

Evolución molecular al alcance de tu computadora

Dr. Luis José Delaye Arredondo
Unidad Irapuato
luis.delaye@cinvestav.mx

**Ciencia
viva**

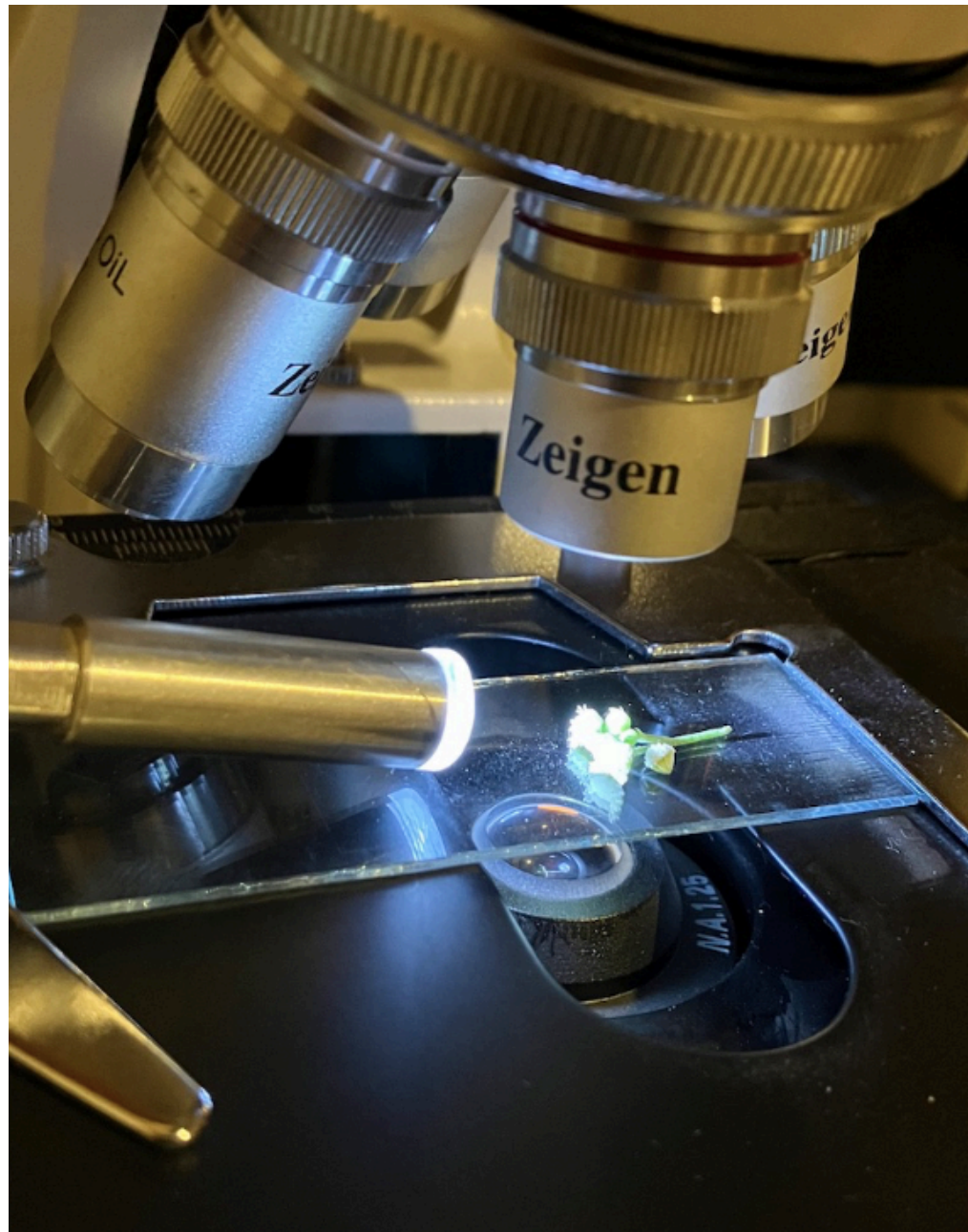


Cinvestav
Irapuato







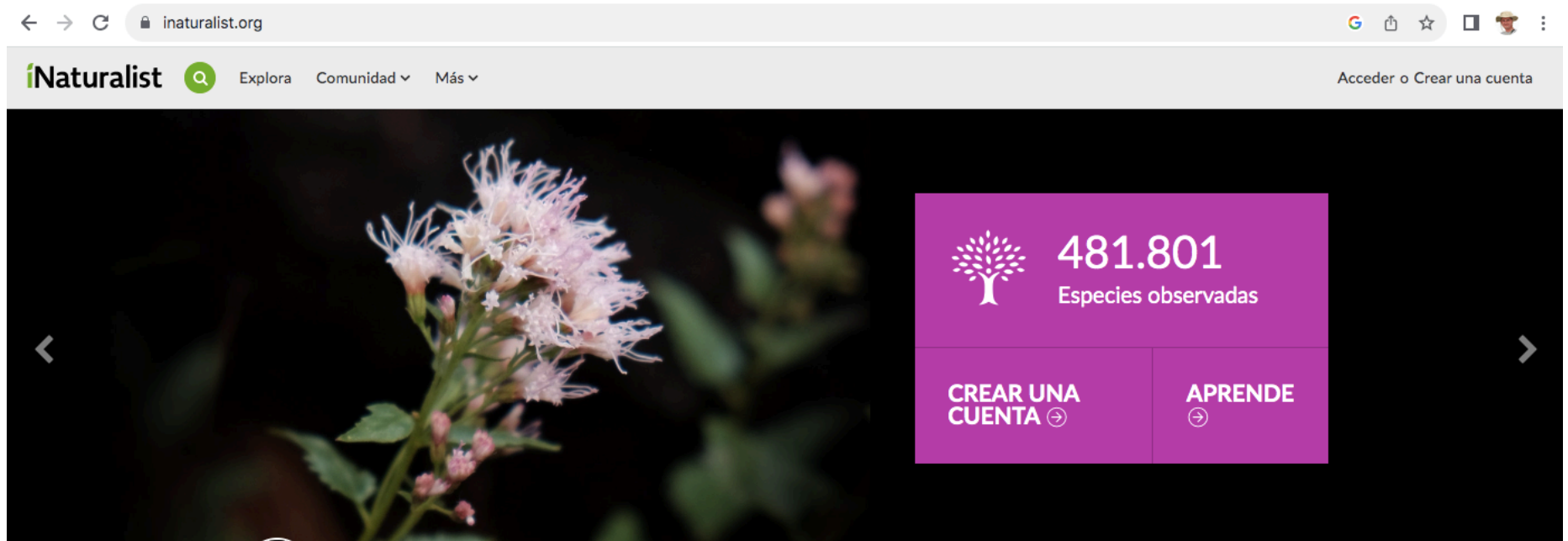








https://www.inaturalist.org/



Cómo funciona

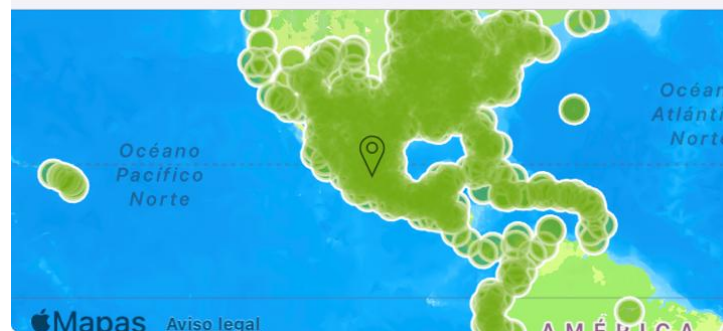




Género *Parthenium*

Parthenium es un género de plantas fanerógamas perteneciente a la familia de las asteráceas. Tiene 40 especies. (Fuente: Wikipedia, [Parthenium](#), [CC BY-SA 3.0](#))

MAPA DE OBSERVACIONES



AA



ncbi.nlm.nih.gov

Taxonomy
Browser

Entrez PubMed Nucleotide Protein Genome Structure PMC Taxonomy BioCollections

Search for as complete name lock

Display levels using filter:

Parthenium

Taxonomy ID: 35934 (for references in articles please use NCBI:txid35934)

current name

***Parthenium* L., 1753**NCBI BLAST name: **audicots**Rank: **genus**Genetic code: [Translation table 1 \(Standard\)](#)Mitochondrial genetic code: [Translation table 1 \(Standard\)](#)Plastid genetic code: [Translation table 11 \(Bacterial, Archaeal and Plant Plastid\)](#)**Lineage (full)**

[cellular organisms](#); [Eukaryota](#); [Viridiplantae](#); [Streptophyta](#);
[Streptophytina](#); [Embryophyta](#); [Tracheophyta](#); [Euphyllophyta](#);
[Spermatophyta](#); [Magnoliopsida](#); [Mesangiospermae](#);
[eudicotyledons](#); [Gunneridae](#); [Pentapetalae](#); [asterids](#);
[campanulids](#); [Asterales](#); [Asteraceae](#); [Asteroideae](#); [Heliantheae](#)
[alliance](#); [Heliantheae](#)

Entrez records

Database name	Subtree links	Direct links
Nucleotide	12,073	-
Protein	498	-
Structure	4	-
Popset	58	52
PubMed Central	928	928
Gene	235	-
SRA Experiments	561	98
Protein Clusters	54	-
Identical Protein Groups	181	-
BioProject	12	-
BioSample	516	89
PubChem BioAssay	3	-
Taxonomy	15	1



how can I ask for all sequences from the rbcL gene from the genus Parthenium in NCBI?

