

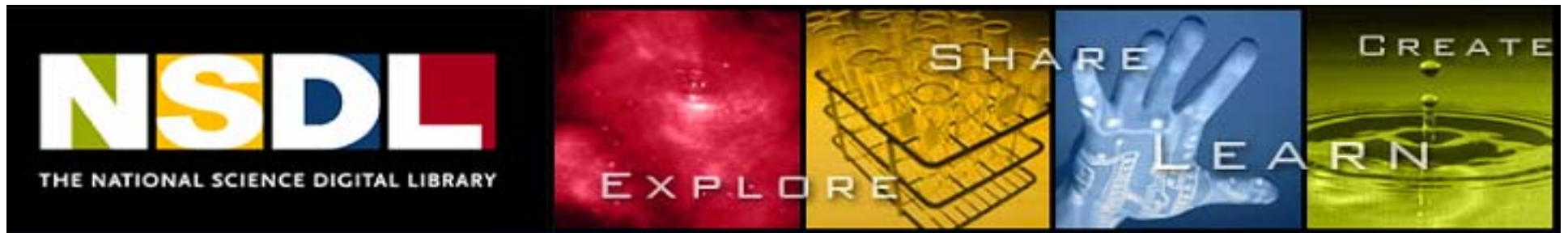


**NSDL/NSTA Web Seminar:**

**Studying Genomes: From the Lab  
to the Classroom**



Tuesday, November 13, 2007



## Today's NSDL Expert:



Dr. Rob DeSalle,  
Author and Curator in the Sackler  
Institute for Comparative Genomics,  
American Museum of Natural History

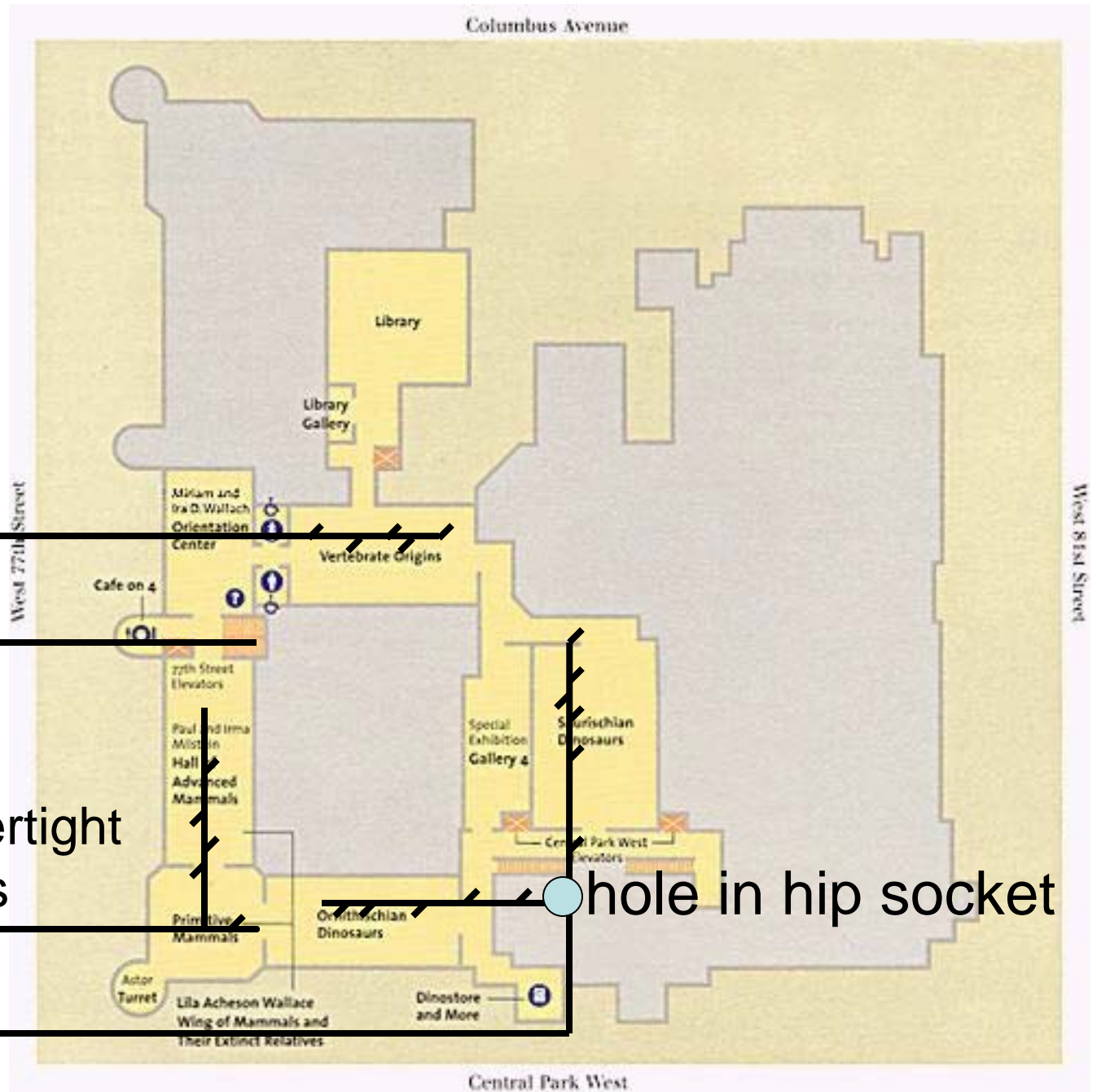


<http://nsdl.org>





- What do evolutionary trees tell us?
- How are evolutionary trees built from genomic information?
- Some neat things about the trunk of the tree of life
- Some even neater things about the tips of the tree of life where we humans reside



