

FEL results preliminary

sadie

3/4/2020

check one alignment

zeiformes nd1 FEL results

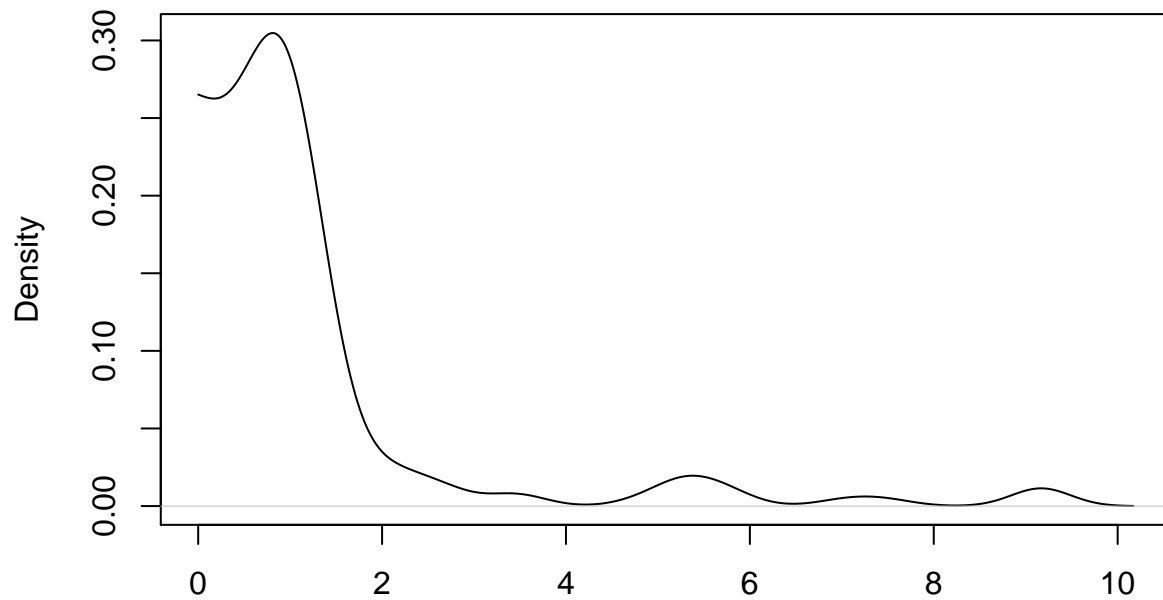
```
filepath <- read_json("~/bin/mtDNA_redo/data/FEL/zeiformes-nd1-align-dna.fas.FEL.json") #read in json
heads <- filepath$MLE$headers %>% unlist() %>% .[c(TRUE,FALSE)] #get headers and ignore header descrip
#get MLE contents and make them a data frame
temp <- filepath$MLE$content$`0` %>% unlist %>% matrix(ncol = 6, byrow = TRUE) %>% as.data.frame()
#make the headers the variable names
names(temp) <- heads
```

kernel density and plots?

Kernel density and plot for alpha for single FEL result

```
d_alpha <- density(log(temp$alpha), kernel = "gaussian", from = 0) #Kernel density for alpha rate estim
#start from 0 and log transform to control outliers
d_alpha %>% plot() #plot the density
```

```
density.default(x = log(temp$alpha), kernel = "gaussian", from = 0)
```

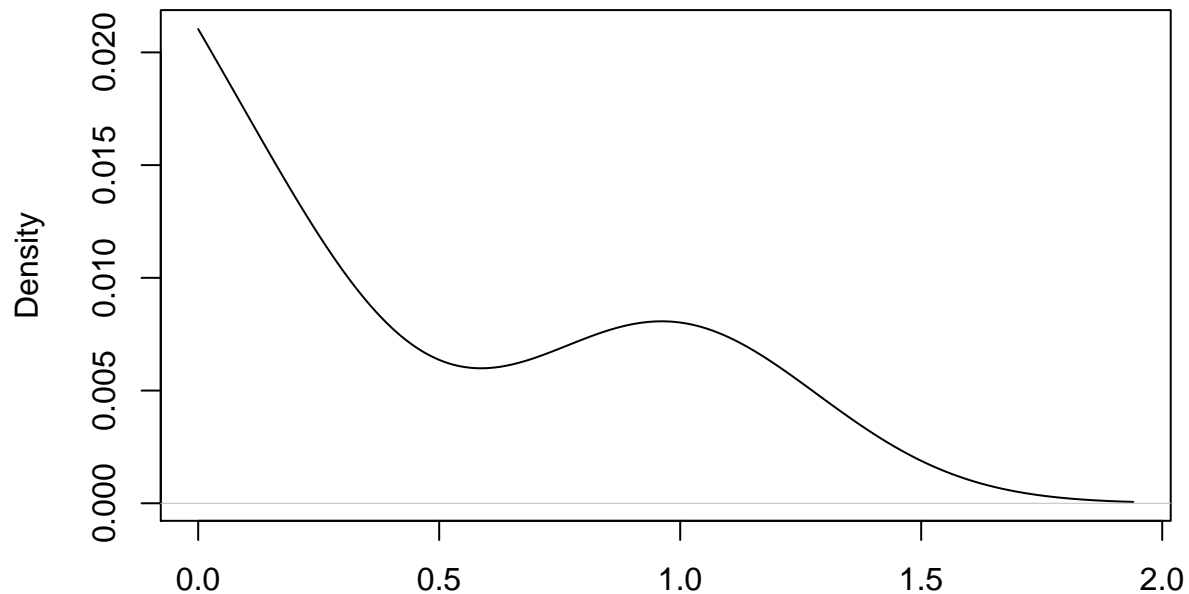


N = 325 Bandwidth = 0.32

Kernel density and plot for beta for single FEL result

```
d_beta <- density(log(temp$beta), kernel = "gaussian", from = 0) #Kernel density for the beta rate est  
d_beta %>% plot() #plot the density
```

density.default(x = log(temp\$beta), kernel = "gaussian", from = 0)



N = 325 Bandwidth = 0.3038

check a second alignment:

acipenseriformes at8 FEL results

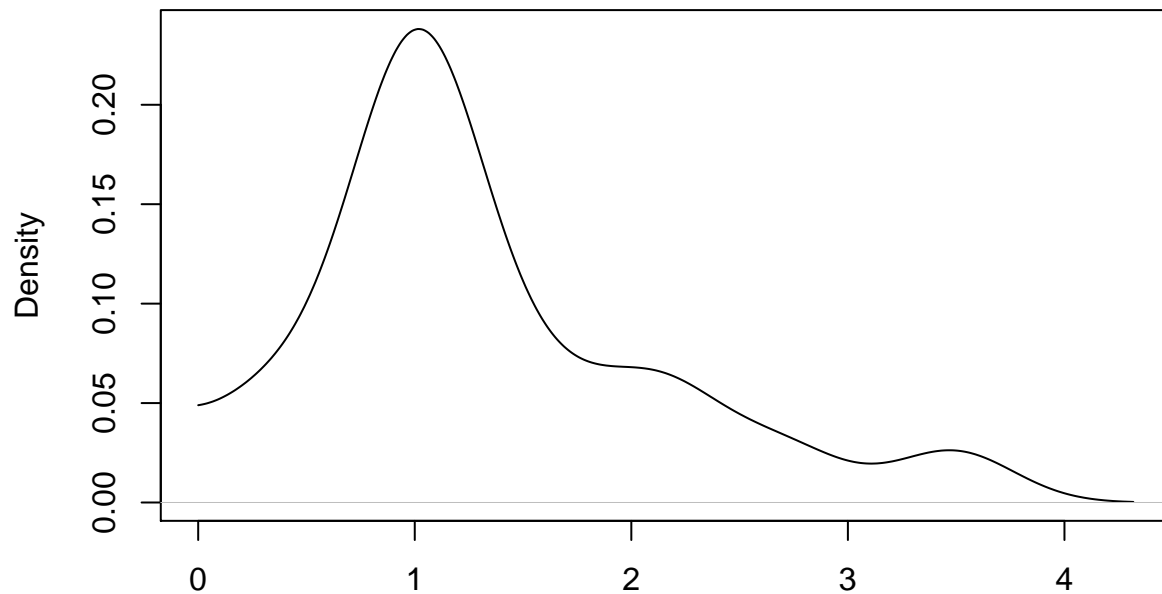
```
filepath <- read_json("~/bin/mtDNA_redo/data/FEL/acipenseriformes-atp8-align-dna.fas.FEL.json") #read i
heads <- filepath$MLE$headers %>% unlist() %>% .[c(TRUE,FALSE)] #get headers and ignore header descrip
#get MLE contents and make them a data frame
temp_2 <- filepath$MLE$content$`0` %>% unlist %>% matrix(ncol = 6, byrow = TRUE) %>% as.data.frame()
#make the headers the variable names
names(temp_2) <- heads
```

kernel density and plots?

