The Data

File formats

Computer programs

- Multitude of programs available for free!
- Most have their own input format
- Many are ”black box” programs
- Input files are always simple text files!!!

No good online resource available

http://evolution.gs.washington.edu/phylip/software.html

was an attempt but not updated for a long time

Computer programs - ML

- IQ-TREE (recommended)
- RAxML (recommended)
- PHYML
- GARLI

Computer programs- Bayesian inference

- MrBayes (recommended)
- BEAST (recommended)
- BAMBE
- BayesPhylogenies

Viewing trees

- FigTree (recommended)
- TreeView
- Winclada
- Dendroscope (for large trees >200 taxa)
- ITOL (Interactive Tree of Life) - https://itol.embl.de/ - an online resource that has a lot of different options

Three most common data formats

- FASTA
- Phylip
- Nexus

Input format - FASTA

```
>Papilio_glaucus_69_3
GAGaTGGAaGACAaGGTTTCGTCGACCCTGTCCGGCCTCGAGGGCGAACT
>Hamearis84_13
GGaATGGAaGAGAAaGTCTCCACAACCCTCTCCGGACTCGAAGGTGAGCT
>Danaus_plexippus108_21
GAGAtGGAGGAGAaGGTCTCCTCCACCCTCTCAGGTCTCGAAGGTGAACT
>Greta_oto70_9
GGAATGGAaGAGAaGGTCTCCTCGACCCTCTCAGGCCTTGAAGGTGAACT
>Amathusia_phidippus114_17
GGaATGGAaGACAAaGTCTCCTCAaCCCTCTCCGGTCTTGAGGGTGAACT
>Morpho_peleides66_5
GGaATGGAGAGAAAaGTCTCTACTACCCTGTCTGGCCTCGAAGGCGAACT
>BrintesiaB01
GGAATGGAaGACAAaGTCTCGTCCACCCTCTCCGGGCTGGAAGGCGAGCT
>Elymnias_casiphone121_20
GAGAwGGaAGAcaAAGTATCCTCCACCCTCTCTGGTCTTGAAGCTGAACT
>Erebia_oemeEW24_7
gGaATGGAaGACAAaGTCTCCTCGACTCTCTCTGGCCTCGAAGGCGAGCT
```

Input format – PHYLIP

```
9 50
Papilio_gl GAGaTGGAaGACAaGGTTTCGTCGACCCTGTCCGGCCTCGAGGGCGAACT
Hamearis84 GGaATGGAaGAGAAaGTCTCCACAACCCTCTCCGGACTCGAAGGTGAGCT
Danaus_ple GAGAtGGAGGAGAaGGTCTCCTCCACCCTCTCAGGTCTCGAAGGTGAACT
Greta_oto7 GGAATGGAaGAGAaGGTCTCCTCGACCCTCTCAGGCCTTGAAGGTGAACT
Amathusia_ GGaATGGAaGACAAaGTCTCCTCAaCCCTCTCCGGTCTTGAGGGTGAACT
Morpho_pel GGaATGGAGAGAAAaGTCTCTACTACCCTGTCTGGCCTCGAAGGCGAACT
BrintesiaB GGAATGGAaGACAAaGTCTCGTCCACCCTCTCCGGGCTGGAAGGCGAGCT
Elymnias_c GAGAwGGaAGAcaAAGTATCCTCCACCCTCTCTGGTCTTGAAGCTGAACT
Erebia_oem gGaATGGAaGACAAaGTCTCCTCGACTCTCTCTGGCCTCGAAGGCGAGCT
```