vertebrae

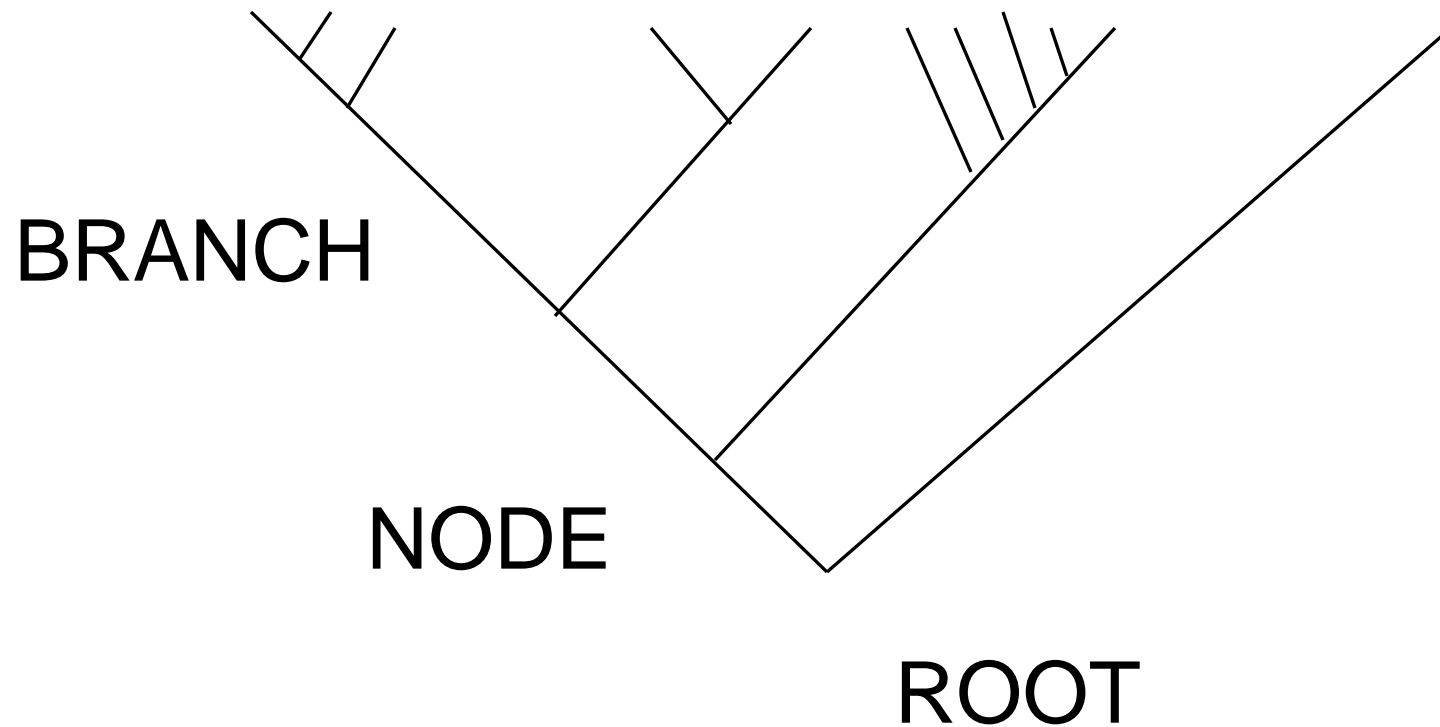
4 limbs

watertight  
eggs

hole in hip socket



# Some tree terminology





## Cast of Characters

F

C

D

L

P

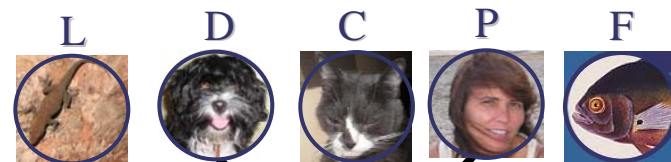


If we have these four taxa and F is the root, how many possible trees are there?

Write your answer in the chat



I



II

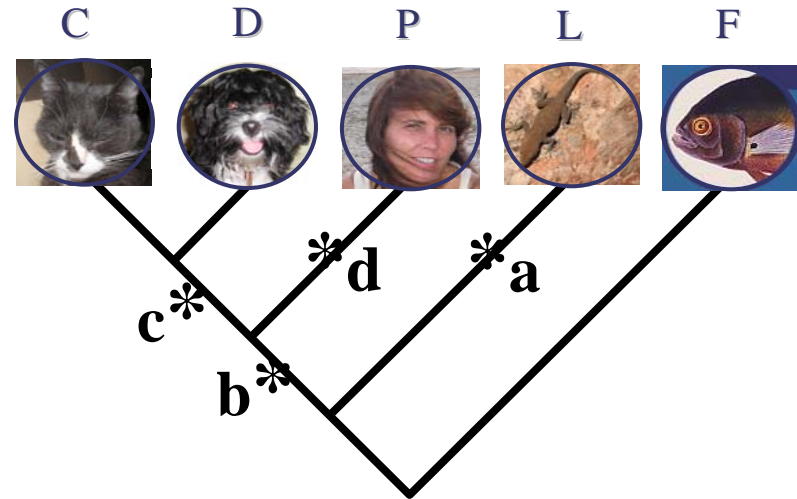


III



IV

Where would you attach these species on the tree?  
 (Bonobo, Marsupial, Bear)  
 Stamp your answer