Kernel density and plot for alpha for single FEL result

```
d_alpha_2 <- density(log(temp_2$alpha), kernel = "gaussian", from = 0)
d_alpha_2 %>% plot()
```

density.default(x = log(temp_2\$alpha), kernel = "gaussian", from = 0)

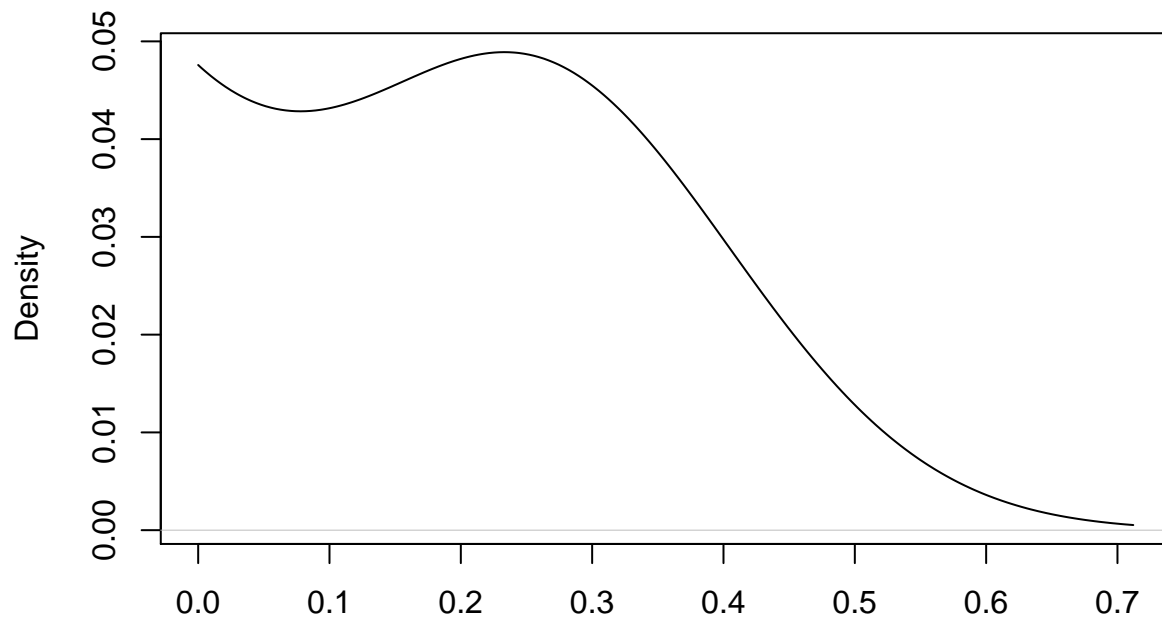


N = 56 Bandwidth = 0.2771

##Kernel density and plot for beta for single FEL result

```
d_beta_2 <- density(log(temp_2$beta), from = 0)
d_beta_2 %>% plot()
```

density.default(x = log(temp_2\$beta), from = 0)



N = 56 Bandwidth = 0.1526

#try

different ways of calculating the KL or JSD ##using the entropy library:

```
#uses entropy library to calculate Kullback-Leibler divergence (KL) as it is needed to do the JSD
library("entropy")
```

```
KL <- KL.plugin(freqs1 = d_alpha$x, freqs2 = d_beta$x)
```

```
## Warning in KL.plugin(freqs1 = d_alpha$x, freqs2 = d_beta$x): Vanishing value(s)
## in argument freqs2!
```

```
KL_2 <- KL.plugin(freqs1 = d_alpha_2$x, freqs2 = d_beta_2$x)
```

```
## Warning in KL.plugin(freqs1 = d_alpha_2$x, freqs2 = d_beta_2$x): Vanishing
## value(s) in argument freqs2!
```

```
#both of these return an error: Vanishing value(s) in argument freqs2!
```

Using a calculation from stackoverflow:

```
#from stackoverflow https://stackoverflow.com/questions/11226627/jensen-shannon-divergence-in-r
p <- d_beta_2$x
q <- d_alpha_2$x
n <- 0.5 * (p + q)
JS <- 0.5 * (sum(p * log(p / n)) + sum(q * log(q / n))) #returns an NaN
```

Using a formula from a website:

```
#actually, lets try the way this site does it: https://enterotype.embl.de/enterotypes.html
```

```
JSD<- function(x,y) sqrt(0.5 * KLD(x, (x+y)/2) + 0.5 * KLD(y, (x+y)/2))
```

```
KLD <- function(x,y) sum(x * log(x/y))
```

```
KLD(d_beta_2$x, d_alpha_2$x)
```

```
## [1] NaN
```

```
JSD(d_beta_2$x, d_alpha_2$x)
```

```
## [1] NaN
```

```
dist.JSD <- function(inMatrix, pseudocount=0.000001, ...) {
  KLD <- function(x,y) sum(x * log(x/y))
  JSD<- function(x,y) sqrt(0.5 * KLD(x, (x+y)/2) + 0.5 * KLD(y, (x+y)/2))
  matrixColSize <- length(colnames(inMatrix))
  matrixRowSize <- length(rownames(inMatrix))
  colnames <- colnames(inMatrix)
  resultsMatrix <- matrix(0, matrixColSize, matrixColSize)

  inMatrix = apply(inMatrix,1:2,function(x) ifelse (x==0,pseudocount,x))

  for(i in 1:matrixColSize) {
    for(j in 1:matrixColSize) {
      resultsMatrix[i,j]=JSD(as.vector(inMatrix[,i]),
                             as.vector(inMatrix[,j]))
    }
  }
}
```

```

colnames -> colnames(resultsMatrix) -> rownames(resultsMatrix)
as.dist(resultsMatrix)->resultsMatrix
attr(resultsMatrix, "method") <- "dist"
return(resultsMatrix)
}

```

calculate the JSD between alpha and beta

```

d.temp <- dist.JSD(temp %>% select(alpha, beta))

d.temp

```

```

##          alpha
## beta 108.0882

```

this last method works and gives me the JSD between the nonsynonymous (beta) and synonymous (alpha) rate distributions.

so now what if we want the distance for every FEL result?

first, get list of all FEL results:

```

dir <- "~/bin/mtDNA_redo/data/FEL"
FEL_jsons <- list.files(path = dir,
                        pattern = '*FEL.json', recursive = TRUE, full.names = TRUE)

```

write function for JSD calculation:

```

JSD.calc <- function(filename){

  results <- read_json(filename) #read in json

  heads <- results$MLE$headers %>% unlist() %>% .[c(TRUE,FALSE)] #get headers and ignore header descriptions

  #get MLE contents and make them a data frame
  temp <- results$MLE$content`0` %>% unlist %>% matrix(ncol = 6, byrow = TRUE) %>% as.data.frame()
#make the headers the variable names
  names(temp) <- heads

  #Kernel density for alpha rate estimation
#start from 0 and log transform to control outliers
  # d_alpha <- density(log(temp$alpha), kernel = "gaussian", from = 0)
  # d_beta <- density(log(temp$beta), kernel = "gaussian", from = 0)

  d.temp <- dist.JSD(temp %>% select(alpha, beta))
  return(d.temp)
}

```

check that it works:

```

#JSD.calc(paste0(dir,FEL_jsons[1]))

```

this returns a named number of JSD calculations

```

t <- sapply(FEL_jsons, JSD.calc)
t

```

```

##          /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-atp6-align-dna.fas.FEL.json

```

```

## 60.1693124
## /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-atp8-align-dna.fas.FEL.json
## 6.0910806
## /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-cox1-align-dna.fas.FEL.json
## 19.6441866
## /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-cox2-align-dna.fas.FEL.json
## 58.1551711
## /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-cox3-align-dna.fas.FEL.json
## 28.2511289
## /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-nd1-align-dna.fas.FEL.json
## 84.3809173
## /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-nd2-align-dna.fas.FEL.json
## 97.8256070
## /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-nd3-align-dna.fas.FEL.json
## 8.5137675
## /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-nd5-align-dna.fas.FEL.json
## 35.0844530
## /Users/Sadie/bin/mtDNA_redo/data/FEL/acipenseriformes-nd6-align-dna.fas.FEL.json
## 22.2316634
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-ATP6-Aligned-DNA.fas.FEL.json
## 135.5566605
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-ATP8-Aligned-DNA.fas.FEL.json
## 59.6080050
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-COX1-Aligned-DNA.fas.FEL.json
## 151.8205989
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-COX3-Aligned-DNA.fas.FEL.json
## 67.7325563
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-CYTB-Aligned-DNA.fas.FEL.json
## 162.0590693
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-ND1-Aligned-DNA.fas.FEL.json
## 173.3868351
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-ND2-Aligned-DNA.fas.FEL.json
## 275.1854043
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-ND3-Aligned-DNA.fas.FEL.json
## 76.2457216
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-ND4-Aligned-DNA.fas.FEL.json
## 200.5529607
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-ND4L-Aligned-DNA.fas.FEL.json
## 109.8130988
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-ND5-Aligned-DNA.fas.FEL.json
## 290.6448624
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anguilliformes-ND6-Aligned-DNA.fas.FEL.json
## 102.4477043
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-ATP6-Aligned-DNA.fas.FEL.json
## 11.5023719
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-ATP8-Aligned-DNA.fas.FEL.json
## 5.5814536
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-COX1-Aligned-DNA.fas.FEL.json
## 112.6862892
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-COX2-Aligned-DNA.fas.FEL.json
## 56.6955794
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-COX3-Aligned-DNA.fas.FEL.json
## 111.0054078
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-CYTB-Aligned-DNA.fas.FEL.json