Mostrar versiones 



You can use the same strategy as for the COI gene search, but with the following changes:

1. Entrez Nucleotide Search:

- Go to the NCBI Entrez Nucleotide search page: [National Institutes of Health \(.gov\)](https://www.ncbi.nlm.nih.gov/entrez/seq/blast.cgi).
- In the search bar, enter the following query:

```
(rbcL[gene]) AND Parthenium[Organism]
```



Nucleotide

Nucleotide ▾

txid35934[Organism:exp] AND rbcl[gene]



Search

[Create alert](#) [Advanced](#)

[Help](#)

Species

Plants (17)
[Customize ...](#)

Molecule types

genomic DNA/RNA (17)
[Customize ...](#)

Source databases

INSDC (GenBank) (15)
RefSeq (2)
[Customize ...](#)

Sequence Type

Nucleotide (17)

Genetic compartments

Chloroplast (16)
Plastid (17)

Summary ▾ 100 per page ▾ Sort by Default order ▾

Send to: ▾ **Filters:** [Manage Filters](#)

Items: 17

[Parthenium hysterophorus chloroplast, complete genome](#)

1. 151,881 bp circular DNA

Accession: NC_086650.1 GI: 2692944900

[BioProject](#) [Protein](#) [Taxonomy](#)

[GenBank](#) [FASTA](#) [Graphics](#)

[Parthenium hysterophorus voucher Jonathan D. Amith 2024 \(MEXU, US\) ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit \(rbcl\) gene, partial cds; chloroplast](#)

2. 552 bp linear DNA

Accession: OP710317.1 GI: 2416166667

[BioProject](#) [Protein](#) [Taxonomy](#)

[GenBank](#) [FASTA](#) [Graphics](#) [PopSet](#)

Results by taxon

Top Organisms [\[Tree\]](#)

Parthenium hysterophorus (10)
Parthenium argentatum (2)
Parthenium integrifolium (2)
Parthenium sp. Gostel 613 (1)
Parthenium sp. SNP_13_0361 (1)
All other taxa (1)

[More...](#)

Analyze these sequences

[Run BLAST](#)

Find related data



Nucleotide

Nucleotide ▾

txid35934[Organism:exp] AND rbcl[gene]



Search

[Create alert](#) [Advanced](#)

[Help](#)

Species

Plants (17)
[Customize ...](#)

Molecule types

genomic DNA/RNA (17)
[Customize ...](#)

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[GenBank](#) [FASTA](#) [Graphics](#) [PopSet](#)



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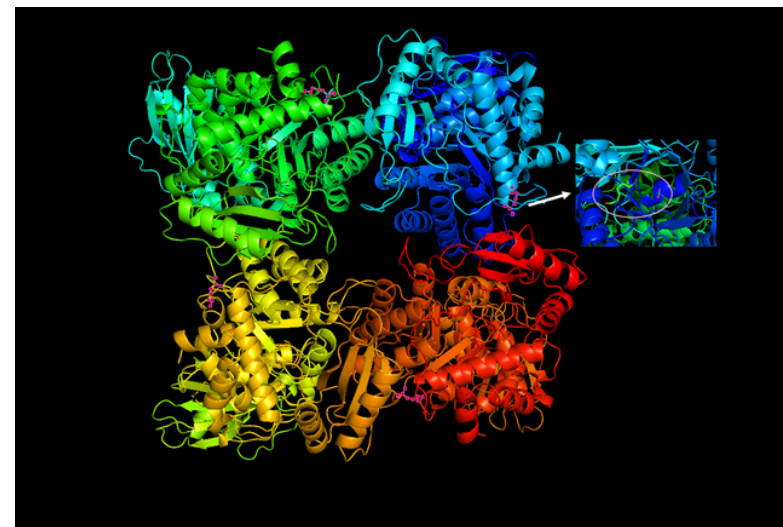
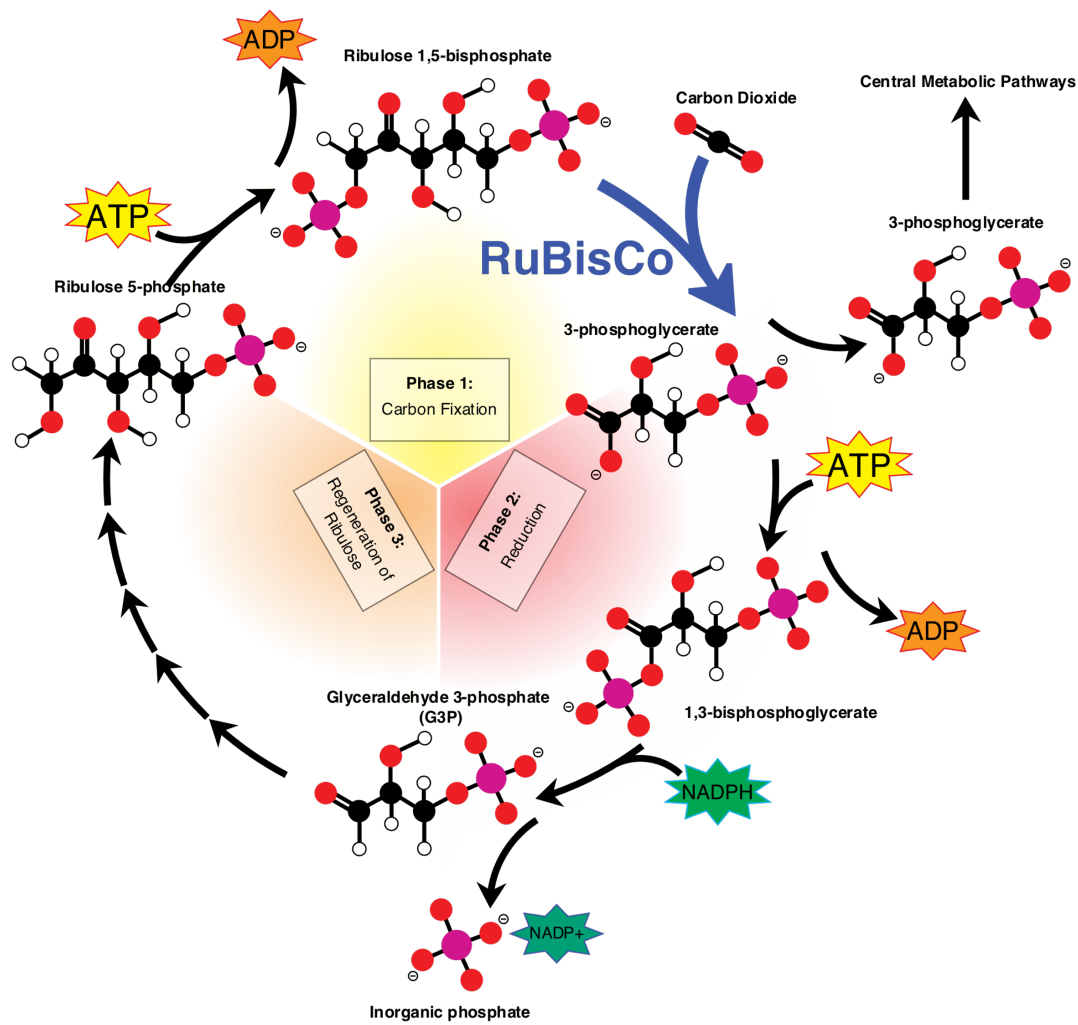
Analyze these sequences

[Run BLAST](#)

Find related data

LOCUS OP710317 552 bp DNA linear PLN 23-FEB-2024
 DEFINITION Parthenium hysterophorus voucher Jonathan D. Amith 2024 (MEXU, US)
 ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit
 (rbcL) gene, partial cds; chloroplast.
 ACCESSION OP710317
 VERSION OP710317.1
 DBLINK BioProject: PRJNA722235
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 SOURCE chloroplast Parthenium hysterophorus
 ORGANISM Parthenium hysterophorus
 Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
 Spermatophyta; Magnoliopsida; eudicotyledons; Gunneridae;
 Pentapetalae; asterids; campanulids; Asterales; Asteraceae;
 Asteroideae; Heliantheae alliance; Heliantheae; Parthenium.
 REFERENCE 1 (bases 1 to 552)
 AUTHORS Amith,J.D., Kress,W.J.E., Radosavljevic,A., Redmond,N.,
 Schuettpelz,E. and Steier,J.
 TITLE Direct Submission
 JOURNAL Submitted (17-OCT-2022) Botany, National Museum of Natural History,
 1000 Constitution Ave, Washington, DC 20056, USA
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 Sequencing Technology :: Sanger dideoxy sequencing
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 LGCTIKPKLGLSAKNYGRACYECL"
 ORIGIN
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 61 gaaaccaagg atactgatat cttggcagca ttctgagtaa ctctcoaacc tggagttccg
 121 cctgaagaag caggggccgc agtagctgcc gaatcttcta ctggtacatg gacaactgta
 181 tggaccgatg gacttacgag ccttgatcgt tacaaaggcc gatgctatg acttgagcct
 241 gttcctggag aagacaatca atatatgct tatgtagctt acccattaga cctttttgaa
 301 gaagttctg ttactaacat gtttacttcc attgtaggta atgtatttg gttcaaagcc
 361 ctgcgtgctc tacgtctgga agatttgcca atcccgactg cgtatgtaa aactttcgag
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 481 ttgggatgta ctattaaacc taaattgggg ttatccgcta aaaactacgg tagagcttgt
 541 tatgaatgct tt

//



Standard Nucleotide BLAST

blastn

blastp

blastx

tblastn

tblastx

BLASTN programs search nucleotide databases using a nucleotide query. more...

Enter Query Sequence

Enter accession number(s), gi(s), or FASTA sequence(s) ? Clear

OP710317.1

Query subrange ?

From

To

Or, upload file

Choose File

No file chosen

?

Job Title

Enter a descriptive title for your BLAST search ?

 Align two or more sequences ?

Choose Search Set

Database

- Standard databases (nr etc.): rRNA/ITS databases Genomic + transcript databases Betacoronavirus
 Core nucleotide database **NEW**

Nucleotide collection (nr/nt) ?

Organism

Optional

Parthenium (taxid:35934)

exclude

[Add organism](#)

Enter organism common name, binomial, or tax id. Only 20 top taxa will be shown ?