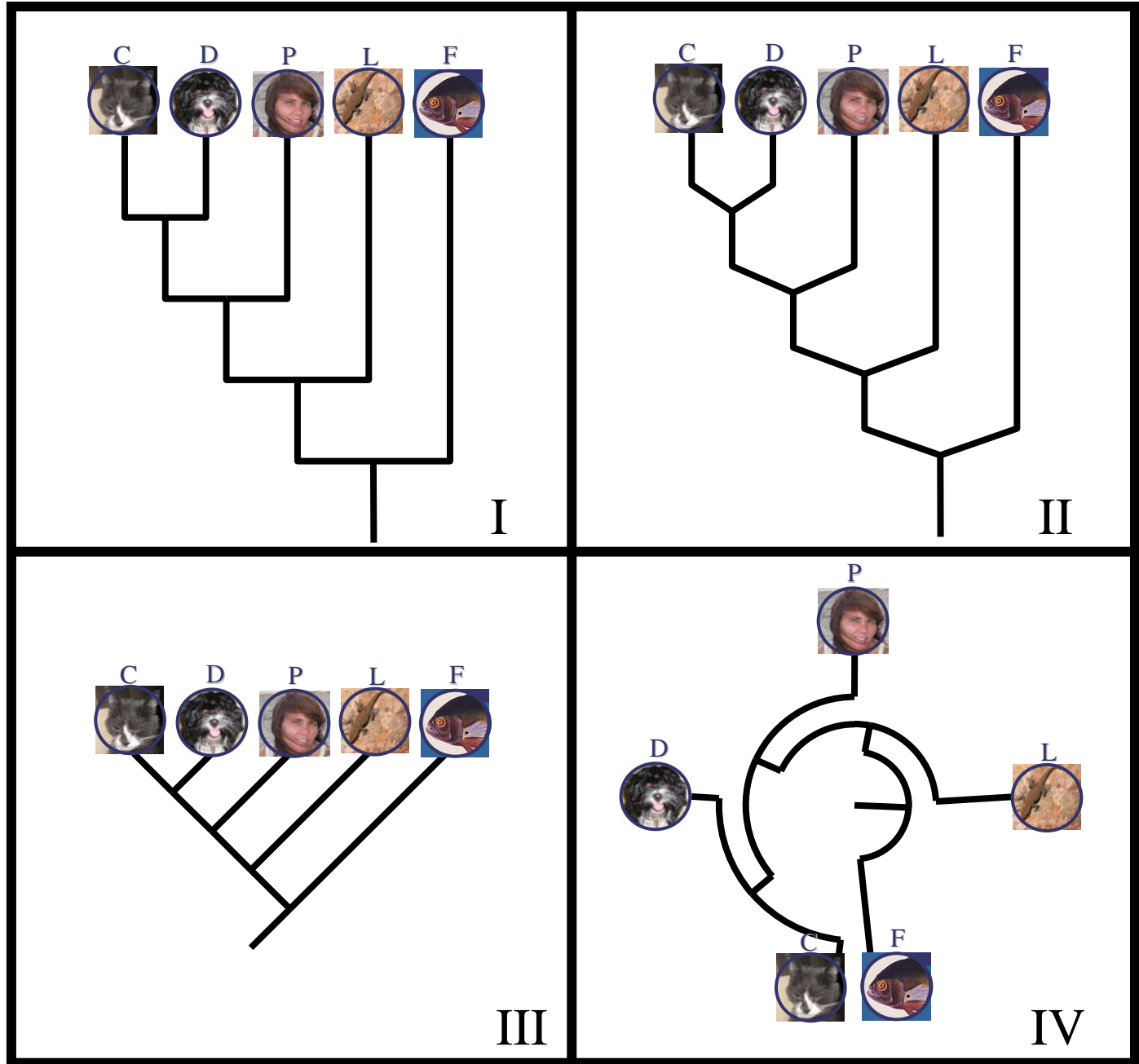


a	b	c	d	Not marked



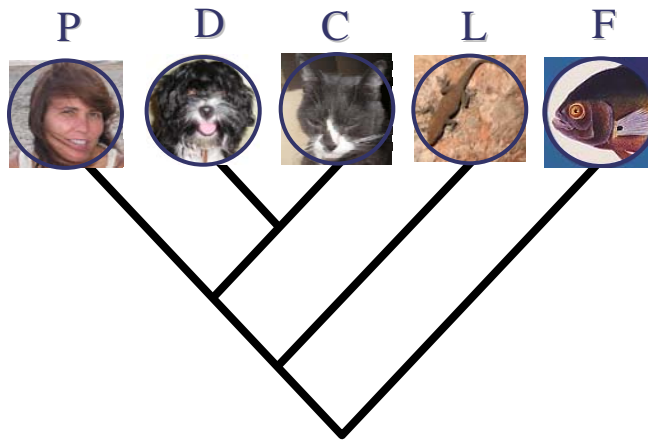


Which of these trees is not like the others?





# Poll Question!



A good root for the tree above would be:

- a. Orangutan
- b. Tiger
- c. Snake
- d. Sea urchin



“This is a dinosaur DNA sequence.”

Dr. Wu, Ingen

<http://www.ncbi.nlm.nih.gov/BLAST>

```

>DinoDNA "Dinosaur DNA" from Crichton's JURASSIC PARK p. 103 nt 1-
1200GCGTTGCTGGCGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAATCGACGCGGTG
GCGAAACCCGACAGGACTATAAAGATAACCAGGCGTTTCCCCCTGGAAGCTCCCTCGTGTTCGACCCT
GCCGCTTACCGGATACTGTCCGCCTTTCTCCCTTCGGGAAGCGTGGCTGCTCACGCTGTACCTATCT
CAGTTCGGTGTAGGTTCGTTTCGCTCCAAGCT
CGGTAACTATCGTCTTGAGTCCAACCCGGT
CGGCGAGGACCGCTTTCGCTGGAGATCGG
TCAAGCCTTCGTCACTCAAACGTTTCGG
GCTGGGCTGGCGTTCGCGACGCGAGGCTG
CCCGCGTTGCAGGCCATGCTGTCCAGGCA
ACCAGCCTAACTTCGATCACTGGACCGCT
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GATACCTGTCCGCCTTTCTCCCTTCGGGC
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CCCCGCGGTGCATGGAGCCGGGCCACCTC
GAATTGGAGCCAATCAATTCTTGCGGAGA
CGATCTCCAGCAGCCGCACGCGGCATC

```



<http://nsdl.org>





# Search For Eminem

```
NCBI Blast:ld|24640 (6 letters)
http://www.ncbi.nlm.nih.gov/BLAST/Blast.cgi
Google Image thraxis.gif Bioinformat... - DNA-BAR PHYML MrBayes Webmail sergios'softLinks
Query 1      EMINEM 6
Sbjct 323    EMINEM 328

>[ref|YP_001232475.1|] G pyridine nucleotide-disulphide oxidoreductase dimerisation region
[Geobacter uraniumreducens RI4]
[qb|ABQ27902.1|] G pyridine nucleotide-disulphide oxidoreductase dimerisation region
[Geobacter uraniumreducens RI4]
Length=510

Score = 23.5 bits (48), Expect = 986, Method: Composition-based stats.
Identities = 6/6 (100%), Positives = 6/6 (100%), Gaps = 0/6 (0%)

Query 1      EMINEM 6
Sbjct 447    EMINEM 452

>[ref|YP_202658.6|] G cellulase [Xanthomonas oryzae pv. oryzae KACC10331]
Length=482

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Identities = 5/6 (83%), Positives = 6/6 (100%), Gaps = 0/6 (0%)

Query 1      EMINEM 6
Sbjct 68     EMINQM 73

>[ref|YP_452818.1|] G cellulase [Xanthomonas oryzae pv. oryzae MAFF 311018]
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Length=486

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Identities = 5/6 (83%), Positives = 6/6 (100%), Gaps = 0/6 (0%)

Query 1      EMINEM 6
Sbjct 68     EMINQM 73

>[qb|AAW77273.1|] G cellulase [Xanthomonas oryzae pv. oryzae KACC10331]
Length=533

Score = 23.1 bits (47), Expect = 1185, Method: Composition-based stats.
Identities = 5/6 (83%), Positives = 6/6 (100%), Gaps = 0/6 (0%)

Query 1      EMINEM 6
Sbjct 119    EMINQM 124

>[qb|BA780860.1|] hypothetical protein SNCG_11816 [Phaeosphaeria nodorum SN15]
Length=994

Score = 23.1 bits (47), Expect = 1264, Method: Composition-based stats.
Identities = 5/6 (83%), Positives = 6/6 (100%), Gaps = 0/6 (0%)

Query 1      EMINEM 6
Sbjct 344    +MINEM 344
```