```

```

## 74.6076430
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-ND1-Aligned-DNA.fas.FEL.json
## 44.5790006
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-ND2-Aligned-DNA.fas.FEL.json
## 36.7039634
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-ND3-Aligned-DNA.fas.FEL.json
## 8.6128959
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-ND4L-Aligned-DNA.fas.FEL.json
## 59.3546685
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-ND5-Aligned-DNA.fas.FEL.json
## 109.5224266
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anseriformes-ND6-Aligned-DNA.fas.FEL.json
## 11.4155994
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-ATP6-Aligned-DNA.fas.FEL.json
## 315.7656893
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-COX1-Aligned-DNA.fas.FEL.json
## 332.1441192
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-COX2-Aligned-DNA.fas.FEL.json
## 272.3949743
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-COX3-Aligned-DNA.fas.FEL.json
## 267.2814818
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-CYTB-Aligned-DNA.fas.FEL.json
## 330.1180978
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-ND1-Aligned-DNA.fas.FEL.json
## 352.3513714
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-ND2-Aligned-DNA.fas.FEL.json
## 404.3609935
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-ND3-Aligned-DNA.fas.FEL.json
## 218.4365688
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-ND4-Aligned-DNA.fas.FEL.json
## 522.1790318
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-ND4L-Aligned-DNA.fas.FEL.json
## 231.4169433
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Anura-ND6-Aligned-DNA.fas.FEL.json
## 367.6941205
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-atp6-align-dna.fas.FEL.json
## 423.9026471
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-atp8-align-dna.fas.FEL.json
## 102.0017266
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-cox1-align-dna.fas.FEL.json
## 577.6827304
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-cox2-align-dna.fas.FEL.json
## 451.8164325
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-cox3-align-dna.fas.FEL.json
## 391.5672423
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-cytb-align-dna.fas.FEL.json
## 467.3369903
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-nd1-align-dna.fas.FEL.json
## 444.3244802
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-nd2-align-dna.fas.FEL.json
## 444.5465296
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-nd3-align-dna.fas.FEL.json
## 348.9899404
## /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-nd4-align-dna.fas.FEL.json

```



```

##                                     454.3912343
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-nd4l-align-dna.fas.FEL.json
##                                     332.7686243
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-nd5-align-dna.fas.FEL.json
##                                     824.1333826
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/araneae-nd6-align-dna.fas.FEL.json
##                                     0.5327481
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-ATP6-Aligned-DNA.fas.FEL.json
##                                     242.3264018
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-COX1-Aligned-DNA.fas.FEL.json
##                                     216.4810689
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-COX2-Aligned-DNA.fas.FEL.json
##                                     145.7238735
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-COX3-Aligned-DNA.fas.FEL.json
##                                     212.8345325
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-CYTB-Aligned-DNA.fas.FEL.json
##                                     311.9664928
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-ND1-Aligned-DNA.fas.FEL.json
##                                     223.0581802
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-ND2-Aligned-DNA.fas.FEL.json
##                                     188.6557516
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-ND3-Aligned-DNA.fas.FEL.json
##                                     140.9965845
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-ND4-Aligned-DNA.fas.FEL.json
##                                     318.8329257
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-ND4L-Aligned-DNA.fas.FEL.json
##                                     134.9826306
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Ascaridida-ND6-Aligned-DNA.fas.FEL.json
##                                     150.9286226
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-ATP6-Aligned-DNA.fas.FEL.json
##                                     121.7398670
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-ATP8-Aligned-DNA.fas.FEL.json
##                                     84.5709280
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-COX1-Aligned-DNA.fas.FEL.json
##                                     173.9216636
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-COX2-Aligned-DNA.fas.FEL.json
##                                     45.7607005
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-ND1-Aligned-DNA.fas.FEL.json
##                                     170.8287453
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-ND2-Aligned-DNA.fas.FEL.json
##                                     259.4490344
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-ND4-Aligned-DNA.fas.FEL.json
##                                     201.8559475
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-ND4L-Aligned-DNA.fas.FEL.json
##                                     60.9612422
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-ND5-Aligned-DNA.fas.FEL.json
##                                     313.3826122
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Beloniformes-ND6-Aligned-DNA.fas.FEL.json
##                                     196.4236867
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-atp6-align-dna.fas.FEL.json
##                                     73.1834936
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-atp8-align-dna.fas.FEL.json
##                                     16.3331454
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-cox1-align-dna.fas.FEL.json

```

```

## 126.5434473
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-cox2-align-dna.fas.FEL.json
## 52.7378224
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-cox3-align-dna.fas.FEL.json
## 56.2206163
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-cytb-align-dna.fas.FEL.json
## 119.7103372
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-nd1-align-dna.fas.FEL.json
## 79.5026968
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-nd2-align-dna.fas.FEL.json
## 163.3121881
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-nd3-align-dna.fas.FEL.json
## 21.0526619
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-nd4-align-dna.fas.FEL.json
## 158.9917973
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-nd4l-align-dna.fas.FEL.json
## 52.2098358
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-nd5-align-dna.fas.FEL.json
## 143.5212417
## /Users/Sadie/bin/mtDNA_redo/data/FEL/beryciformes-nd6-align-dna.fas.FEL.json
## 132.0137309
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-atp6-align-dna.fas.FEL.json
## 72.4539756
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-atp8-align-dna.fas.FEL.json
## 59.2112074
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-cox1-align-dna.fas.FEL.json
## 86.8802889
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-cox2-align-dna.fas.FEL.json
## 77.2932813
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-cytb-align-dna.fas.FEL.json
## 80.1989644
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-nd1-align-dna.fas.FEL.json
## 82.2676047
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-nd2-align-dna.fas.FEL.json
## 84.7607138
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-nd4l-align-dna.fas.FEL.json
## 62.0364782
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-nd5-align-dna.fas.FEL.json
## 86.4024146
## /Users/Sadie/bin/mtDNA_redo/data/FEL/carnivores-nd6-align-dna.fas.FEL.json
## 41.6872273
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-ATP6-Aligned-DNA.fas.FEL.json
## 29.8523636
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-ATP8-Aligned-DNA.fas.FEL.json
## 5.2777819
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-COX1-Aligned-DNA.fas.FEL.json
## 85.3163772
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-COX2-Aligned-DNA.fas.FEL.json
## 16.8450989
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-COX3-Aligned-DNA.fas.FEL.json
## 91.8966391
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-CYTB-Aligned-DNA.fas.FEL.json
## 129.8074772
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-ND1-Aligned-DNA.fas.FEL.json

```

```

##                                     103.2210223
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-ND2-Aligned-DNA.fas.FEL.json
##                                     104.3518888
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-ND4L-Aligned-DNA.fas.FEL.json
##                                     18.4211020
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-ND5-Aligned-DNA.fas.FEL.json
##                                     99.2313495
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Cetacea-ND6-Aligned-DNA.fas.FEL.json
##                                     86.8413716
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Characiformes-ATP6-Aligned-DNA.fas.FEL.json
##                                     235.6824125
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Characiformes-ATP8-Aligned-DNA.fas.FEL.json
##                                     92.6073335
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Characiformes-COX1-Aligned-DNA.fas.FEL.json
##                                     229.6881127
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Characiformes-COX2-Aligned-DNA.fas.FEL.json
##                                     159.6155206
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Characiformes-CYTB-Aligned-DNA.fas.FEL.json
##                                     151.8410993
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Characiformes-ND1-Aligned-DNA.fas.FEL.json
##                                     131.6495246
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Characiformes-ND4L-Aligned-DNA.fas.FEL.json
##                                     17.2662467
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Characiformes-ND5-Aligned-DNA.fas.FEL.json
##                                     295.8364212
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Characiformes-ND6-Aligned-DNA.fas.FEL.json
##                                     159.3803575
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-ATP6-Aligned-DNA.fas.FEL.json
##                                     33.2994238
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-ATP8-Aligned-DNA.fas.FEL.json
##                                     4.9131352
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-COX1-Aligned-DNA.fas.FEL.json
##                                     101.1021351
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-COX2-Aligned-DNA.fas.FEL.json
##                                     68.1076053
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-COX3-Aligned-DNA.fas.FEL.json
##                                     70.7439384
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-CYTB-Aligned-DNA.fas.FEL.json
##                                     82.6433201
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-ND1-Aligned-DNA.fas.FEL.json
##                                     85.6393368
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-ND2-Aligned-DNA.fas.FEL.json
##                                     115.3354946
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-ND4L-Aligned-DNA.fas.FEL.json
##                                     13.8776047
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-ND5-Aligned-DNA.fas.FEL.json
##                                     116.2517052
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/Chimaeriforms-ND6-Aligned-DNA.fas.FEL.json
##                                     58.0491543
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-atp6-align-dna.fas.FEL.json
##                                     93.1358788
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-atp8-align-dna.fas.FEL.json
##                                     102.2205450
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-cox1-align-dna.fas.FEL.json