Score	Expect	Identities	Gaps	Strand
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Sbjct 54603		AGTGTGGATTCAAAGCTGGTGTAAAGATTATAAATTGACTTATTATACTCCTGAATAT		54662
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Sbjct 54663		GAAACCAAGGATACTGATATCTTGGCAGCATTTTCGAGTAACTCCTCAACCTGGAGTCCG		54722
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Sbjct 54723		CCTGAAGAAGCAGGGGCCGAGTAGCTGCCGAATCTTCTACTGGTACATGGACAACGTGA		54782
Query 181		TGGACCGATGGACTTACGAGCCTTGATCGTTACAAAGGCCGATGCTATGGACTTGAGCCT		240
Sbjct 54783		TGGACCGATGGACTTACGAGCCTTGATCGTTACAAAGGCCGATGCTATGGACTTGAGCCT		54842
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Sbjct 54843		GTTCTGGAGAAGACAATCAATATATTGCTTATGTAGCTTACCCATTAGACCTTTTTGAA		54902
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Query 541		TATGAATGTCTT 552		
Sbjct 55143		TATGAATGTCTT 55154		

Margaret Oakley Dayhoff



Born	Margaret Belle Oakley March 11, 1925 Philadelphia, Pennsylvania
Died	February 5, 1983 (aged 57) Silver Spring, Maryland
Known for	Substitution matrices one-letter code
Scientific career	
Fields	Bioinformatics
Institutions	Columbia University
Doctoral advisor	Duncan A. MacInnes

>Parthenium_hysterophorus

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>Echinacea_purpurea

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>Echinacea_angustifolia

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>Sanvitalia_procumbens

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MEGA 11: Molecular Evolutionary Genetics Analysis version 11

Version 11 adds new timing methods and is optimized for working with larger data.



[Info on Log4j](#)

macOS ▾

Graphical (GUI) ▾

MEGA 11 (64-bit) ▾

DOWNLOAD



Sequence Analyses

- Phylogeny Inference
- Model Selection
- Dating and Clocks
- Ancestral States
- Selection and Tests
- Sequence Alignment

Statistical Methods

- Maximum Likelihood
- Distance Methods
- Ordinary Least Squares
- Maximum Parsimony
- Composite Likelihood
- Bayesian

Powerful Visual Tools

- Alignment/Trace Editor
- Tree Explorer
- Data Explorers
- Legend Generator
- Gene Duplication Wizard
- Timetree Wizard



Human



Cat



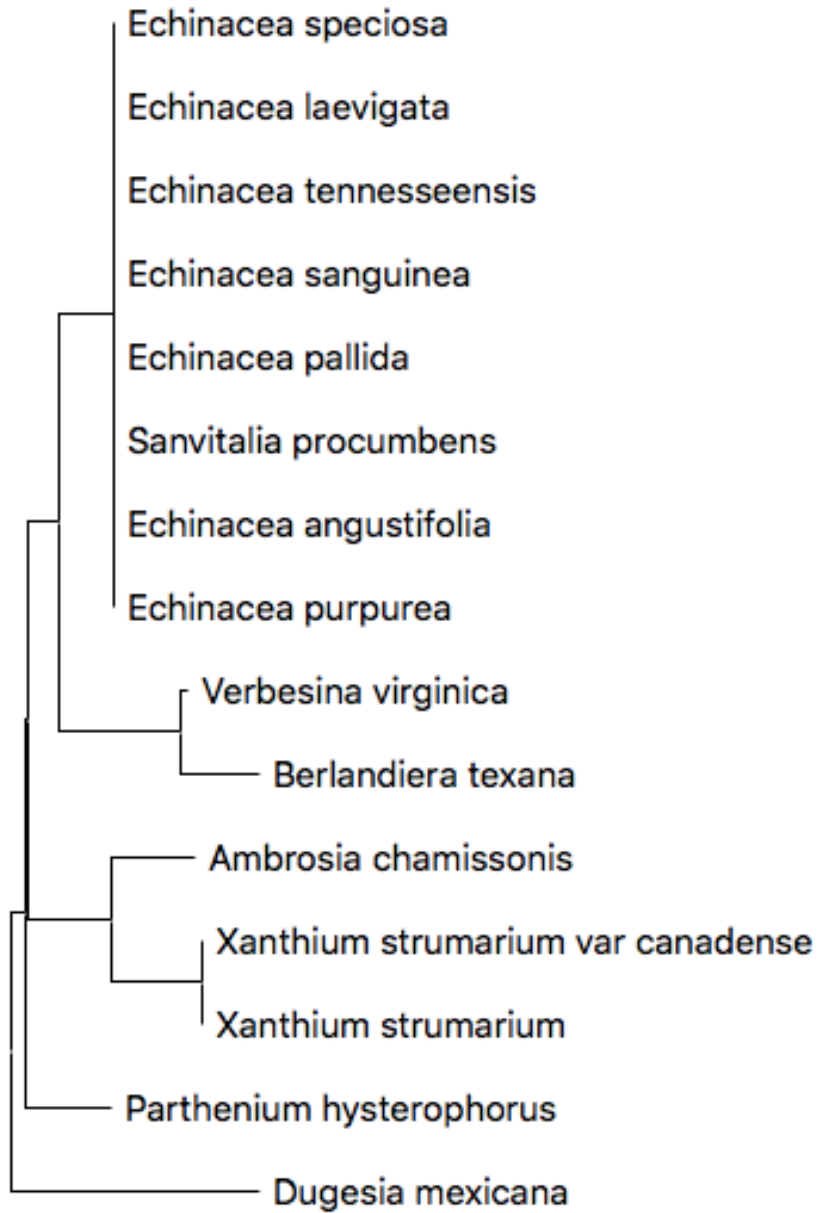
Whale



Bat

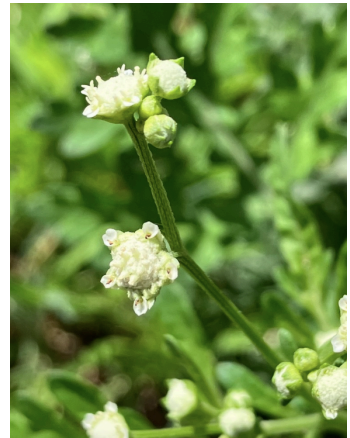
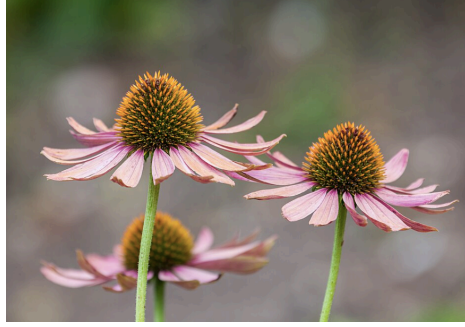
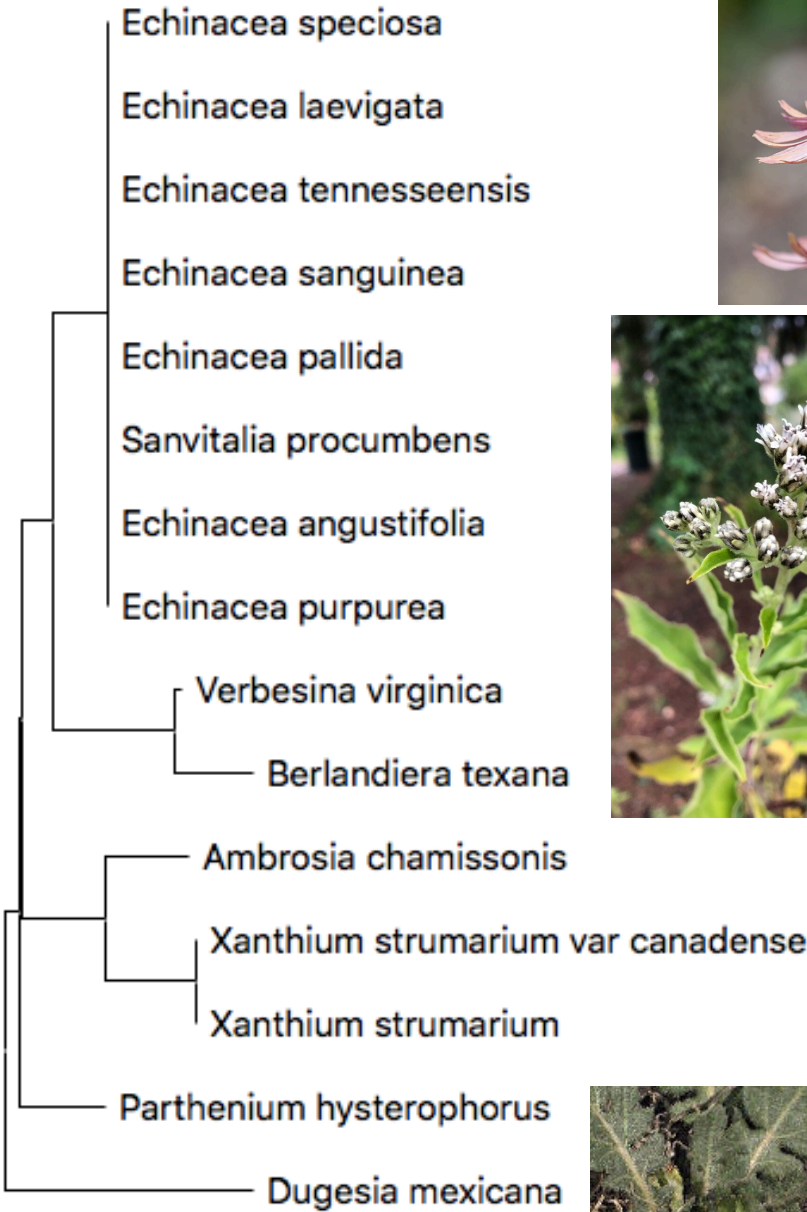
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Species/Abbrev
1. Parthenium hyst
2. Echinacea purpt
3. Echinacea angu
4. Sanvitalia procu
5. Echinacea pallid
6. Echinacea sangi
7. Echinacea tenne
8. Echinacea speci
9. Echinacea laeviç
10. Verbesina virgi
11. Xanthium strum
12. Xanthium strun
13. Ambrosia charn
14. Berlandiera tex
15. Dugesia mexica