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# \*SpongeBob Squarepants



Crossword Puzzle! brand spankin' new



## Building a Bikini Bottom Phylogeny



NCBI HomePage  
http://www.ncbi.nlm.nih.gov/

Google Image... thracis.gif Bioinformat... - DNA-BAR PHYML MrBayes Webmail sergios' softLinks

# National Center for Biotechnology Information

National Library of Medicine National Institutes of Health

PubMed All Databases BLAST OMIM Books TaxBrowser Structure

Search Nucleotide for  Go

### SITE MAP

- Alphabetical List
- Resource Guide

### About NCBI

An introduction to NCBI

### GenBank

Sequence submission support and software

### Literature databases

PubMed, OMIM, Books, and PubMed Central

### Molecular databases

Sequences, structures, and taxonomy

### Genomic biology

The human genome, whole genomes, and related resources

### Tools

Data mining

### Research at NCBI

People, projects, and seminars

### Software

Open "http://www.ncbi.nlm.nih.gov/" in a new tab behind the current one

### What does NCBI do?

Established in 1988 as a national resource for molecular biology information, NCBI creates public databases, conducts research in computational biology, develops software tools for analyzing genome data, and disseminates biomedical information - all for the better understanding of molecular processes affecting human health and disease. [More...](#)

### Hot Spots

- Assembly Archive
- Clusters of orthologous groups
- Coffee Break, Genes & Disease, NCBI Handbook
- Electronic PCR
- Entrez Home
- Entrez Tools
- Gene expression omnibus (GEO)
- Human genome resources
- Influenza Virus Resource
- Map Viewer
- dbMHC
- Mouse genome resources
- My NCBI
- DRF finder
- Rat genome resources

### GenBank vs. RefSeq

Confused about the distinctions between GenBank, RefSeq, TPA and UniProt? [Click here](#) for a brief description of the databases and their differences.

### New dbGaP

NCBI's dbGaP Genome Wide Association Database

NCBI's dbGaP (database of Genotype and Phenotype) provides data from Genome Wide Association (GWA) studies. The resource is intended to help elucidate the link between genes and disease. For each study, users have access to detailed information about the phenotypic variables measured and pre-computed associations between subjects' phenotypes and genotypes. [Click here](#) to read the press release. To read more about GWA projects, see NCBI's [GWA resource page](#).

### PubMed Central

An archive of biomedical and life sciences journals

- Free fulltext
- Over 1,100,000 articles from over 340 journals
- Linked to PubMed and fully searchable



http://nsdl.org





>spongebob

```

1 ggttgatcct gccagtagtc atatgctgtt ccaaaagatt aagccatgca tgtctcagta
61 taagctttta cacggcgaaa ctgcgaatgg ctcatataag cagttataat ttatttgatg
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481 gcatccatg ttcctcagaa ttcctcagaa ttcctcagaa ttcctcagaa
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```



>patrick

```

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>MrKrabs

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>Squidburt

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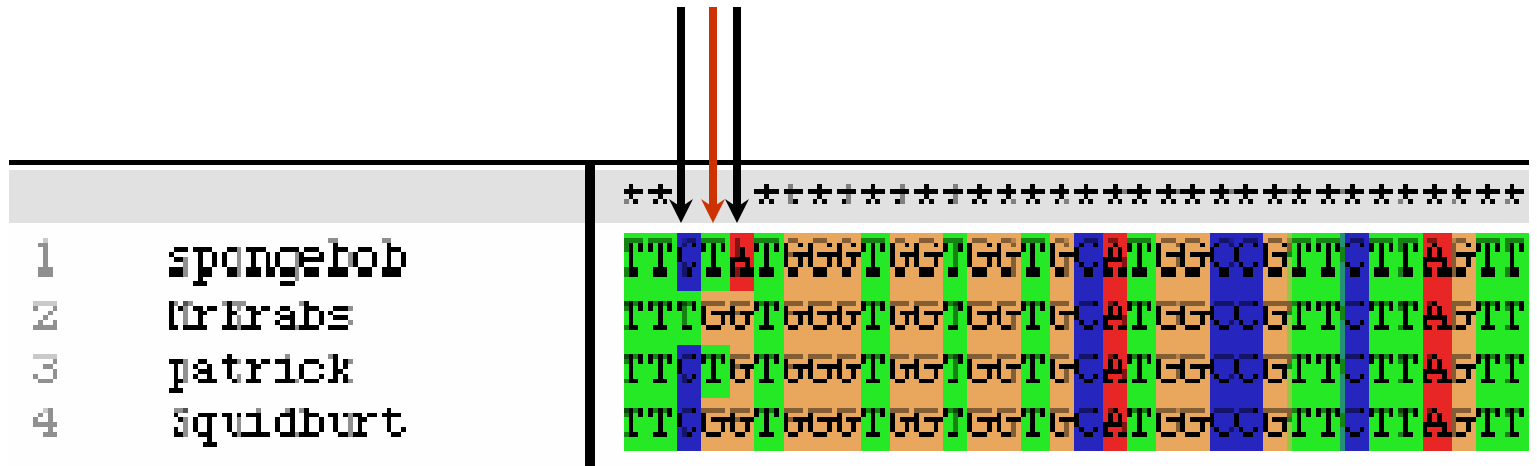
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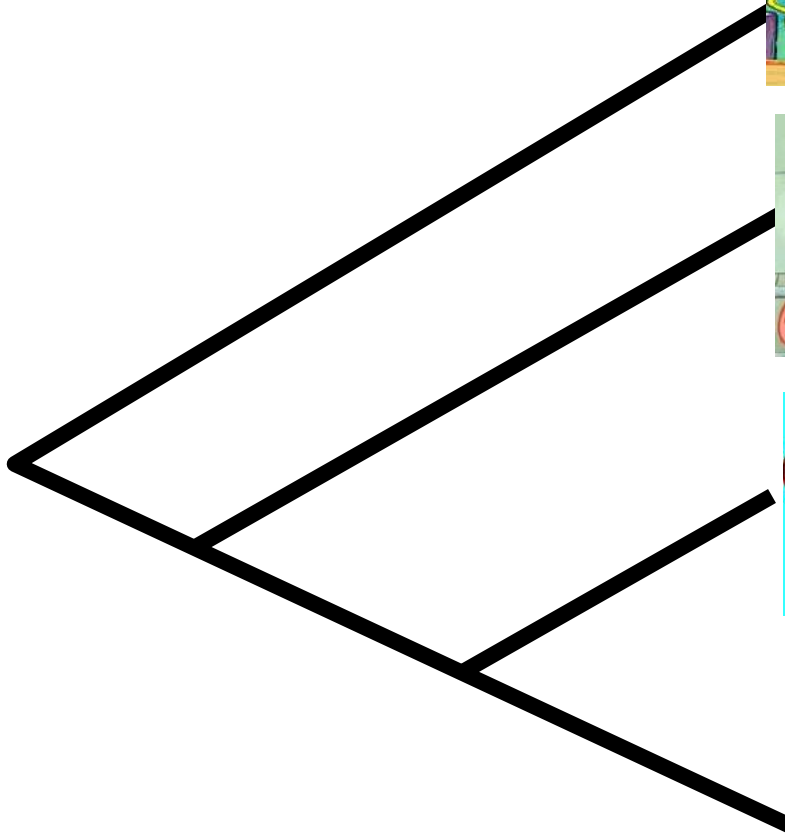
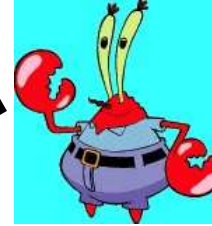