```

```

##                                     98.9634284
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-cox2-align-dna.fas.FEL.json
##                                     30.7991532
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-cox3-align-dna.fas.FEL.json
##                                     56.7198979
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-cytb-align-dna.fas.FEL.json
##                                     98.7338416
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-nd1-align-dna.fas.FEL.json
##                                     144.9762555
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-nd2-align-dna.fas.FEL.json
##                                     115.3951376
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-nd3-align-dna.fas.FEL.json
##                                     51.1531955
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-nd4-align-dna.fas.FEL.json
##                                     197.0107251
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-nd4l-align-dna.fas.FEL.json
##                                     102.4145926
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-nd5-align-dna.fas.FEL.json
##                                     212.6775180
## /Users/Sadie/bin/mtDNA_redo/data/FEL/chiroptera-nd6-align-dna.fas.FEL.json
##                                     161.8660115
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-atp6-align-dna.fas.FEL.json
##                                     84.1673464
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-atp8-align-dna.fas.FEL.json
##                                     59.0437860
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-cox1-align-dna.fas.FEL.json
##                                     101.6301664
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-cox2-align-dna.fas.FEL.json
##                                     92.2626906
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-cytb-align-dna.fas.FEL.json
##                                     105.9161061
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-nd1-align-dna.fas.FEL.json
##                                     84.3611886
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-nd2-align-dna.fas.FEL.json
##                                     100.0170944
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-nd3-align-dna.fas.FEL.json
##                                     76.9601611
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-nd4l-align-dna.fas.FEL.json
##                                     8.0916707
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-nd5-align-dna.fas.FEL.json
##                                     66.1941702
## /Users/Sadie/bin/mtDNA_redo/data/FEL/ciconiiformes-nd6-align-dna.fas.FEL.json
##                                     60.1446585
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Clupeiformes-ATP6-Aligned-DNA.fas.FEL.json
##                                     90.1273258
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Clupeiformes-ATP8-Aligned-DNA.fas.FEL.json
##                                     98.1515375
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Clupeiformes-COX1-Aligned-DNA.fas.FEL.json
##                                     99.2116090
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Clupeiformes-ND1-Aligned-DNA.fas.FEL.json
##                                     120.7719702
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Clupeiformes-ND2-Aligned-DNA.fas.FEL.json
##                                     193.2130216
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Clupeiformes-ND4-Aligned-DNA.fas.FEL.json

```

```

## 139.8229458
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Clupeiformes-ND4L-Aligned-DNA.fas.FEL.json
## 10.5794854
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Clupeiformes-ND5-Aligned-DNA.fas.FEL.json
## 209.1033971
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Clupeiformes-ND6-Aligned-DNA.fas.FEL.json
## 132.2875719
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-ATP6-Aligned-DNA.fas.FEL.json
## 277.1358451
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-ATP8-Aligned-DNA.fas.FEL.json
## 102.0340805
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-COX1-Aligned-DNA.fas.FEL.json
## 343.4791221
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-COX2-Aligned-DNA.fas.FEL.json
## 339.8510471
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-COX3-Aligned-DNA.fas.FEL.json
## 264.9917803
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-CYTB-Aligned-DNA.fas.FEL.json
## 392.5853220
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-ND1-Aligned-DNA.fas.FEL.json
## 314.2810724
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-ND2-Aligned-DNA.fas.FEL.json
## 695.8700214
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-ND3-Aligned-DNA.fas.FEL.json
## 334.8442622
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-ND4-Aligned-DNA.fas.FEL.json
## 414.5461934
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-ND4L-Aligned-DNA.fas.FEL.json
## 195.8147943
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-ND5-Aligned-DNA.fas.FEL.json
## 395.2838982
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Coleoptera-ND6-Aligned-DNA.fas.FEL.json
## 390.1489803
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-atp6-align-dna.fas.FEL.json
## 526.2587902
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-atp8-align-dna.fas.FEL.json
## 234.3580925
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-cox1-align-dna.fas.FEL.json
## 621.9768552
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-cox2-align-dna.fas.FEL.json
## 439.7102236
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-cox3-align-dna.fas.FEL.json
## 510.0815209
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-cytb-align-dna.fas.FEL.json
## 677.8634996
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-nd1-align-dna.fas.FEL.json
## 343.2076329
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-nd2-align-dna.fas.FEL.json
## 382.4006513
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-nd3-align-dna.fas.FEL.json
## 140.3864027
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-nd4-align-dna.fas.FEL.json
## 539.9180321
## /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-nd4l-align-dna.fas.FEL.json

```

```

##                                     342.2231431
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-nd5-align-dna.fas.FEL.json
##                                     518.4561345
##           /Users/Sadie/bin/mtDNA_redo/data/FEL/collembola-nd6-align-dna.fas.FEL.json
##                                     411.8803304
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-atp6-align-dna.fas.FEL.json
##                                     147.0297731
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-atp8-align-dna.fas.FEL.json
##                                     83.6152436
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-cox1-align-dna.fas.FEL.json
##                                     172.0183190
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-cox2-align-dna.fas.FEL.json
##                                     44.8545450
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-cox3-align-dna.fas.FEL.json
##                                     104.0870063
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-cytb-align-dna.fas.FEL.json
##                                     130.9373391
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-nd1-align-dna.fas.FEL.json
##                                     120.4710643
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-nd2-align-dna.fas.FEL.json
##                                     183.9043190
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-nd3-align-dna.fas.FEL.json
##                                     84.4900574
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-nd4-align-dna.fas.FEL.json
##                                     194.0913635
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-nd4l-align-dna.fas.FEL.json
##                                     19.6222404
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-nd5-align-dna.fas.FEL.json
##                                     229.1208538
## /Users/Sadie/bin/mtDNA_redo/data/FEL/cyprinodontiformes-nd6-align-dna.fas.FEL.json
##                                     206.8271017
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-atp6-align-dna.fas.FEL.json
##                                     212.2637967
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-atp8-align-dna.fas.FEL.json
##                                     121.2989010
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-cox1-align-dna.fas.FEL.json
##                                     172.7202722
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-cox2-align-dna.fas.FEL.json
##                                     166.7709991
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-cox3-align-dna.fas.FEL.json
##                                     146.2047112
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-cytb-align-dna.fas.FEL.json
##                                     228.2021554
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-nd1-align-dna.fas.FEL.json
##                                     244.3948500
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-nd2-align-dna.fas.FEL.json
##                                     375.5888055
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-nd3-align-dna.fas.FEL.json
##                                     235.0864751
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-nd4-align-dna.fas.FEL.json
##                                     302.8781028
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-nd4l-align-dna.fas.FEL.json
##                                     105.9221823
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-nd5-align-dna.fas.FEL.json

```

```

## 517.0385228
## /Users/Sadie/bin/mtDNA_redo/data/FEL/dasyuromorphia-nd6-align-dna.fas.FEL.json
## 284.9218558
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-ATP6-Aligned-DNA.fas.FEL.json
## 258.4903275
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-ATP8-Aligned-DNA.fas.FEL.json
## 144.5359848
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-COX1-Aligned-DNA.fas.FEL.json
## 315.9297069
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-COX2-Aligned-DNA.fas.FEL.json
## 218.9376804
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-COX3-Aligned-DNA.fas.FEL.json
## 230.7876458
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-CYTB-Aligned-DNA.fas.FEL.json
## 337.8672828
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-ND1-Aligned-DNA.fas.FEL.json
## 254.3280431
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-ND2-Aligned-DNA.fas.FEL.json
## 436.7732005
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-ND3-Aligned-DNA.fas.FEL.json
## 149.1954802
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-ND4-Aligned-DNA.fas.FEL.json
## 406.7655870
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-ND4L-Aligned-DNA.fas.FEL.json
## 192.8712721
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-ND5-Aligned-DNA.fas.FEL.json
## 423.5820625
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Decapoda-ND6-Aligned-DNA.fas.FEL.json
## 357.2831520
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-ATP6-Aligned-DNA.fas.FEL.json
## 127.3239352
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-ATP8-Aligned-DNA.fas.FEL.json
## 131.9126777
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-COX1-Aligned-DNA.fas.FEL.json
## 183.6938922
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-COX2-Aligned-DNA.fas.FEL.json
## 130.2885724
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-CYTB-Aligned-DNA.fas.FEL.json
## 236.4528690
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-ND1-Aligned-DNA.fas.FEL.json
## 236.6471723
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-ND2-Aligned-DNA.fas.FEL.json
## 224.2420963
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-ND3-Aligned-DNA.fas.FEL.json
## 133.2862701
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-ND4L-Aligned-DNA.fas.FEL.json
## 111.1519419
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-ND5-Aligned-DNA.fas.FEL.json
## 340.0301114
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diprotodontia-ND6-Aligned-DNA.fas.FEL.json
## 111.6168972
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-ATP6-Aligned-DNA.fas.FEL.json
## 188.4384289
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-ATP8-Aligned-DNA.fas.FEL.json

