article{,
##     title = {ape 5.0: an environment for modern phylogenetics and evolutionary a
nalyses in {R}},
##     author = {E. Paradis and K. Schliep},
##     journal = {Bioinformatics},
##     year = {2018},
##     volume = {35},
##     pages = {526-528},
##   }
##
## As ape is evolving quickly, you may want to cite also its version
## number (found with 'library(help = ape)' or 'packageVersion("ape")').
```

```
citation("phangorn")
```

```
##
## Use 2011 to cite phangorn in a publication; 2017 for plotting
## phylogenetic networks. As phangorn is evolving quickly, you may want to
## cite also its version number (phangorn 2.5.5).
##
##   Schliep K.P. 2011. phangorn: phylogenetic analysis in R.
##   Bioinformatics, 27(4) 592-593
##
##   Schliep, K., Potts, A. J., Morrison, D. A., Grimm, G. W. (2017),
##   Intertwining phylogenetic trees and networks. Methods in Ecology and
##   Evolution, 8: 1212--1220. doi: 10.1111/2041-210X.12760
##
## To see these entries in BibTeX format, use 'print(<citation>,
## bibtex=TRUE)', 'toBibtex(.)', or set
## 'options(citation.bibtex.max=999)'.
```

```
citation("phytools")
```

```
##
## To cite phytools in publication use:
##
##   Revell, L. J. (2012) phytools: An R package for phylogenetic
##   comparative biology (and other things). Methods Ecol. Evol. 3
##   217-223. doi:10.1111/j.2041-210X.2011.00169.x
##
## A BibTeX entry for LaTeX users is
##
##   @Article{,
##     title = {phytools: An R package for phylogenetic comparative biology (and ot
her things).},
##     author = {Liam J. Revell},
##     journal = {Methods in Ecology and Evolution},
##     year = {2012},
##     volume = {3},
##     pages = {217-223},
##   }
##
## As phytools is continually evolving, you may want to cite its version
## number. Find it with 'help(package=phytools)'.
```

```
citation("geiger")
```

```
##
## To cite medusa, auteur, or geiger in a publication use:
##
## medusa
##
##   Alfaro Michael E, Francesco Santini, Chad Brock, Hugo Alamillo, Alex
##   Dornburg, Daniel L Rabosky, Giorgio Carnevale, and Luke J Harmon.
##   2009. Nine exceptional radiations plus high turnover explain species
##   diversity in jawed vertebrates. PNAS 106:13410-13414.
##
## auteur
##
##   Eastman Jonathan M, Michael E Alfaro, Paul Joyce, Andrew L Hipp, and
##   Luke J Harmon. 2011. A novel comparative method for identifying
##   shifts in the rate of character evolution on trees. Evolution
##   65:3578-3589.
##
## MECCA
##
##   Slater Graham J, Luke J Harmon, Daniel Wegmann, Paul Joyce, Liam J
##   Revell, and Michael E Alfaro. 2012. Fitting models of continuous
##   trait evolution to incompletely sampled comparative data using
##   approximate Bayesian computation. Evolution 66:752-762.
##
## geiger-orig
##
##   Harmon Luke J, Jason T Weir, Chad D Brock, Richard E Glor, and
##   Wendell Challenger. 2008. GEIGER: investigating evolutionary
##   radiations. Bioinformatics 24:129-131.
##
## geiger
##
##   Pennell Matthew W, Jonathan M Eastman, Graham J Slater, Joseph W
##   Brown, Josef C Uyeda, Richard G FitzJohn, Michael E Alfaro, and Luke
##   J Harmon. 2014. geiger v2.0: an expanded suite of methods for fitting
##   macroevolutionary models to phylogenetic trees. Bioinformatics
##   30:2216-2218.
##
## To see these entries in BibTeX format, use 'print(<citation>,
## bibtex=TRUE)', 'toBibtex(.)', or set
## 'options(citation.bibtex.max=999)'.
```

```
citation("BiocManager")
```

```
##
## To cite package 'BiocManager' in publications use:
##
##   Martin Morgan (2019). BiocManager: Access the Bioconductor Project
##   Package Repository. R package version 1.30.10.
##   https://CRAN.R-project.org/package=BiocManager
##
## A BibTeX entry for LaTeX users is
##
##   @Manual{,
##     title = {BiocManager: Access the Bioconductor Project Package Repository},
##     author = {Martin Morgan},
##     year = {2019},
##     note = {R package version 1.30.10},
##     url = {https://CRAN.R-project.org/package=BiocManager},
##   }
```

```
citation("stringr")
```

```
##
## To cite package 'stringr' in publications use:
##
##   Hadley Wickham (2019). stringr: Simple, Consistent Wrappers for
##   Common String Operations. R package version 1.4.0.
##   https://CRAN.R-project.org/package=stringr
##
## A BibTeX entry for LaTeX users is
##
##   @Manual{,
##     title = {stringr: Simple, Consistent Wrappers for Common String Operations},
##     author = {Hadley Wickham},
##     year = {2019},
##     note = {R package version 1.4.0},
##     url = {https://CRAN.R-project.org/package=stringr},
##   }
```

```
citation("ggmsa")
```

```
##
## To cite package 'ggmsa' in publications use:
##
##   Guangchuang Yu and Lang Zhou (2020). ggmsa: Plot Multiple Sequence
##   Alignment using 'ggplot2'. R package version 0.0.2.
##   https://CRAN.R-project.org/package=ggmsa
##
## A BibTeX entry for LaTeX users is
##
##   @Manual{,
##     title = {ggmsa: Plot Multiple Sequence Alignment using 'ggplot2'},
##     author = {Guangchuang Yu and Lang Zhou},
##     year = {2020},
##     note = {R package version 0.0.2},
##     url = {https://CRAN.R-project.org/package=ggmsa},
##   }
```

Especificaciones de entrega

- Formato de entrega: PDF y RNotebook o Script
- Nombre del entregable: ev02.pdf y ev02.Rmd
- Medio de entrega: Se entrega en Canvas en el botón “Entregar Tarea” en la parte superior de esta pantalla.