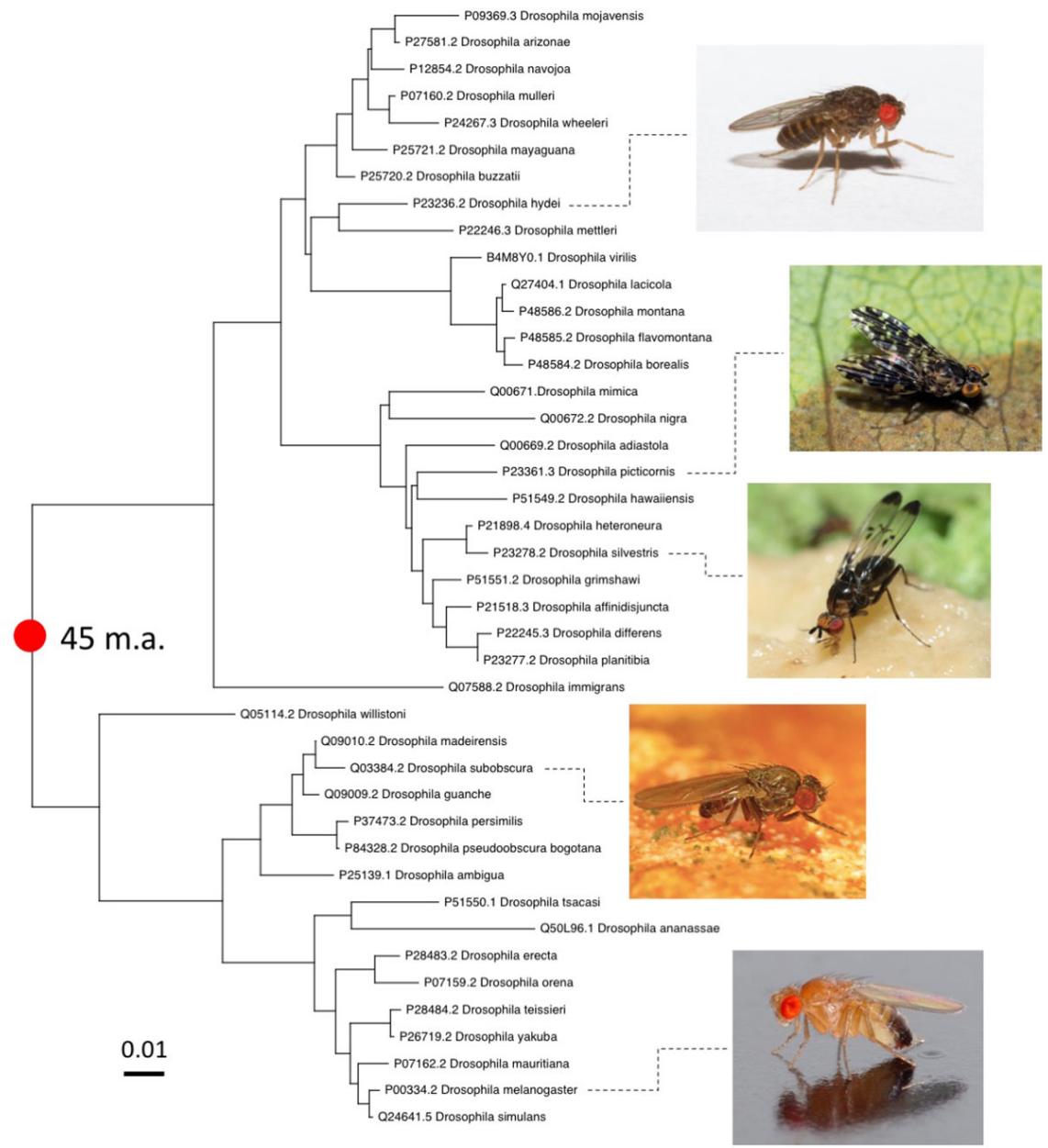


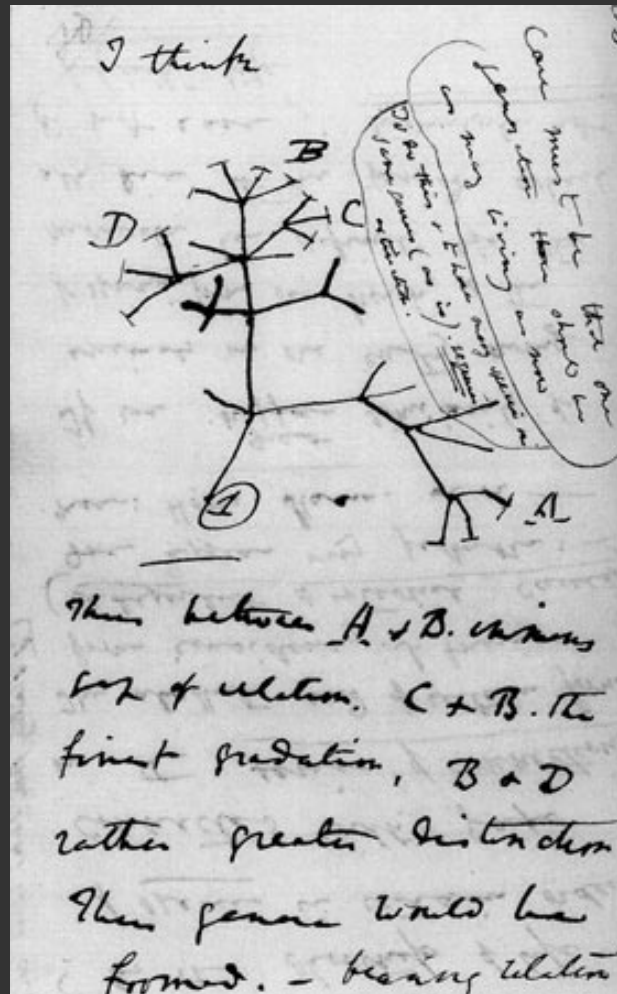
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5. Echinacea pallid
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7. Echinacea tenne
8. Echinacea speci
9. Echinacea laevi
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14. Berlandiera tex
15. Dugesia mexica