```

```

## 117.8618178
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-COX1-Aligned-DNA.fas.FEL.json
## 251.1676568
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-COX2-Aligned-DNA.fas.FEL.json
## 163.3114126
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-COX3-Aligned-DNA.fas.FEL.json
## 116.9110550
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-CYTB-Aligned-DNA.fas.FEL.json
## 213.6239639
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-ND1-Aligned-DNA.fas.FEL.json
## 179.1672896
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-ND2-Aligned-DNA.fas.FEL.json
## 205.2119415
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-ND3-Aligned-DNA.fas.FEL.json
## 155.3425908
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-ND4L-Aligned-DNA.fas.FEL.json
## 118.2030359
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-ND5-Aligned-DNA.fas.FEL.json
## 354.0152489
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Diptera-ND6-Aligned-DNA.fas.FEL.json
## 178.0952187
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-ATP6-Aligned-DNA.fas.FEL.json
## 65.4723086
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-ATP8-Aligned-DNA.fas.FEL.json
## 4.7529210
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-COX1-Aligned-DNA.fas.FEL.json
## 153.0869945
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-COX2-Aligned-DNA.fas.FEL.json
## 77.3530392
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-CYTB-Aligned-DNA.fas.FEL.json
## 94.6809752
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-ND1-Aligned-DNA.fas.FEL.json
## 21.7530608
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-ND2-Aligned-DNA.fas.FEL.json
## 61.9988253
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-ND3-Aligned-DNA.fas.FEL.json
## 64.2721301
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-ND4-Aligned-DNA.fas.FEL.json
## 160.9829788
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-ND4L-Aligned-DNA.fas.FEL.json
## 83.7971901
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-ND5-Aligned-DNA.fas.FEL.json
## 134.0463846
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Falconiformes-ND6-Aligned-DNA.fas.FEL.json
## 106.2531379
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-ATP6-Aligned-DNA.fas.FEL.json
## 84.2204868
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-COX1-Aligned-DNA.fas.FEL.json
## 92.5645565
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-COX2-Aligned-DNA.fas.FEL.json
## 60.0882487
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-COX3-Aligned-DNA.fas.FEL.json
## 63.7134221
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-CYTB-Aligned-DNA.fas.FEL.json

```



```

## 110.8991649
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-ND1-Aligned-DNA.fas.FEL.json
## 93.1569115
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-ND2-Aligned-DNA.fas.FEL.json
## 133.5922851
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-ND3-Aligned-DNA.fas.FEL.json
## 60.0004253
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-ND4-Aligned-DNA.fas.FEL.json
## 160.2501052
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-ND4L-Aligned-DNA.fas.FEL.json
## 59.2376382
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-ND5-Aligned-DNA.fas.FEL.json
## 217.3721354
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gadiformes-ND6-Aligned-DNA.fas.FEL.json
## 83.7392269
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-ATP6-Aligned-DNA.fas.FEL.json
## 66.5025352
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-ATP8-Aligned-DNA.fas.FEL.json
## 6.5069791
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-COX1-Aligned-DNA.fas.FEL.json
## 76.0872727
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-COX2-Aligned-DNA.fas.FEL.json
## 37.3138313
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-CYTB-Aligned-DNA.fas.FEL.json
## 118.0052550
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-ND1-Aligned-DNA.fas.FEL.json
## 107.3142565
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-ND2-Aligned-DNA.fas.FEL.json
## 65.3398835
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-ND3-Aligned-DNA.fas.FEL.json
## 88.8760407
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-ND4L-Aligned-DNA.fas.FEL.json
## 6.8505101
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-ND5-Aligned-DNA.fas.FEL.json
## 193.3192239
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Galliformes-ND6-Aligned-DNA.fas.FEL.json
## 63.7312296
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-atp6-align-dna.fas.FEL.json
## 72.0263496
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-cox1-align-dna.fas.FEL.json
## 62.3420813
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-cox3-align-dna.fas.FEL.json
## 32.6813313
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-cytb-align-dna.fas.FEL.json
## 17.8099099
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-nd1-align-dna.fas.FEL.json
## 67.9492947
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-nd2-align-dna.fas.FEL.json
## 52.3508628
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-nd3-align-dna.fas.FEL.json
## 9.9346624
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-nd4-align-dna.fas.FEL.json
## 67.1090318
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-nd4l-align-dna.fas.FEL.json

```

```

## 7.3757215
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-nd5-align-dna.fas.FEL.json
## 86.3454689
## /Users/Sadie/bin/mtDNA_redo/data/FEL/gasterosteiformes-nd6-align-dna.fas.FEL.json
## 29.6614345
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-ATP6-Aligned-DNA.fas.FEL.json
## 141.6959887
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-ATP8-Aligned-DNA.fas.FEL.json
## 119.0118145
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-COX1-Aligned-DNA.fas.FEL.json
## 181.0611000
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-COX2-Aligned-DNA.fas.FEL.json
## 108.3711174
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-CYTB-Aligned-DNA.fas.FEL.json
## 225.9032347
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-ND1-Aligned-DNA.fas.FEL.json
## 182.1226666
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-ND2-Aligned-DNA.fas.FEL.json
## 244.0504831
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-ND3-Aligned-DNA.fas.FEL.json
## 110.2321103
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-ND4-Aligned-DNA.fas.FEL.json
## 239.1114043
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-ND4L-Aligned-DNA.fas.FEL.json
## 105.3125580
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-ND5-Aligned-DNA.fas.FEL.json
## 350.7135919
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gruiformes-ND6-Aligned-DNA.fas.FEL.json
## 202.2591716
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-ATP6-Aligned-DNA.fas.FEL.json
## 286.7858721
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-ATP8-Aligned-DNA.fas.FEL.json
## 212.4116499
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-COX1-Aligned-DNA.fas.FEL.json
## 266.6346647
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-COX2-Aligned-DNA.fas.FEL.json
## 255.5349505
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-ND1-Aligned-DNA.fas.FEL.json
## 323.5788121
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-ND2-Aligned-DNA.fas.FEL.json
## 378.8050376
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-ND3-Aligned-DNA.fas.FEL.json
## 189.1761714
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-ND4-Aligned-DNA.fas.FEL.json
## 470.5089075
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-ND4L-Aligned-DNA.fas.FEL.json
## 205.2726237
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-ND5-Aligned-DNA.fas.FEL.json
## 462.7834825
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Gymnophiona-ND6-Aligned-DNA.fas.FEL.json
## 230.7524812
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-ATP6-Aligned-DNA.fas.FEL.json
## 435.7767592
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-ATP8-Aligned-DNA.fas.FEL.json

```

```

##                                     294.3830980
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-COX1-Aligned-DNA.fas.FEL.json
##                                     448.7785159
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-COX2-Aligned-DNA.fas.FEL.json
##                                     441.1072107
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-COX3-Aligned-DNA.fas.FEL.json
##                                     418.1422365
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-CYTB-Aligned-DNA.fas.FEL.json
##                                     530.1928897
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-ND1-Aligned-DNA.fas.FEL.json
##                                     355.6060796
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-ND2-Aligned-DNA.fas.FEL.json
##                                     492.4224163
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-ND3-Aligned-DNA.fas.FEL.json
##                                     288.4935314
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-ND4-Aligned-DNA.fas.FEL.json
##                                     514.5043834
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-ND4L-Aligned-DNA.fas.FEL.json
##                                     242.9308191
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-ND5-Aligned-DNA.fas.FEL.json
##                                     674.5117072
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Hemiptera-ND6-Aligned-DNA.fas.FEL.json
##                                     235.4368404
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-atp6-align-dna.fas.FEL.json
##                                     204.5233508
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-atp8-align-dna.fas.FEL.json
##                                     117.8256831
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-cox1-align-dna.fas.FEL.json
##                                     289.2002761
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-cox2-align-dna.fas.FEL.json
##                                     204.5267464
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-cox3-align-dna.fas.FEL.json
##                                     210.7303328
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-cytb-align-dna.fas.FEL.json
##                                     228.2003756
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-nd1-align-dna.fas.FEL.json
##                                     187.9238493
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-nd2-align-dna.fas.FEL.json
##                                     156.6490170
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-nd3-align-dna.fas.FEL.json
##                                     176.7612804
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-nd4-align-dna.fas.FEL.json
##                                     213.6501558
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-nd4l-align-dna.fas.FEL.json
##                                     117.6575923
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-nd5-align-dna.fas.FEL.json
##                                     323.3397431
## /Users/Sadie/bin/mtDNA_redo/data/FEL/hymenoptera-nd6-align-dna.fas.FEL.json
##                                     165.9974514
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-ATP6-Aligned-DNA.fas.FEL.json
##                                     228.9765089
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-ATP8-Aligned-DNA.fas.FEL.json
##                                     122.4412712
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-COX1-Aligned-DNA.fas.FEL.json

```

```

##                                     247.7791574
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-COX2-Aligned-DNA.fas.FEL.json
##                                     176.2128707
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-CYTB-Aligned-DNA.fas.FEL.json
##                                     276.7217451
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-ND1-Aligned-DNA.fas.FEL.json
##                                     282.5753519
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-ND2-Aligned-DNA.fas.FEL.json
##                                     377.6753139
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-ND3-Aligned-DNA.fas.FEL.json
##                                     200.6087895
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-ND4L-Aligned-DNA.fas.FEL.json
##                                     141.1664291
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-ND5-Aligned-DNA.fas.FEL.json
##                                     422.2663962
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Insectivora-ND6-Aligned-DNA.fas.FEL.json
##                                     319.3441336
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-ATP6-Aligned-DNA.fas.FEL.json
##                                     407.2214403
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-ATP8-Aligned-DNA.fas.FEL.json
##                                     220.2899911
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-COX1-Aligned-DNA.fas.FEL.json
##                                     328.1456136
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-COX2-Aligned-DNA.fas.FEL.json
##                                     329.9108457
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-COX3-Aligned-DNA.fas.FEL.json
##                                     434.0435331
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-CYTB-Aligned-DNA.fas.FEL.json
##                                     406.1668616
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-ND1-Aligned-DNA.fas.FEL.json
##                                     311.4535187
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-ND2-Aligned-DNA.fas.FEL.json
##                                     580.3430053
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-ND3-Aligned-DNA.fas.FEL.json
##                                     353.2589975
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-ND4-Aligned-DNA.fas.FEL.json
##                                     478.4439604
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-ND4L-Aligned-DNA.fas.FEL.json
##                                     293.9015693
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-ND5-Aligned-DNA.fas.FEL.json
##                                     505.5155907
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ixodida-ND6-Aligned-DNA.fas.FEL.json
##                                     317.1939101
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-ATP6-Aligned-DNA.fas.FEL.json
##                                     67.3805618
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-ATP8-Aligned-DNA.fas.FEL.json
##                                     105.7575287
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-COX1-Aligned-DNA.fas.FEL.json
##                                     141.7069678
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-COX2-Aligned-DNA.fas.FEL.json
##                                     93.4375494
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-CYTB-Aligned-DNA.fas.FEL.json
##                                     155.5362027
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-ND1-Aligned-DNA.fas.FEL.json