http://nsdl.org







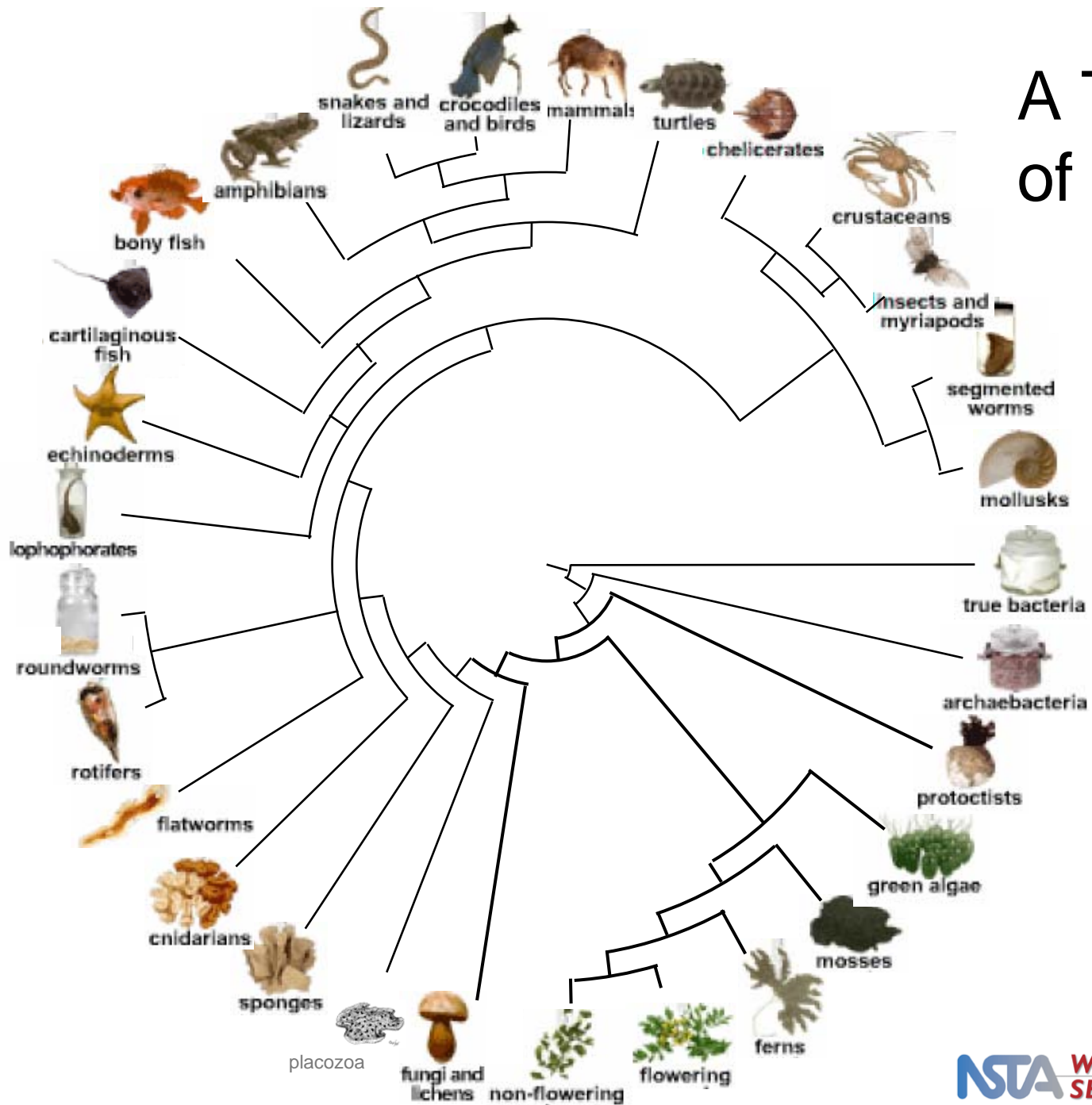


<http://nsdl.org>





# A Tree of Life





True or False:

There are 5 major kingdoms of life

Stamp your answer

True	False



3 Super-domains

YES



Eukaryota  
Bacteria  
Archaea

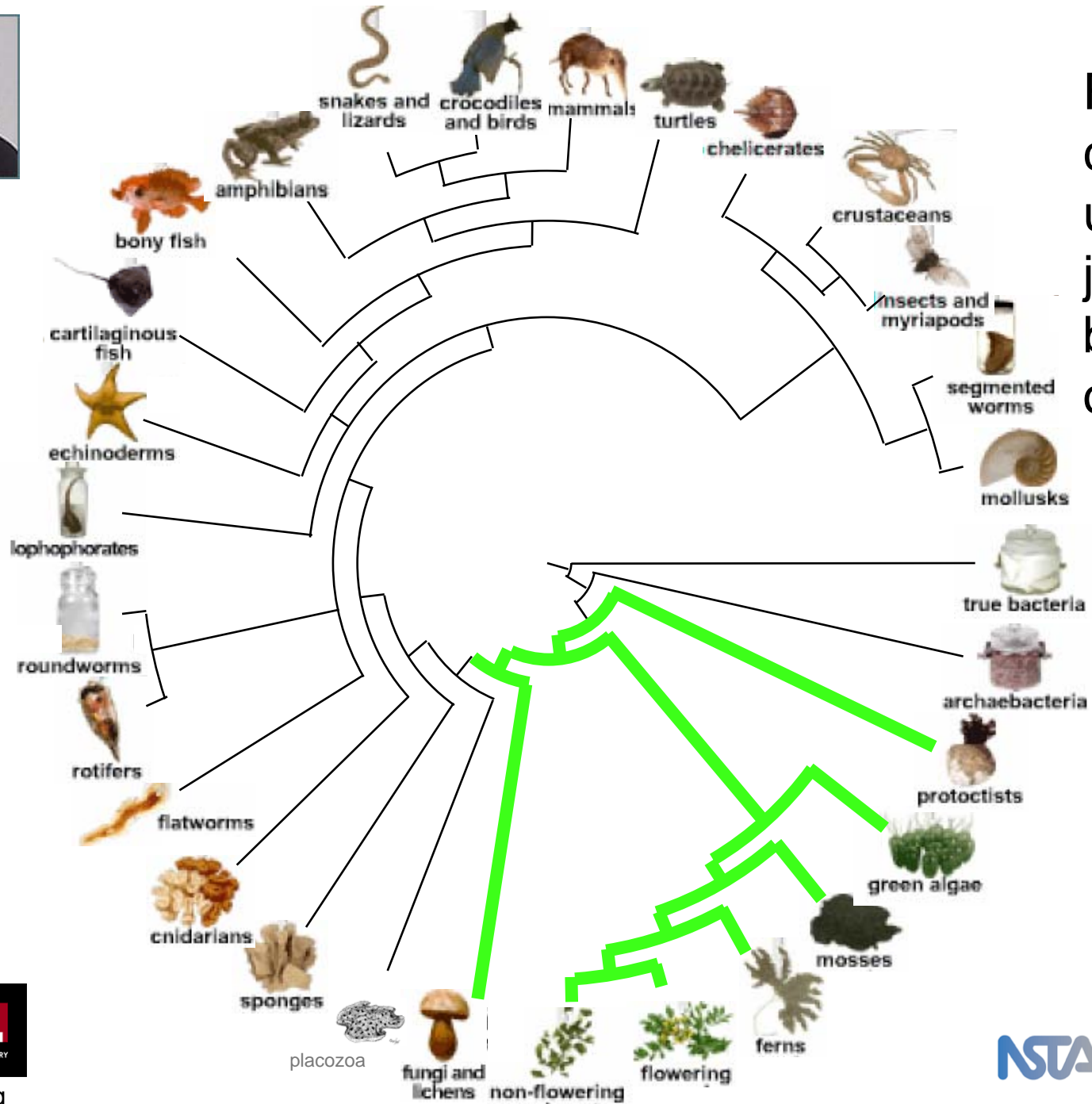
6 Kingdoms

YES... well maybe

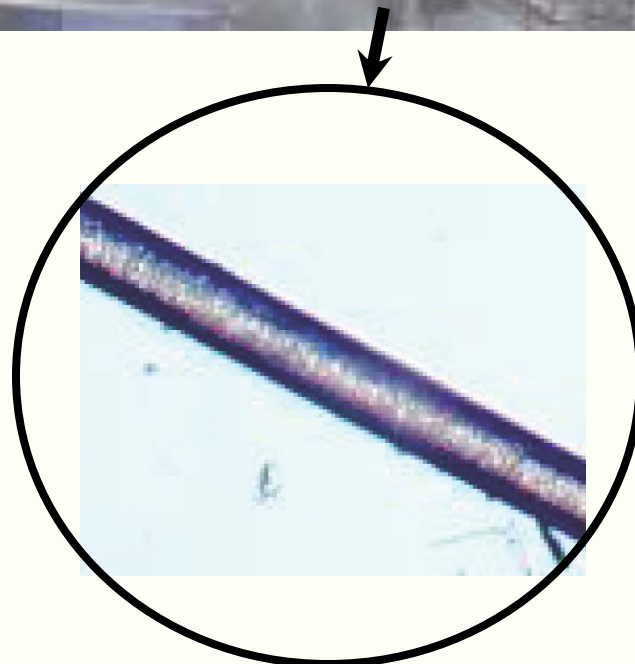


Bacteria  
Archaea  
Fungi

Plants  
Animals  
PROTISTA (darn)



Fungi are closer to us beyond just being between our toes





# MEET YOUR RELATIVES

Learn how you are like—and different from—a Neanderthal and a chimpanzee!

**Chimpanzees** are more closely related to **humans** than any other living species. Among the extinct human-like species, **Neanderthals** were our closest cousins.

BONES

BRAINS

DNA

USE THESE BUTTONS to explore how humans, Neanderthals and chimpanzees are similar in their bones, brains and DNA—and what makes humans unique