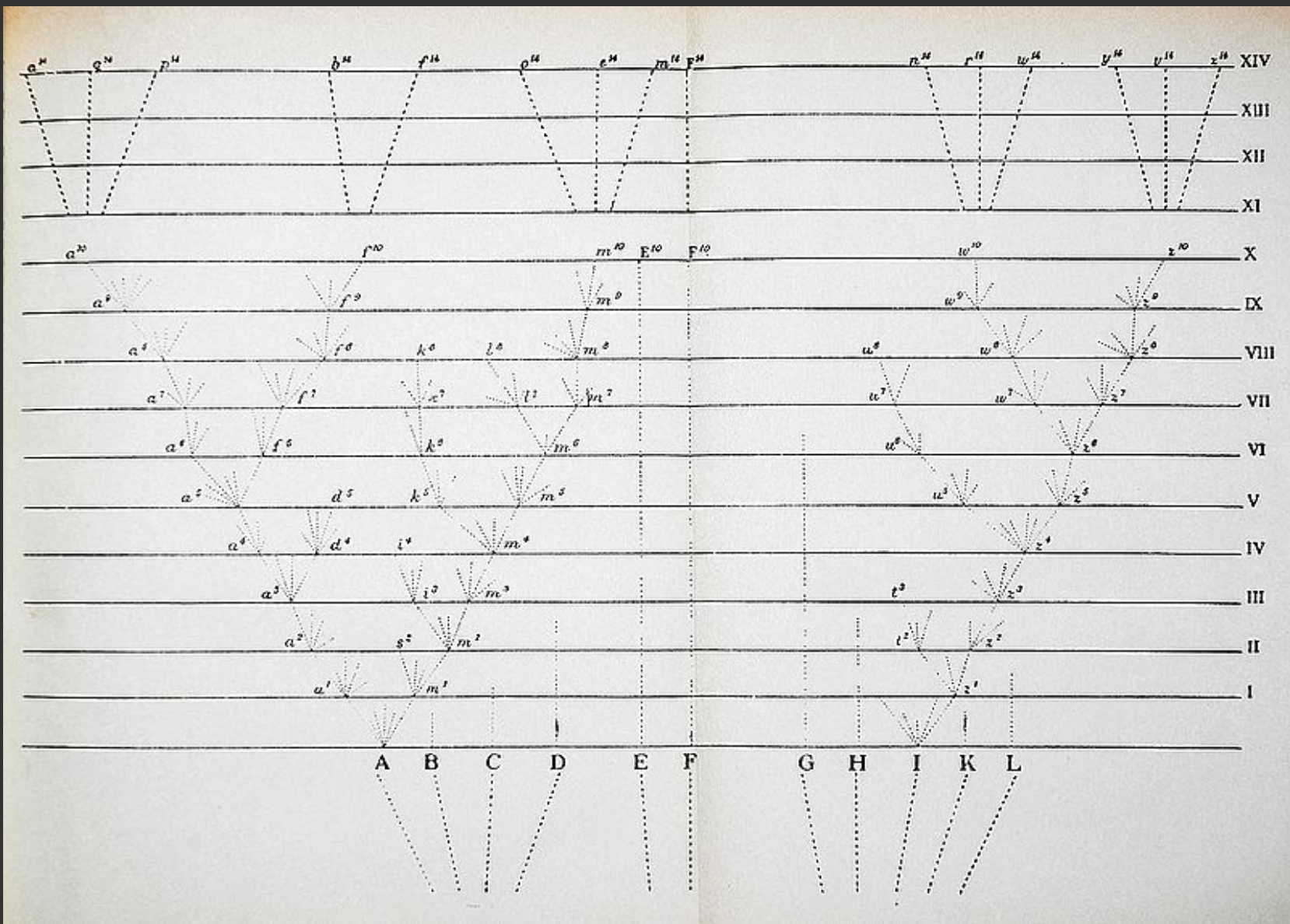


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T	G	A	A	G	A	A	G	G	T	T	C	T	G	T	T	A	C	T	A	A	C	A	T	G	T	T	T
T	G	A	A	G	A	A	G	G	T	T	C	T	G	T	T	A	C	T	A	A	C	A	T	G	T	T	T
T	G	A	A	G	A	A	G	G	T	T	C	T	G	T	T	A	C	T	A	A	C	A	T	G	T	T	T
T	G	A	A	G	A	A	G	G	T	T	C	T	G	T	T	A	C	T	A	A	C	A	T	G	T	T	T
T	G	A	A	G	A	A	G	G	T	T	C	T	G	T	T	A	C	T	A	A	C	A	T	G	T	T	T
T	G	A	A	G	A	A	G	G	T	T	C	T	G	T	T	A	C	T	A	A	C	A	T	G	T	T	T
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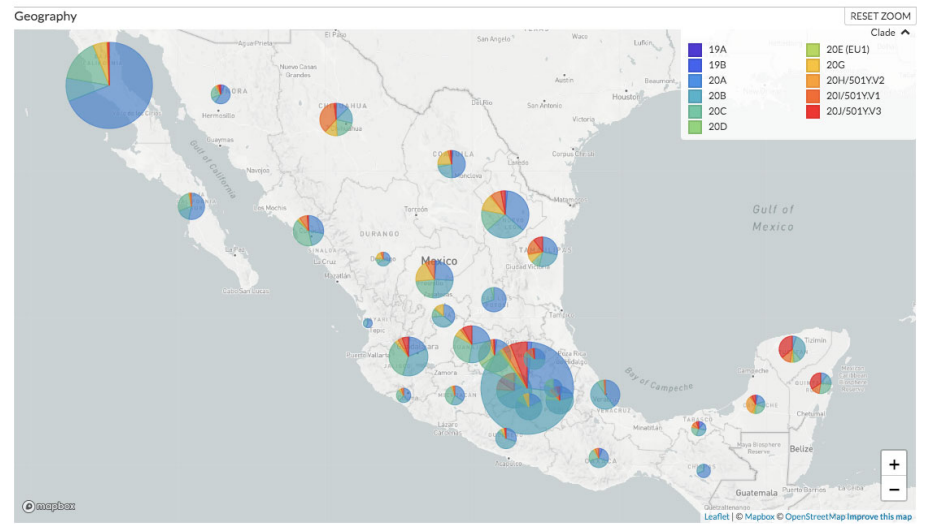
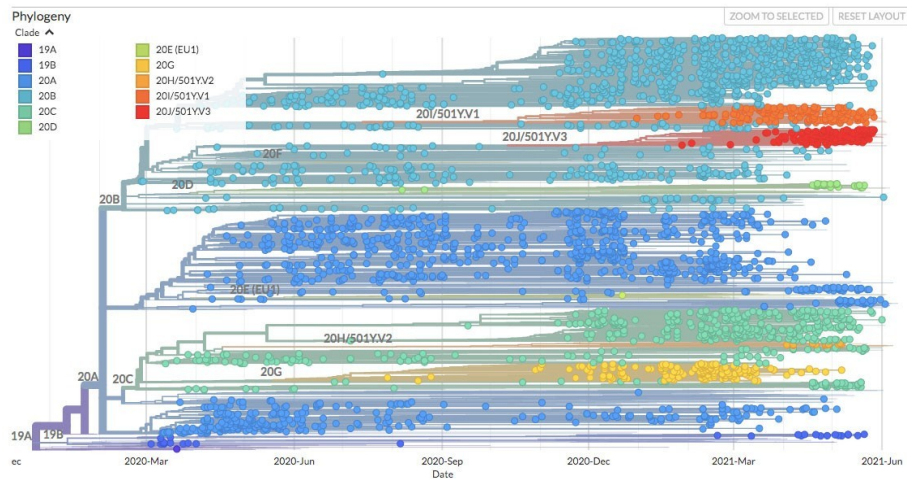


Red transmutation notebook B
Charles Darwin (1837-38)

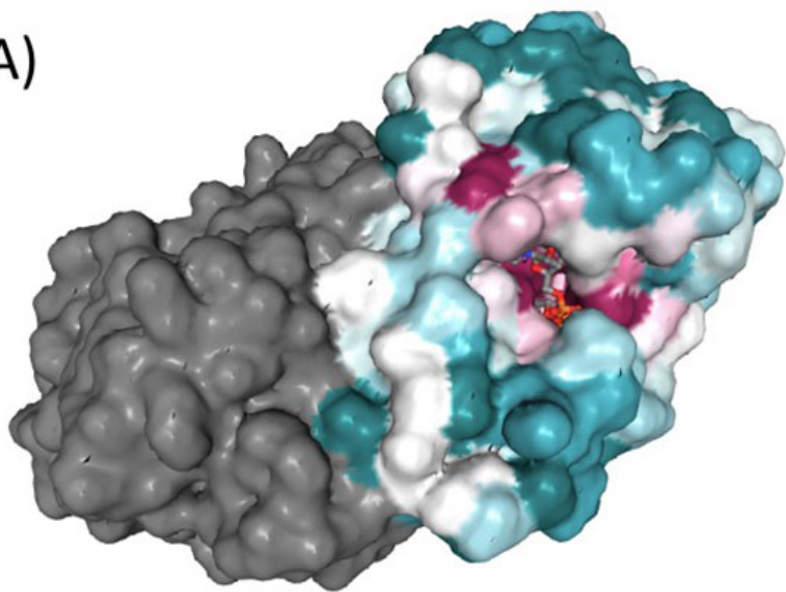


Charles Darwin, 1859.
 On the Origin of Species
 London, John Murray

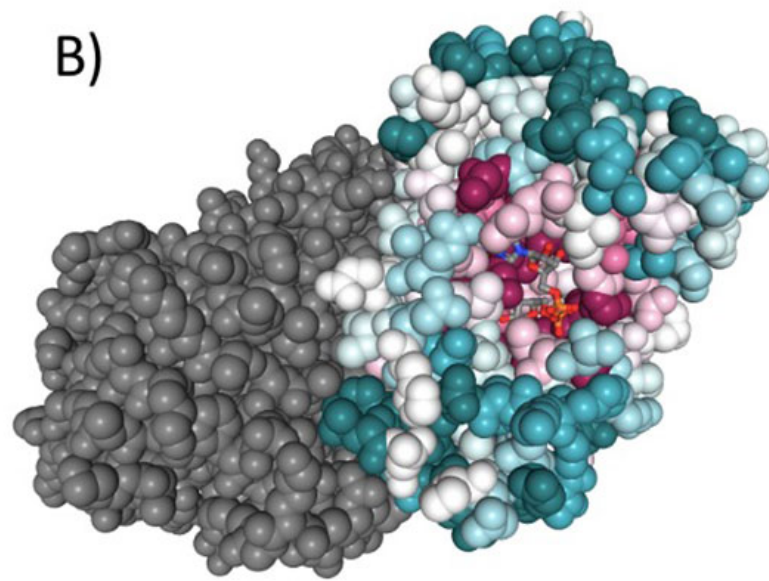
¿Para qué sirve?



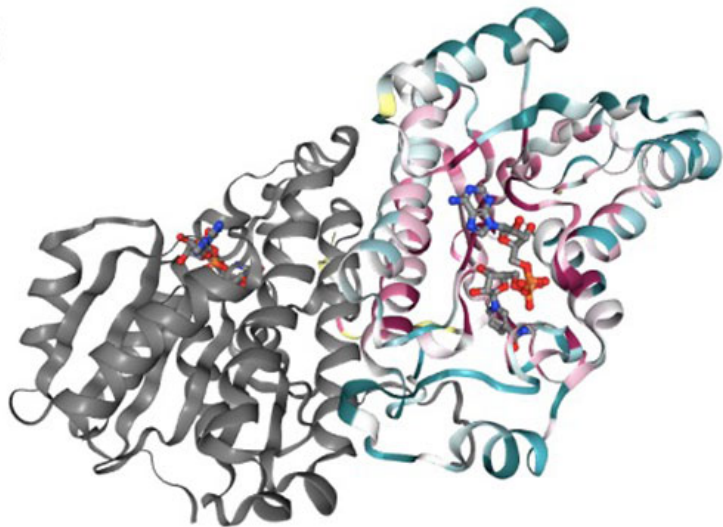
A)