```

```

## 117.7614662
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-ND2-Aligned-DNA.fas.FEL.json
## 181.1402596
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-ND4L-Aligned-DNA.fas.FEL.json
## 84.4940583
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-ND5-Aligned-DNA.fas.FEL.json
## 213.2021587
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lagomorpha-ND6-Aligned-DNA.fas.FEL.json
## 146.2849219
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-ATP6-Aligned-DNA.fas.FEL.json
## 270.9523328
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-ATP8-Aligned-DNA.fas.FEL.json
## 176.7839169
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-COX1-Aligned-DNA.fas.FEL.json
## 257.8757929
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-COX2-Aligned-DNA.fas.FEL.json
## 294.3467624
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-COX3-Aligned-DNA.fas.FEL.json
## 254.4566378
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-CYTB-Aligned-DNA.fas.FEL.json
## 423.1472797
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-ND1-Aligned-DNA.fas.FEL.json
## 236.8093886
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-ND2-Aligned-DNA.fas.FEL.json
## 353.2985565
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-ND3-Aligned-DNA.fas.FEL.json
## 235.8849270
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-ND4-Aligned-DNA.fas.FEL.json
## 366.9626544
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-ND4L-Aligned-DNA.fas.FEL.json
## 228.1668407
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-ND5-Aligned-DNA.fas.FEL.json
## 343.7317052
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lepidoptera-ND6-Aligned-DNA.fas.FEL.json
## 276.6594349
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-ATP6-Aligned-DNA.fas.FEL.json
## 59.7441372
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-COX1-Aligned-DNA.fas.FEL.json
## 62.3503793
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-COX2-Aligned-DNA.fas.FEL.json
## 11.2912024
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-COX3-Aligned-DNA.fas.FEL.json
## 59.9815548
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-CYTB-Aligned-DNA.fas.FEL.json
## 86.2729809
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-ND1-Aligned-DNA.fas.FEL.json
## 18.1092912
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-ND2-Aligned-DNA.fas.FEL.json
## 102.9476679
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-ND4L-Aligned-DNA.fas.FEL.json
## 14.9333959
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-ND5-Aligned-DNA.fas.FEL.json
## 77.7748569
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Lophiiformes-ND6-Aligned-DNA.fas.FEL.json

```

```

## 83.7646834
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-ATP6-Aligned-DNA.fas.FEL.json
## 320.2006320
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-COX1-Aligned-DNA.fas.FEL.json
## 462.9082542
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-COX2-Aligned-DNA.fas.FEL.json
## 320.0238278
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-COX3-Aligned-DNA.fas.FEL.json
## 464.0131974
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-CYTB-Aligned-DNA.fas.FEL.json
## 546.0884689
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-ND1-Aligned-DNA.fas.FEL.json
## 539.0830509
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-ND2-Aligned-DNA.fas.FEL.json
## 545.3982859
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-ND3-Aligned-DNA.fas.FEL.json
## 346.3910011
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-ND4-Aligned-DNA.fas.FEL.json
## 629.9765421
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-ND4L-Aligned-DNA.fas.FEL.json
## 306.0492371
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-ND5-Aligned-DNA.fas.FEL.json
## 654.6458154
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Mermithida-ND6-Aligned-DNA.fas.FEL.json
## 376.8323623
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-atp6-align-dna.fas.FEL.json
## 325.2955557
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-atp8-align-dna.fas.FEL.json
## 58.8710441
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-cox1-align-dna.fas.FEL.json
## 457.2270867
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-cox2-align-dna.fas.FEL.json
## 182.6172597
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-cox3-align-dna.fas.FEL.json
## 254.4909005
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-cytb-align-dna.fas.FEL.json
## 274.7990891
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-nd1-align-dna.fas.FEL.json
## 244.3341562
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-nd2-align-dna.fas.FEL.json
## 456.5248646
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-nd3-align-dna.fas.FEL.json
## 263.1531116
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-nd4-align-dna.fas.FEL.json
## 355.9541268
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-nd4l-align-dna.fas.FEL.json
## 163.3364753
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-nd5-align-dna.fas.FEL.json
## 509.7823558
## /Users/Sadie/bin/mtDNA_redo/data/FEL/neuroptera-nd6-align-dna.fas.FEL.json
## 0.6764760
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ophidiiformes-ATP6-Aligned-DNA.fas.FEL.json
## 230.2346303
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ophidiiformes-ATP8-Aligned-DNA.fas.FEL.json

```

```

## 118.1687294
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ophidiiformes-COX1-Aligned-DNA.fas.FEL.json
## 157.8878133
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ophidiiformes-ND1-Aligned-DNA.fas.FEL.json
## 256.9985409
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ophidiiformes-ND4L-Aligned-DNA.fas.FEL.json
## 119.9555401
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ophidiiformes-ND5-Aligned-DNA.fas.FEL.json
## 387.7444574
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ophidiiformes-ND6-Aligned-DNA.fas.FEL.json
## 165.8930603
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-ATP6-Aligned-DNA.fas.FEL.json
## 237.9751181
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-ATP8-Aligned-DNA.fas.FEL.json
## 117.8709984
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-COX1-Aligned-DNA.fas.FEL.json
## 277.1590731
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-COX2-Aligned-DNA.fas.FEL.json
## 243.4889168
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-COX3-Aligned-DNA.fas.FEL.json
## 265.3940791
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-CYTB-Aligned-DNA.fas.FEL.json
## 275.0692373
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-ND1-Aligned-DNA.fas.FEL.json
## 256.1138517
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-ND2-Aligned-DNA.fas.FEL.json
## 156.8422633
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-ND3-Aligned-DNA.fas.FEL.json
## 228.1324189
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-ND4-Aligned-DNA.fas.FEL.json
## 315.2052111
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-ND4L-Aligned-DNA.fas.FEL.json
## 103.1494216
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-ND5-Aligned-DNA.fas.FEL.json
## 381.1219332
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Orthoptera-ND6-Aligned-DNA.fas.FEL.json
## 295.1422033
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-ATP6-Aligned-DNA.fas.FEL.json
## 23.3758983
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-ATP8-Aligned-DNA.fas.FEL.json
## 8.7707455
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-COX1-Aligned-DNA.fas.FEL.json
## 43.9573433
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-COX3-Aligned-DNA.fas.FEL.json
## 53.0884299
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-CYTB-Aligned-DNA.fas.FEL.json
## 61.5155365
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-ND1-Aligned-DNA.fas.FEL.json
## 28.1516667
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-ND2-Aligned-DNA.fas.FEL.json
## 35.3412350
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-ND3-Aligned-DNA.fas.FEL.json
## 6.5380648
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-ND4-Aligned-DNA.fas.FEL.json

```

```

## 121.7297616
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-ND4L-Aligned-DNA.fas.FEL.json
## 6.8687230
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-ND5-Aligned-DNA.fas.FEL.json
## 130.7237574
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osmeriformes-ND6-Aligned-DNA.fas.FEL.json
## 81.8905181
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-ATP6-Aligned-DNA.fas.FEL.json
## 60.5125163
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-ATP8-Aligned-DNA.fas.FEL.json
## 20.1233415
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-COX1-Aligned-DNA.fas.FEL.json
## 92.7589142
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-COX3-Aligned-DNA.fas.FEL.json
## 47.6170571
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-ND1-Aligned-DNA.fas.FEL.json
## 120.2535245
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-ND2-Aligned-DNA.fas.FEL.json
## 191.8736711
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-ND3-Aligned-DNA.fas.FEL.json
## 96.3262867
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-ND4L-Aligned-DNA.fas.FEL.json
## 73.5767191
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-ND5-Aligned-DNA.fas.FEL.json
## 236.3375236
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Osteoglossiformes-ND6-Aligned-DNA.fas.FEL.json
## 133.6512350
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-ATP6-Aligned-DNA.fas.FEL.json
## 133.1024344
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-COX1-Aligned-DNA.fas.FEL.json
## 143.2503415
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-COX2-Aligned-DNA.fas.FEL.json
## 29.2007447
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-COX3-Aligned-DNA.fas.FEL.json
## 135.6804553
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-CYTB-Aligned-DNA.fas.FEL.json
## 216.8358671
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-ND1-Aligned-DNA.fas.FEL.json
## 92.1643565
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-ND2-Aligned-DNA.fas.FEL.json
## 133.1549654
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-ND3-Aligned-DNA.fas.FEL.json
## 60.1617637
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-ND4-Aligned-DNA.fas.FEL.json
## 159.6865966
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-ND4L-Aligned-DNA.fas.FEL.json
## 59.3936084
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-ND5-Aligned-DNA.fas.FEL.json
## 207.0590086
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Ostreoida-ND6-Aligned-DNA.fas.FEL.json
## 122.3395356
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-ATP6-Aligned-DNA.fas.FEL.json
## 60.1000033
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-ATP8-Aligned-DNA.fas.FEL.json