Input format - NEXUS

```
#NEXUS
BEGIN DATA;
   DIMENSIONS  NTAX=9 NCHAR=50;
   FORMAT DATATYPE=DNA MISSING=? GAP=- INTERLEAVE=No;
   Matrix

[ArgKin 596]
Papilio_glaucus_69_3      GAGaTGGAaGACAaGGTTTCGTCGACCCTGTCCGGCCTCGAGGGCGAACT
Hamearis84_13             GGaATGGAaGAGAAaGTCTCCACAACCCTCTCCGGACTCGAAGGTGAGCT
Danaus_plexippus108_21    GAGAtGGAGGAGAaGGTCTCCTCCACCCTCTCAGGTCTCGAAGGTGAACT
Greta_oto70_9             GGAATGGAaGAGAaGGTCTCCTCGACCCTCTCAGGCCTTGAAGGTGAACT
Amathusia_phidippus114_17 GGaATGGAaGACAAaGTCTCCTCAaCCCTCTCCGGTCTTGAGGGTGAACT
Morpho_peleides66_5       GGaATGGAGAGAAAaGTCTCTACTACCCTGTCTGGCCTCGAAGGCGAACT
BrintesiaB01              GGAATGGAaGACAAaGTCTCGTCCACCCTCTCCGGGCTGGAAGGCGAGCT
Elymnias_casiphone121_20  GAGAwGGaAGAcaAAGTATCCTCCACCCTCTCTGGTCTTGAAGCTGAACT
Erebia_oemeEW24_7         gGaATGGAaGACAAaGTCTCCTCGACTCTCTCTGGCCTCGAAGGCGAGCT
;
end;
```

Input format – NEXUS interleaved

```
#NEXUS
BEGIN DATA;
   DIMENSIONS  NTAX=9 NCHAR=121;
   FORMAT DATATYPE=DNA MISSING=? GAP=- INTERLEAVE=Yes;
   Matrix

[ArgKin 50 bp]
Papilio_glaucus_69_3      GAGaTGGAaGACAaGGTTTCGTCGACCCTGTCCGGCCTCGAGGGCGAACT
Hamearis84_13             GGaATGGAaGAGAAaGTCTCCACAACCCTCTCCGGACTCGAAGGTGAGCT
Danaus_plexippus108_21    GAGAtGGAGGAGAaGGTCTCCTCCACCCTCTCAGGTCTCGAAGGTGAACT
Greta_oto70_9             GGAATGGAaGAGAaGGTCTCCTCGACCCTCTCAGGCCTTGAAGGTGAACT
Amathusia_phidippus114_17 GGaATGGAaGACAAaGTCTCCTCAaCCCTCTCCGGTCTTGAGGGTGAACT
Morpho_peleides66_5       GGaATGGAGAGAAAaGTCTCTACTACCCTGTCTGGCCTCGAAGGCGAACT
BrintesiaB01              GGAATGGAaGACAAaGTCTCGTCCACCCTCTCCGGGCTGGAAGGCGAGCT
Elymnias_casiphone121_20  GAGAwGGaAGAcaAAGTATCCTCCACCCTCTCTGGTCTTGAAGCTGAACT
Erebia_oemeEW24_7         gGaATGGAaGACAAaGTCTCCTCGACTCTCTCTGGCCTCGAAGGCGAGCT

[COI 71 bp]
Papilio_glaucus_69_3      taAagAtaTTgGaACATTATACTTTATTTTTGGAATTTGAGCAAGAATATTAGGAACTTCTTTAAGTTTAT
Hamearis84_13             ??????????????????????????????????????TGAGCAGGAATAGTAGGAACATCATTAAGATTAC
Libythea_celtis71_1       ??????????????????????????????????????TGAGCAGGAATAGTAGGAACTTCATTAAGTCTAT
Danaus_plexippus108_21    ??????????????????????????????????????TGAGCAGGAATAGTTGGGACATCTTTAAGTCTTT
Greta_oto70_9             ??????????????????????????????????????TGAGCAGGAATAGTAGGAACATCTTTAAGTTTAT
Amathusia_phidippus114_17 ??????????????????????????????????????TGATCTGGAATAGTAGGAACATCCCTCAGTCTTA
Morpho_peleides66_5       ??????????????????????????????????????TGAGCCGGTATAATTGGTACATCCCTAAGTCTTA
BrintesiaB01              ??????????????????????????????????????TGAGCAGGTATAGTAGGAACATCTCTTAGTTTAA
Elymnias_casiphone121_20  ??????????????????????????????????????TGATCAGGAATAGTAGGAACTTCCCTCAGTCTTA
Erebia_oemeEW24_7         ??????????????????????????????????????TGAGCAGGTATAGTAGGTACTTCCCTTAGTCTTA
;
end;
```