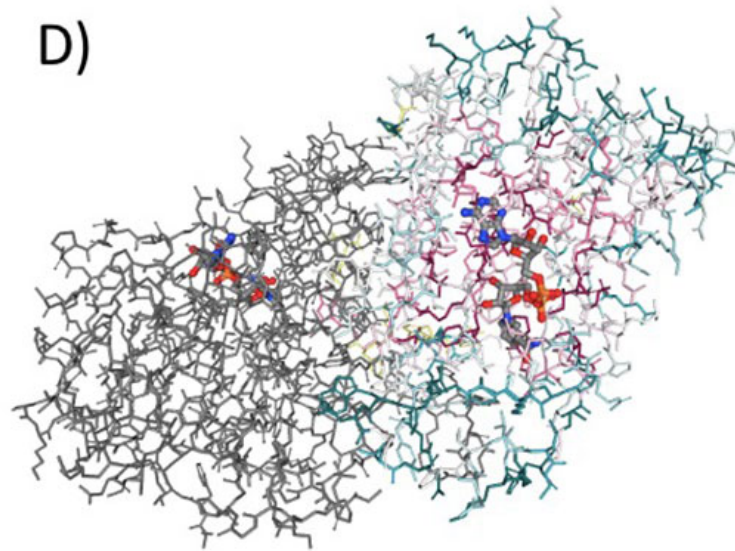
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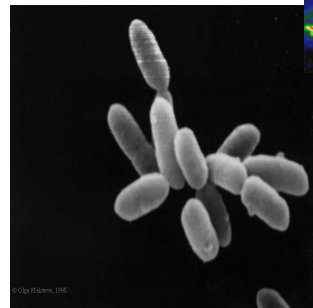
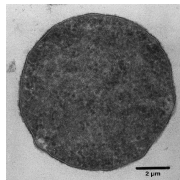
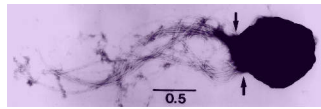
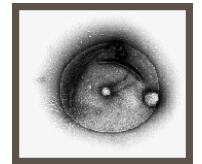
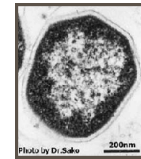
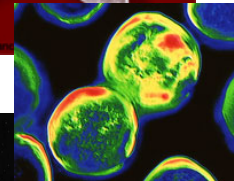
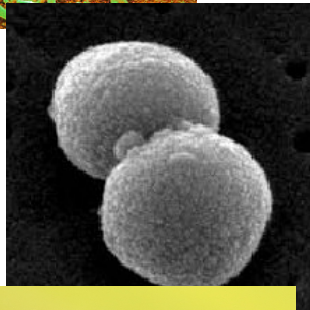
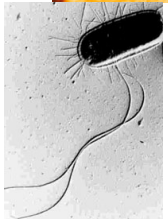
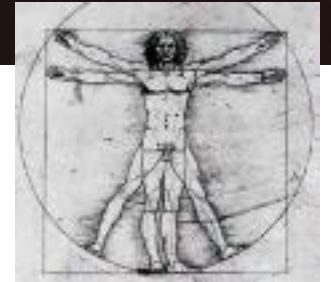
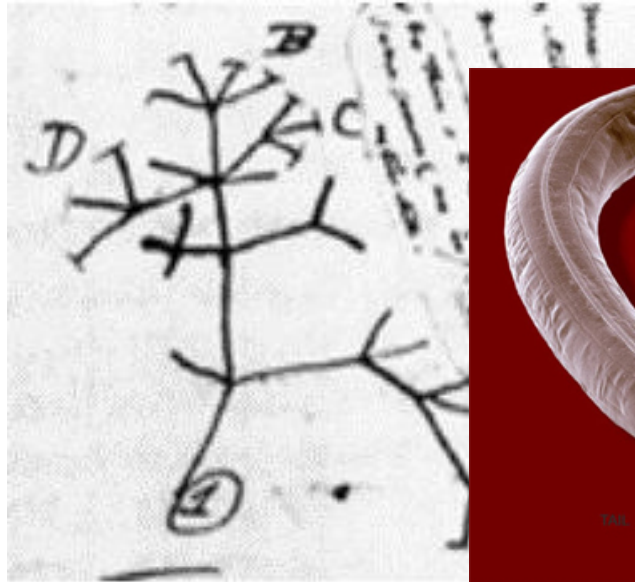
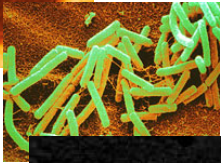
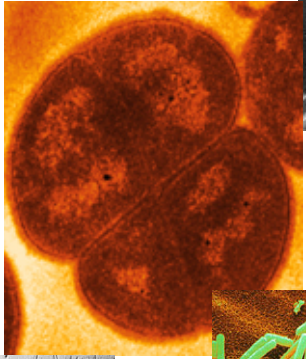
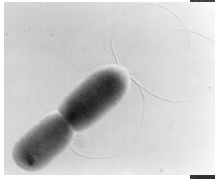
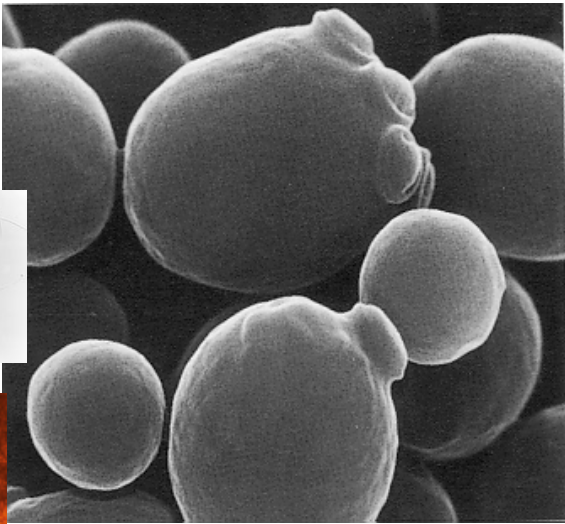


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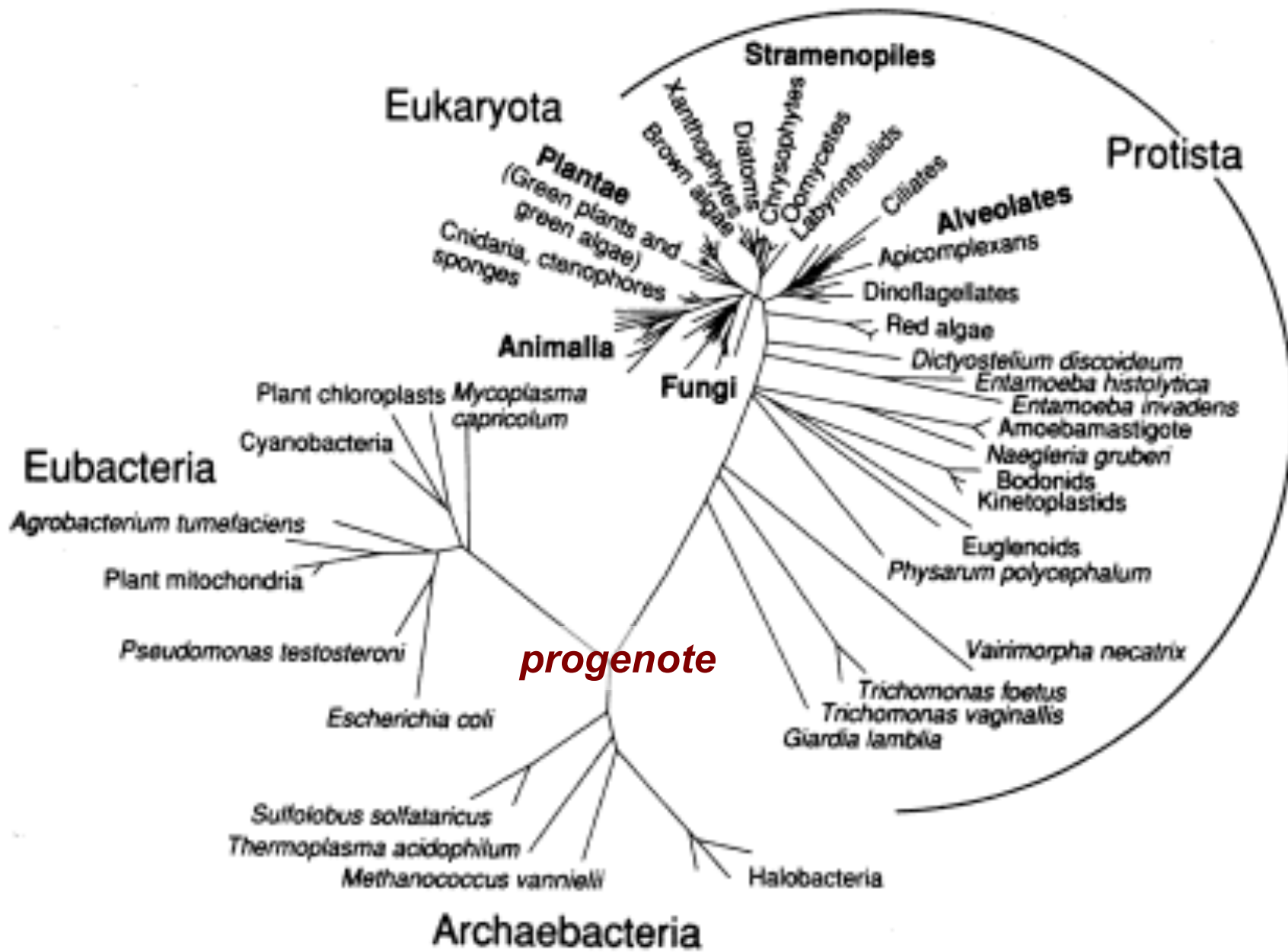


D)