Scale= 20%

**CHIMPANZEE**  
*Pan troglodytes*



**HUMAN**  
*Homo sapiens*

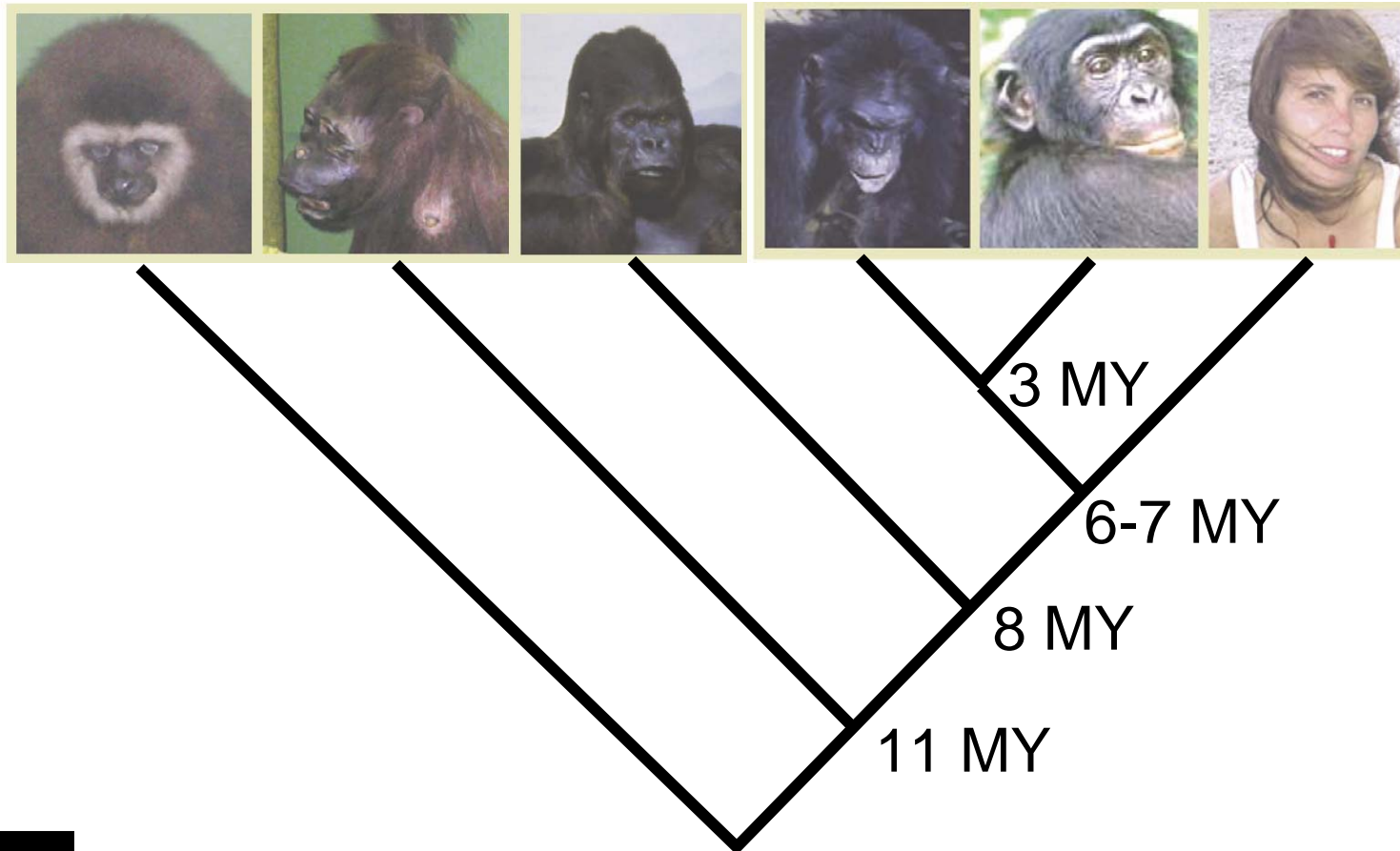


**NEANDERTHAL**  
*Homo neanderthalensis*

99.9%

98.7%

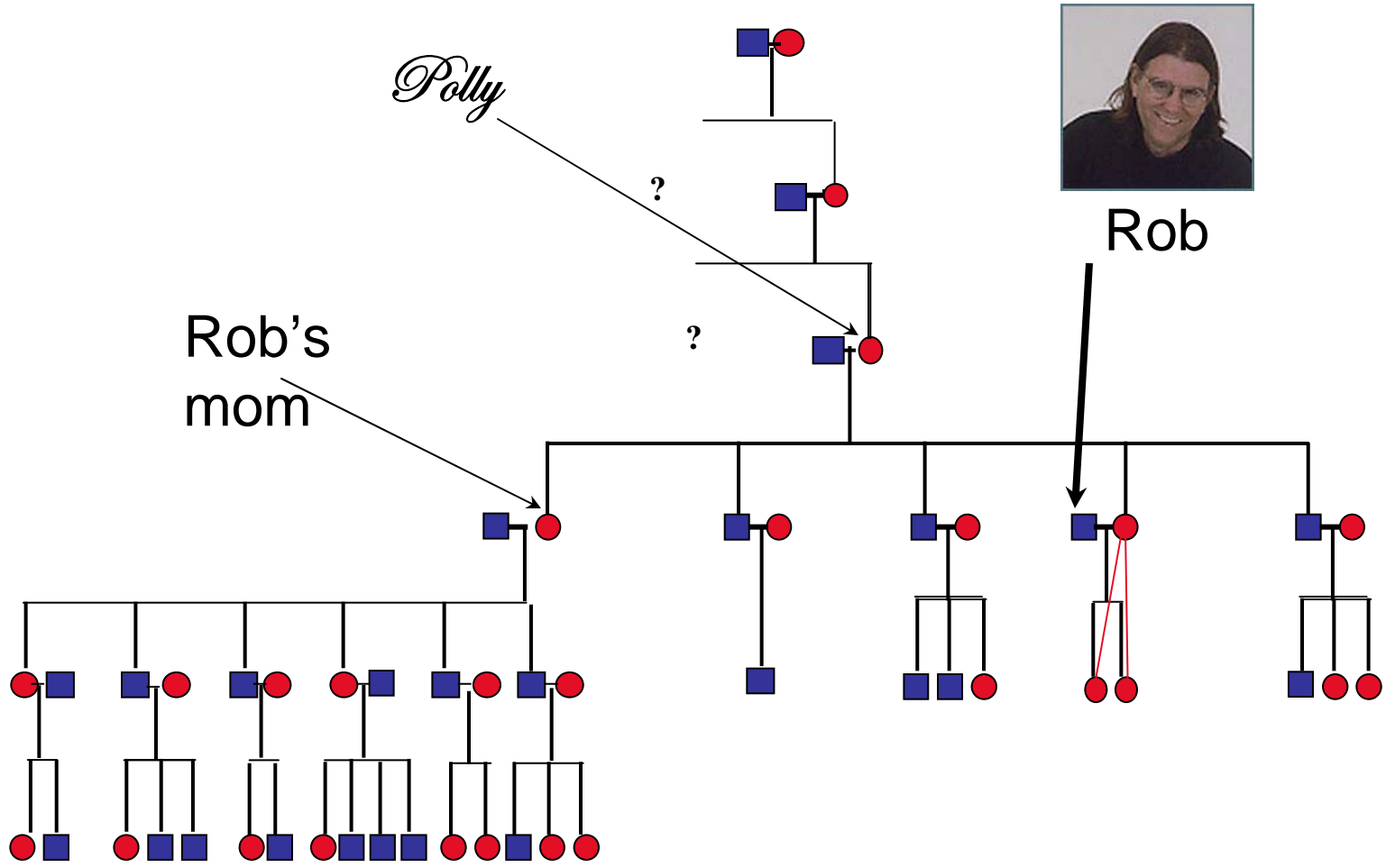






When a genetic testing company tells you that you are Yugoslavian, are you?