```



```

## 7.1353015
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-COX1-Aligned-DNA.fas.FEL.json
## 71.8686497
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-COX2-Aligned-DNA.fas.FEL.json
## 75.5731044
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-COX3-Aligned-DNA.fas.FEL.json
## 86.7184151
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-CYTB-Aligned-DNA.fas.FEL.json
## 18.9869148
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-ND1-Aligned-DNA.fas.FEL.json
## 13.7642930
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-ND2-Aligned-DNA.fas.FEL.json
## 14.6190393
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-ND3-Aligned-DNA.fas.FEL.json
## 7.9059614
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-ND4-Aligned-DNA.fas.FEL.json
## 18.9710135
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-ND4L-Aligned-DNA.fas.FEL.json
## 6.8676690
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-ND5-Aligned-DNA.fas.FEL.json
## 119.6857556
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Passeriformes-ND6-Aligned-DNA.fas.FEL.json
## 10.6698450
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-ATP6-Aligned-DNA.fas.FEL.json
## 69.3550219
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-COX1-Aligned-DNA.fas.FEL.json
## 63.1312001
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-COX3-Aligned-DNA.fas.FEL.json
## 70.5069286
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-CYTB-Aligned-DNA.fas.FEL.json
## 119.8769198
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-ND1-Aligned-DNA.fas.FEL.json
## 69.6236194
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-ND2-Aligned-DNA.fas.FEL.json
## 104.9256894
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-ND3-Aligned-DNA.fas.FEL.json
## 31.2071370
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-ND4-Aligned-DNA.fas.FEL.json
## 40.4904277
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-ND4L-Aligned-DNA.fas.FEL.json
## 60.0469305
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-ND5-Aligned-DNA.fas.FEL.json
## 280.2165988
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pectinoida-ND6-Aligned-DNA.fas.FEL.json
## 145.0214598
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-atp6-align-dna.fas.FEL.json
## 109.7749676
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-atp8-align-dna.fas.FEL.json
## 76.0590646
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-cox1-align-dna.fas.FEL.json
## 86.6167499
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-cox2-align-dna.fas.FEL.json
## 47.2496628
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-cox3-align-dna.fas.FEL.json

```

```

## 79.4015387
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-cytb-align-dna.fas.FEL.json
## 88.1647813
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-nd1-align-dna.fas.FEL.json
## 72.7705852
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-nd2-align-dna.fas.FEL.json
## 110.9896710
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-nd3-align-dna.fas.FEL.json
## 26.7333998
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-nd4-align-dna.fas.FEL.json
## 137.6589762
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-nd4l-align-dna.fas.FEL.json
## 53.5107294
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-nd5-align-dna.fas.FEL.json
## 295.0126757
## /Users/Sadie/bin/mtDNA_redo/data/FEL/perissodactyla-nd6-align-dna.fas.FEL.json
## 68.9293679
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-ATP6-Aligned-DNA.fas.FEL.json
## 273.0866460
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-ATP8-Aligned-DNA.fas.FEL.json
## 0.1379409
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-COX3-Aligned-DNA.fas.FEL.json
## 252.6955683
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-CYTB-Aligned-DNA.fas.FEL.json
## 368.8145365
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-ND1-Aligned-DNA.fas.FEL.json
## 281.7629704
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-ND2-Aligned-DNA.fas.FEL.json
## 453.0686495
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-ND3-Aligned-DNA.fas.FEL.json
## 205.1343193
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-ND4-Aligned-DNA.fas.FEL.json
## 490.7825352
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-ND4L-Aligned-DNA.fas.FEL.json
## 85.4549999
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-ND5-Aligned-DNA.fas.FEL.json
## 413.5165595
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Phasmatodea-ND6-Aligned-DNA.fas.FEL.json
## 265.5245417
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-ATP6-Aligned-DNA.fas.FEL.json
## 99.4354866
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-ATP8-Aligned-DNA.fas.FEL.json
## 6.3979623
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-COX1-Aligned-DNA.fas.FEL.json
## 100.3476560
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-COX3-Aligned-DNA.fas.FEL.json
## 87.1980857
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-CYTB-Aligned-DNA.fas.FEL.json
## 107.9188310
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-ND1-Aligned-DNA.fas.FEL.json
## 104.5438403
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-ND2-Aligned-DNA.fas.FEL.json
## 134.3723160
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-ND3-Aligned-DNA.fas.FEL.json

```

```

## 7.8613402
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-ND4-Aligned-DNA.fas.FEL.json
## 137.1060561
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-ND4L-Aligned-DNA.fas.FEL.json
## 8.7787047
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-ND5-Aligned-DNA.fas.FEL.json
## 80.2559475
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Pleuronectiformes-ND6-Aligned-DNA.fas.FEL.json
## 130.4667485
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-atp6-align-dna.fas.FEL.json
## 118.7251376
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-atp8-align-dna.fas.FEL.json
## 83.4515864
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-cox1-align-dna.fas.FEL.json
## 144.0433483
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-cox2-align-dna.fas.FEL.json
## 91.3941853
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-cytb-align-dna.fas.FEL.json
## 125.6953611
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-nd1-align-dna.fas.FEL.json
## 104.4337928
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-nd2-align-dna.fas.FEL.json
## 169.0300425
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-nd3-align-dna.fas.FEL.json
## 12.7830788
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-nd4-align-dna.fas.FEL.json
## 123.7211741
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-nd4l-align-dna.fas.FEL.json
## 27.6045475
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-nd5-align-dna.fas.FEL.json
## 215.5202784
## /Users/Sadie/bin/mtDNA_redo/data/FEL/primates-nd6-align-dna.fas.FEL.json
## 106.6423507
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-atp6-align-dna.fas.FEL.json
## 172.8517737
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-atp8-align-dna.fas.FEL.json
## 69.2380932
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-cox1-align-dna.fas.FEL.json
## 191.6255117
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-cox2-align-dna.fas.FEL.json
## 145.3626884
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-cox3-align-dna.fas.FEL.json
## 149.6933162
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-cytb-align-dna.fas.FEL.json
## 250.0337017
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-nd1-align-dna.fas.FEL.json
## 104.1324328
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-nd2-align-dna.fas.FEL.json
## 213.1679600
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-nd3-align-dna.fas.FEL.json
## 79.2778770
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-nd4-align-dna.fas.FEL.json
## 194.9779666
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-nd4l-align-dna.fas.FEL.json

```

```

##                                     85.4877718
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-nd5-align-dna.fas.FEL.json
##                                     256.3850550
## /Users/Sadie/bin/mtDNA_redo/data/FEL/psittaciformes-nd6-align-dna.fas.FEL.json
##                                     203.5363020
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-ATP6-Aligned-DNA.fas.FEL.json
##                                     346.0745706
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-COX1-Aligned-DNA.fas.FEL.json
##                                     202.8228689
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-COX2-Aligned-DNA.fas.FEL.json
##                                     224.8797773
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-COX3-Aligned-DNA.fas.FEL.json
##                                     188.9531198
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-CYTB-Aligned-DNA.fas.FEL.json
##                                     351.4213079
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-ND1-Aligned-DNA.fas.FEL.json
##                                     302.6855411
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-ND2-Aligned-DNA.fas.FEL.json
##                                     379.1715316
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-ND3-Aligned-DNA.fas.FEL.json
##                                     257.2006984
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-ND4-Aligned-DNA.fas.FEL.json
##                                     364.5614165
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-ND4L-Aligned-DNA.fas.FEL.json
##                                     178.8773772
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-ND5-Aligned-DNA.fas.FEL.json
##                                     418.4116035
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Rhabditida-ND6-Aligned-DNA.fas.FEL.json
##                                     317.1963557
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-ATP6-Aligned-DNA.fas.FEL.json
##                                     10.9066214
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-COX1-Aligned-DNA.fas.FEL.json
##                                     50.1061223
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-COX2-Aligned-DNA.fas.FEL.json
##                                     10.9143248
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-COX3-Aligned-DNA.fas.FEL.json
##                                     11.0713900
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-CYTB-Aligned-DNA.fas.FEL.json
##                                     13.3199867
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-ND1-Aligned-DNA.fas.FEL.json
##                                     12.7205158
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-ND2-Aligned-DNA.fas.FEL.json
##                                     13.4922844
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-ND4-Aligned-DNA.fas.FEL.json
##                                     56.7101879
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-ND5-Aligned-DNA.fas.FEL.json
##                                     19.4434539
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Salmoniformes-ND6-Aligned-DNA.fas.FEL.json
##                                     12.8397326
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-ATP6-Aligned-DNA.fas.FEL.json
##                                     85.8176276
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-ATP8-Aligned-DNA.fas.FEL.json
##                                     59.0328352
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-COX1-Aligned-DNA.fas.FEL.json