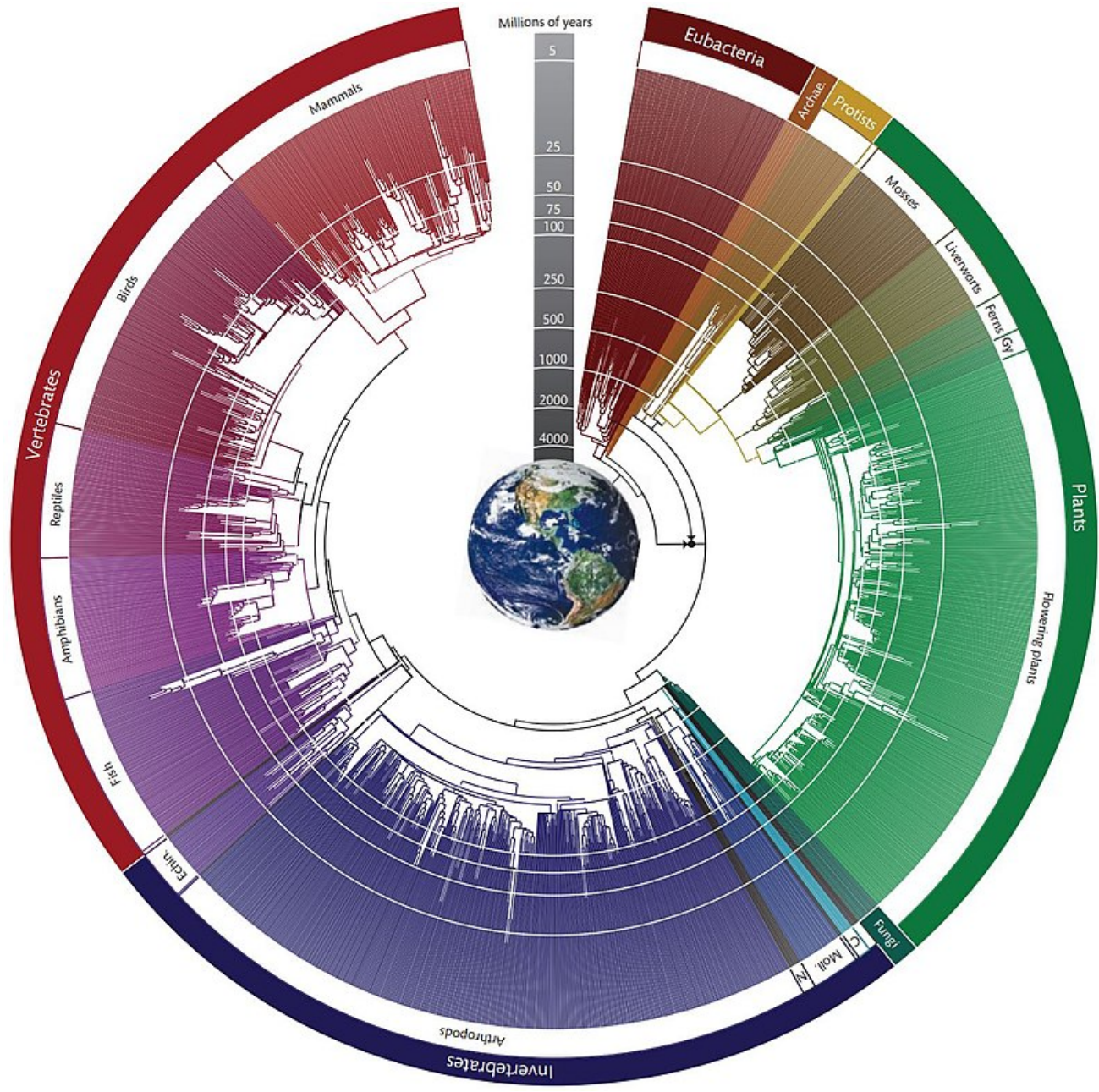


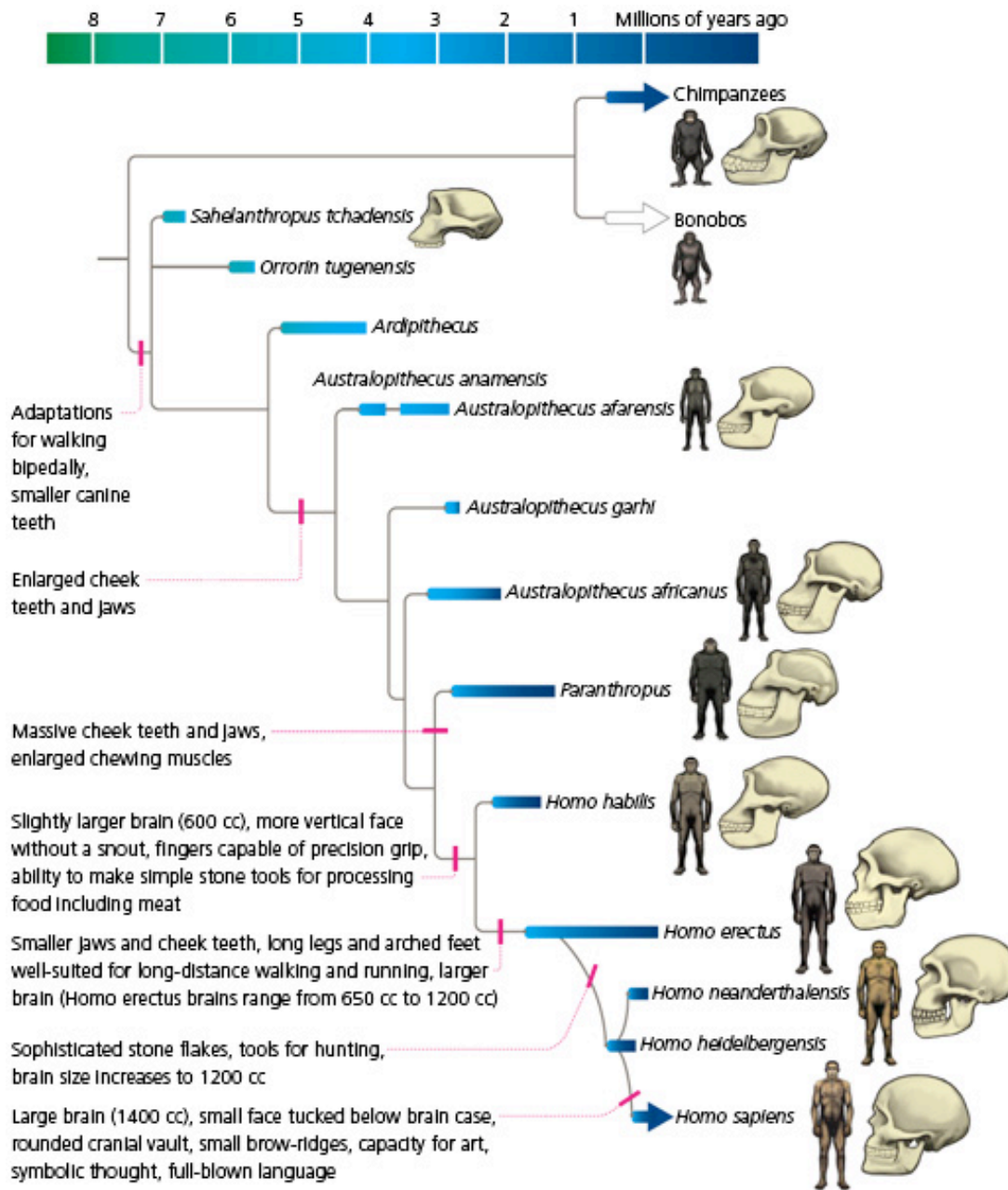


© J. J. Moore, 1998



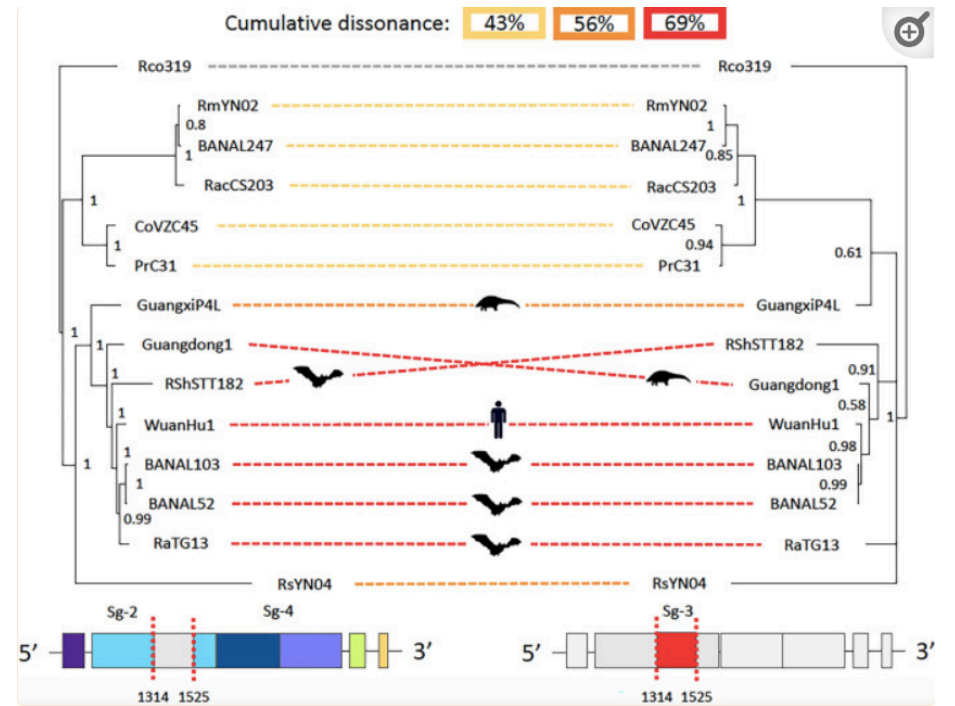
The concept of the progenote: Woese & Fox (1977)

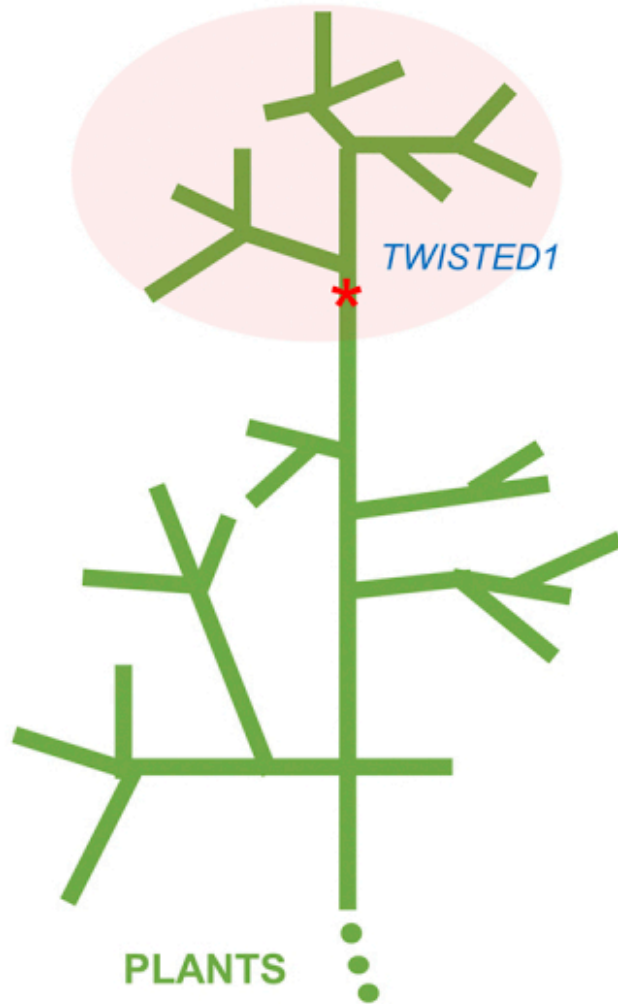




¿Para qué lo
hemos usado?

A)





In *Arabidopsis thaliana*

AtTWT1

wt

↑↑↑

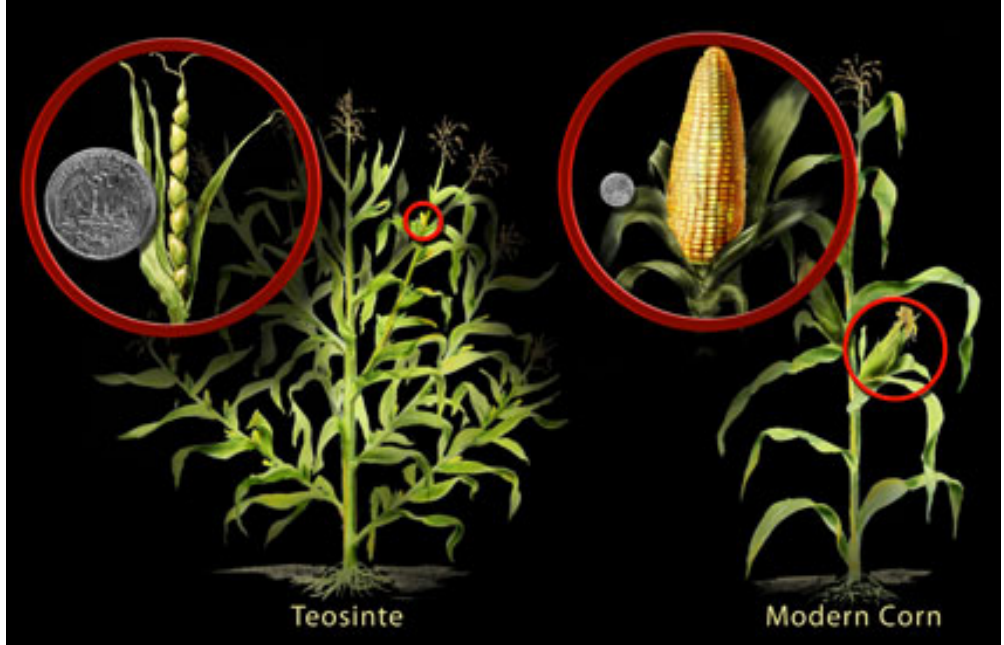
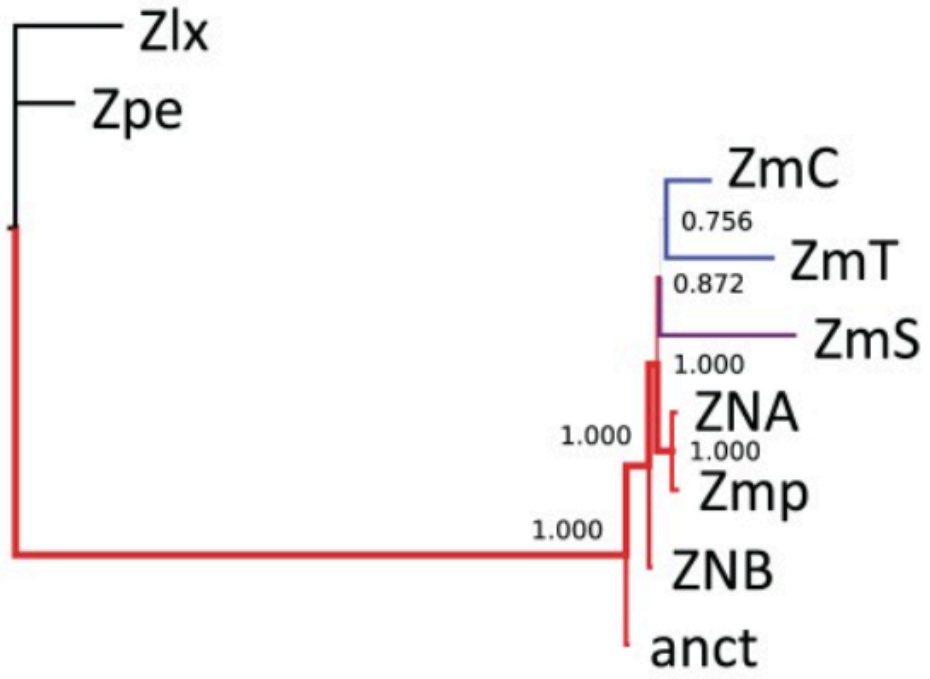
×

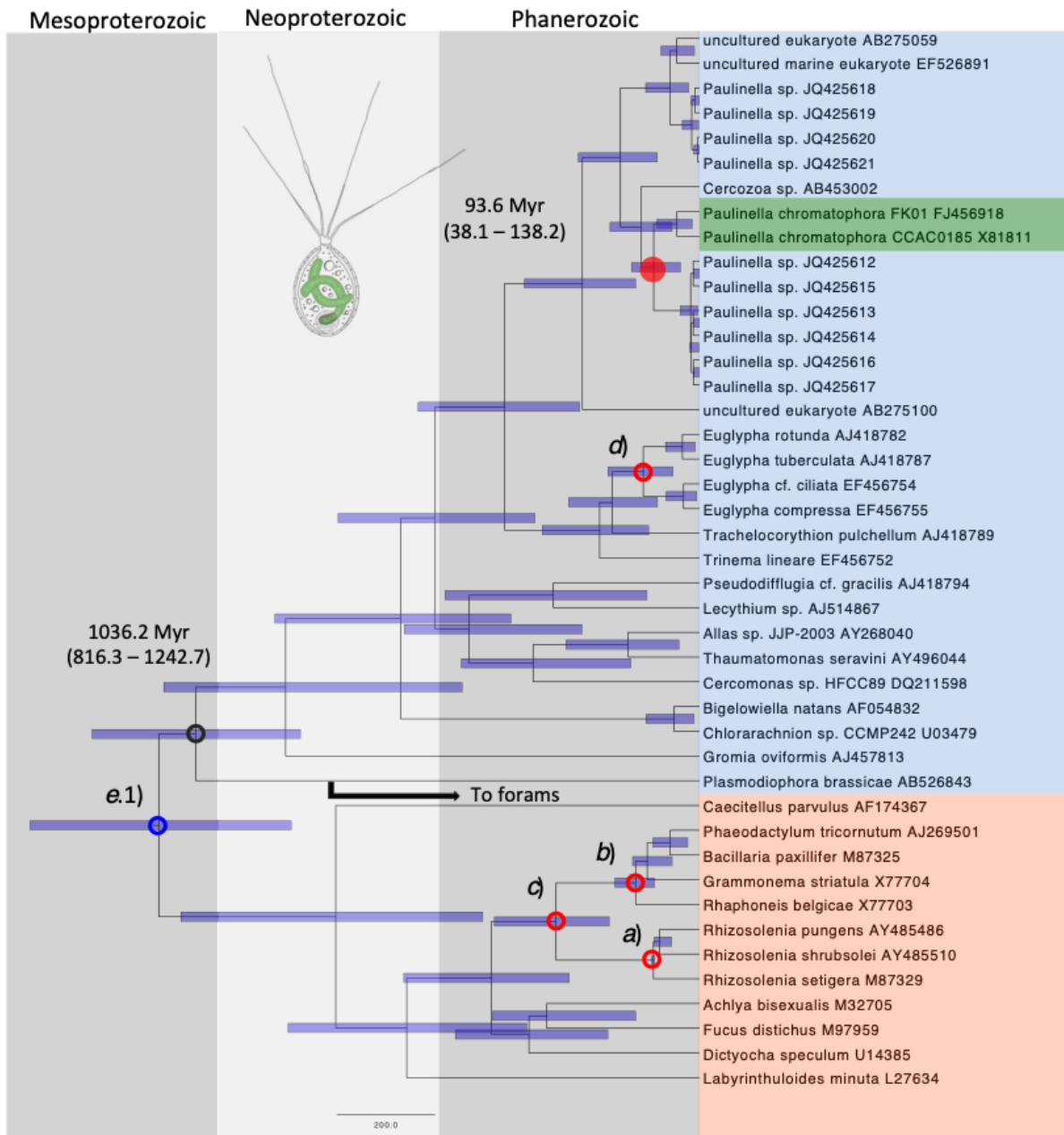


3.1 cm.

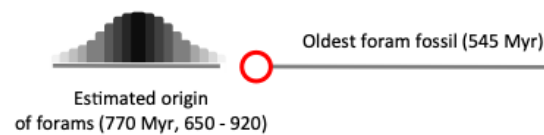


SM10
5,170 Cal AP.





93.6 Myr
(38 - 138)



1400 1200 1000 800 600 400 200

Millions of years (Myr) before present

Delaye et al, (2016)

¡Gracias!



Darwin, C. R. 1862. *On the various contrivances by which British and foreign orchids are fertilised by insects, and on the good effects of intercrossing*. London: John Murray.