```

```

## 98.9948288
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-ND1-Aligned-DNA.fas.FEL.json
## 106.2774107
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-ND2-Aligned-DNA.fas.FEL.json
## 188.5199256
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-ND3-Aligned-DNA.fas.FEL.json
## 17.6163470
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-ND4-Aligned-DNA.fas.FEL.json
## 143.1625336
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-ND4L-Aligned-DNA.fas.FEL.json
## 94.4718840
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-ND5-Aligned-DNA.fas.FEL.json
## 228.6896622
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Scorpaeniformes-ND6-Aligned-DNA.fas.FEL.json
## 179.4306590
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-atp6-align-dna.fas.FEL.json
## 79.8854991
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-atp8-align-dna.fas.FEL.json
## 5.7867380
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-cox1-align-dna.fas.FEL.json
## 31.6329849
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-cox2-align-dna.fas.FEL.json
## 23.0043090
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-cox3-align-dna.fas.FEL.json
## 48.8216381
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-cytb-align-dna.fas.FEL.json
## 89.4166220
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-nd1-align-dna.fas.FEL.json
## 103.0998605
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-nd2-align-dna.fas.FEL.json
## 96.3552007
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-nd3-align-dna.fas.FEL.json
## 61.5145919
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-nd4-align-dna.fas.FEL.json
## 61.9792468
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-nd4l-align-dna.fas.FEL.json
## 37.1883883
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-nd5-align-dna.fas.FEL.json
## 160.5704119
## /Users/Sadie/bin/mtDNA_redo/data/FEL/siluriformes-nd6-align-dna.fas.FEL.json
## 61.5104468
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Stephanoberyciformes-ATP6-Aligned-DNA.fas.FEL.json
## 11.3062604
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Stephanoberyciformes-COX2-Aligned-DNA.fas.FEL.json
## 12.6385635
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Stephanoberyciformes-COX3-Aligned-DNA.fas.FEL.json
## 54.4274519
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Stephanoberyciformes-CYTB-Aligned-DNA.fas.FEL.json
## 39.0223581
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Stephanoberyciformes-ND3-Aligned-DNA.fas.FEL.json
## 18.0735013
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Stephanoberyciformes-ND4-Aligned-DNA.fas.FEL.json
## 75.8859277
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Syngnathiformes-ATP6-Aligned-DNA.fas.FEL.json

```

```

## 313.0039021
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Syngnathiformes-ATP8-Aligned-DNA.fas.FEL.json
## 118.0868734
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Syngnathiformes-COX1-Aligned-DNA.fas.FEL.json
## 258.3113542
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Syngnathiformes-CYTB-Aligned-DNA.fas.FEL.json
## 344.4930543
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Syngnathiformes-ND1-Aligned-DNA.fas.FEL.json
## 324.6773929
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Syngnathiformes-ND2-Aligned-DNA.fas.FEL.json
## 424.5332513
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Syngnathiformes-ND4L-Aligned-DNA.fas.FEL.json
## 171.3883314
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Syngnathiformes-ND5-Aligned-DNA.fas.FEL.json
## 478.4347589
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Syngnathiformes-ND6-Aligned-DNA.fas.FEL.json
## 245.3532490
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Testudines-COX1-Aligned-DNA.fas.FEL.json
## 16.9924172
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Testudines-COX3-Aligned-DNA.fas.FEL.json
## 83.9597894
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Testudines-CYTB-Aligned-DNA.fas.FEL.json
## 177.0493683
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Testudines-ND2-Aligned-DNA.fas.FEL.json
## 157.7350304
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Testudines-ND3-Aligned-DNA.fas.FEL.json
## 83.5265367
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Testudines-ND4-Aligned-DNA.fas.FEL.json
## 113.5884564
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Testudines-ND4L-Aligned-DNA.fas.FEL.json
## 83.5444962
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Testudines-ND5-Aligned-DNA.fas.FEL.json
## 105.0299891
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Testudines-ND6-Aligned-DNA.fas.FEL.json
## 176.7877363
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-ATP6-Aligned-DNA.fas.FEL.json
## 178.4884795
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-ATP8-Aligned-DNA.fas.FEL.json
## 137.0845675
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-COX1-Aligned-DNA.fas.FEL.json
## 198.7202681
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-COX2-Aligned-DNA.fas.FEL.json
## 207.0138618
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-COX3-Aligned-DNA.fas.FEL.json
## 215.6301208
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-CYTB-Aligned-DNA.fas.FEL.json
## 211.0944251
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-ND1-Aligned-DNA.fas.FEL.json
## 194.0755885
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-ND2-Aligned-DNA.fas.FEL.json
## 357.0830474
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-ND3-Aligned-DNA.fas.FEL.json
## 125.0066814
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-ND4-Aligned-DNA.fas.FEL.json

```

```

##                                     397.4430073
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-ND4L-Aligned-DNA.fas.FEL.json
##                                     103.5034514
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-ND5-Aligned-DNA.fas.FEL.json
##                                     387.8638279
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Teuthida-ND6-Aligned-DNA.fas.FEL.json
##                                     197.2706911
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-ATP6-Aligned-DNA.fas.FEL.json
##                                     270.9461867
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-ATP8-Aligned-DNA.fas.FEL.json
##                                     155.8186379
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-COX1-Aligned-DNA.fas.FEL.json
##                                     321.5016460
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-COX2-Aligned-DNA.fas.FEL.json
##                                     263.8865482
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-COX3-Aligned-DNA.fas.FEL.json
##                                     304.6641648
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-CYTB-Aligned-DNA.fas.FEL.json
##                                     359.0170204
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-ND1-Aligned-DNA.fas.FEL.json
##                                     354.0763768
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-ND2-Aligned-DNA.fas.FEL.json
##                                     359.2683957
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-ND3-Aligned-DNA.fas.FEL.json
##                                     249.9176324
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-ND4-Aligned-DNA.fas.FEL.json
##                                     429.1644384
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-ND4L-Aligned-DNA.fas.FEL.json
##                                     220.3811882
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-ND5-Aligned-DNA.fas.FEL.json
##                                     530.4496833
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Trombidiformes-ND6-Aligned-DNA.fas.FEL.json
##                                     353.3339327
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-ATP6-Aligned-DNA.fas.FEL.json
##                                     222.2410155
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-ATP8-Aligned-DNA.fas.FEL.json
##                                     186.9824839
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-COX1-Aligned-DNA.fas.FEL.json
##                                     187.3464013
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-COX2-Aligned-DNA.fas.FEL.json
##                                     332.0645623
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-COX3-Aligned-DNA.fas.FEL.json
##                                     165.8590264
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-CYTB-Aligned-DNA.fas.FEL.json
##                                     263.9130950
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-ND1-Aligned-DNA.fas.FEL.json
##                                     152.0801005
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-ND2-Aligned-DNA.fas.FEL.json
##                                     205.0136334
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-ND3-Aligned-DNA.fas.FEL.json
##                                     198.3977185
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-ND4-Aligned-DNA.fas.FEL.json
##                                     225.5084729
##      /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-ND4L-Aligned-DNA.fas.FEL.json

```

```
## 14.7791568
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-ND5-Aligned-DNA.fas.FEL.json 333.5461916
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Unionoida-ND6-Aligned-DNA.fas.FEL.json 204.6207937
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-ATP6-Aligned-DNA.fas.FEL.json 29.3940929
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-COX1-Aligned-DNA.fas.FEL.json 120.8186476
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-COX2-Aligned-DNA.fas.FEL.json 145.5236314
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-COX3-Aligned-DNA.fas.FEL.json 84.8585775
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-CYTB-Aligned-DNA.fas.FEL.json 83.8770733
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-ND1-Aligned-DNA.fas.FEL.json 118.6079550
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-ND2-Aligned-DNA.fas.FEL.json 88.1262381
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-ND3-Aligned-DNA.fas.FEL.json 106.2712731
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-ND4-Aligned-DNA.fas.FEL.json 134.5214304
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-ND4L-Aligned-DNA.fas.FEL.json 11.2818741
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-ND5-Aligned-DNA.fas.FEL.json 157.1095235
## /Users/Sadie/bin/mtDNA_redo/data/FEL/Veneroida-ND6-Aligned-DNA.fas.FEL.json 119.2177476
## /Users/Sadie/bin/mtDNA_redo/data/FEL/zeiformes-atp6-align-dna.fas.FEL.json 75.2843074
## /Users/Sadie/bin/mtDNA_redo/data/FEL/zeiformes-atp8-align-dna.fas.FEL.json 86.8787157
## /Users/Sadie/bin/mtDNA_redo/data/FEL/zeiformes-cox1-align-dna.fas.FEL.json 111.8207667
## /Users/Sadie/bin/mtDNA_redo/data/FEL/zeiformes-nd1-align-dna.fas.FEL.json 108.0882303
## /Users/Sadie/bin/mtDNA_redo/data/FEL/zeiformes-nd4l-align-dna.fas.FEL.json 77.8975053
## /Users/Sadie/bin/mtDNA_redo/data/FEL/zeiformes-nd5-align-dna.fas.FEL.json 181.3668198
## /Users/Sadie/bin/mtDNA_redo/data/FEL/zeiformes-nd6-align-dna.fas.FEL.json 95.6693558
##
```

take that clean it up so you have gene, order, alpha/beta JSD.

```
cleanup <- str_extract_all(names(t), "\\w+(?=-)", simplify = T)
f <- tibble(order = cleanup[,1], gene = cleanup[,2], JSD_alpha_beta = t)
```

stopped here

```
#hclust(f$JSD_alpha_beta) %>% plot()
```