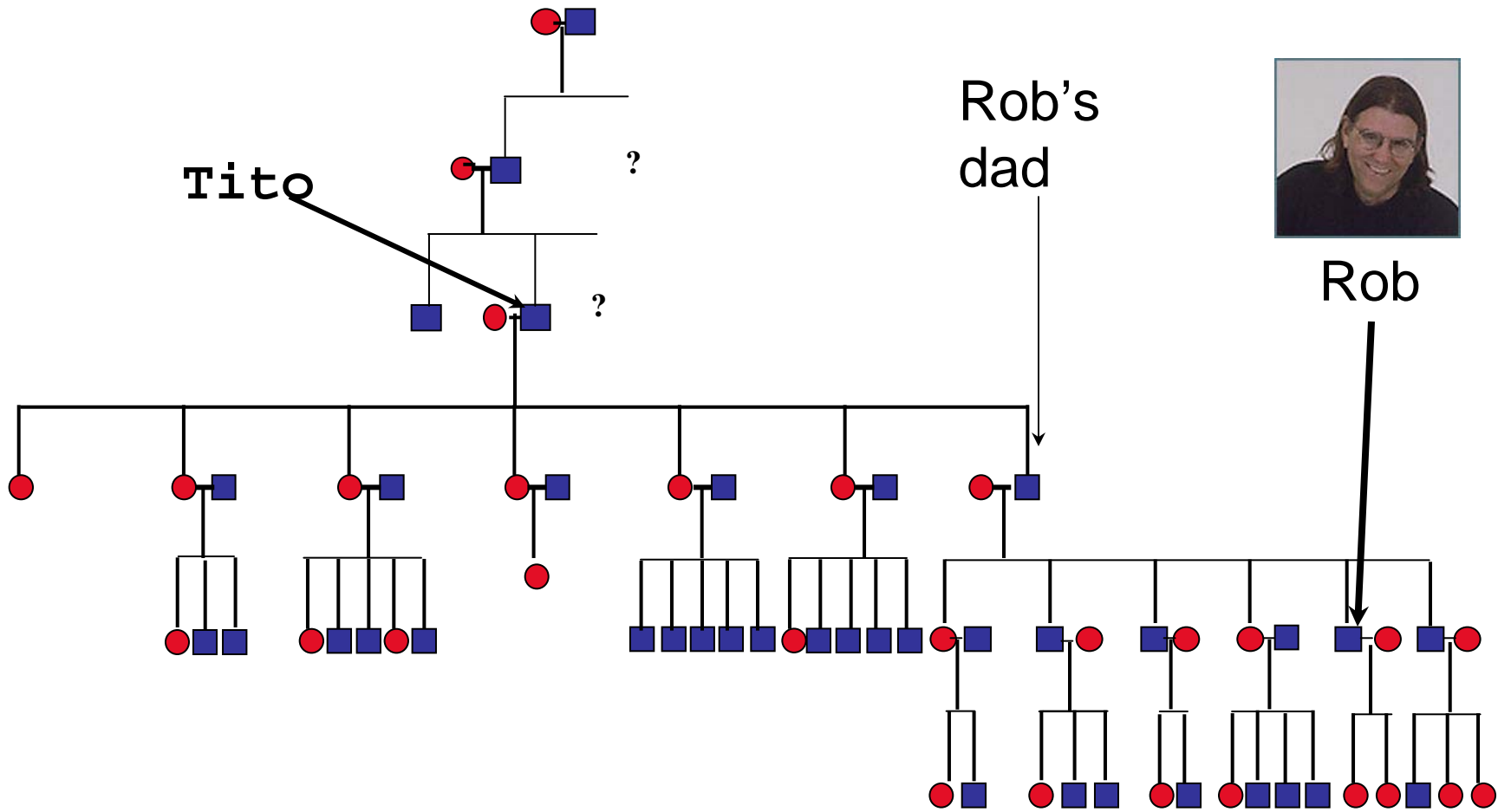


Rob

Rob's  
mom

*Polly*

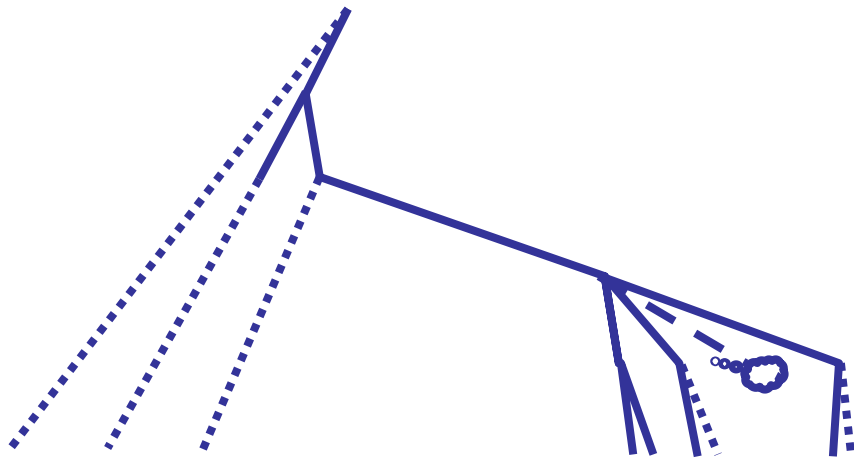
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 ■ = daughter



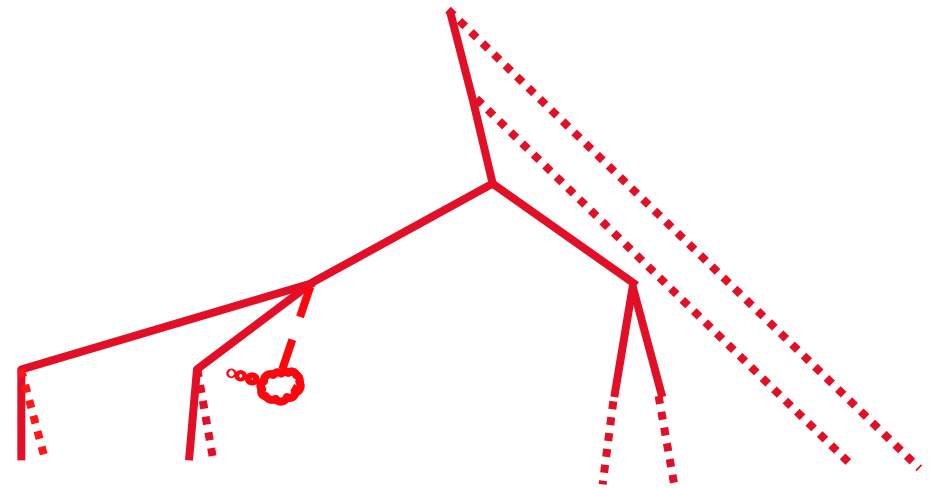
■ = son  
● = daughter

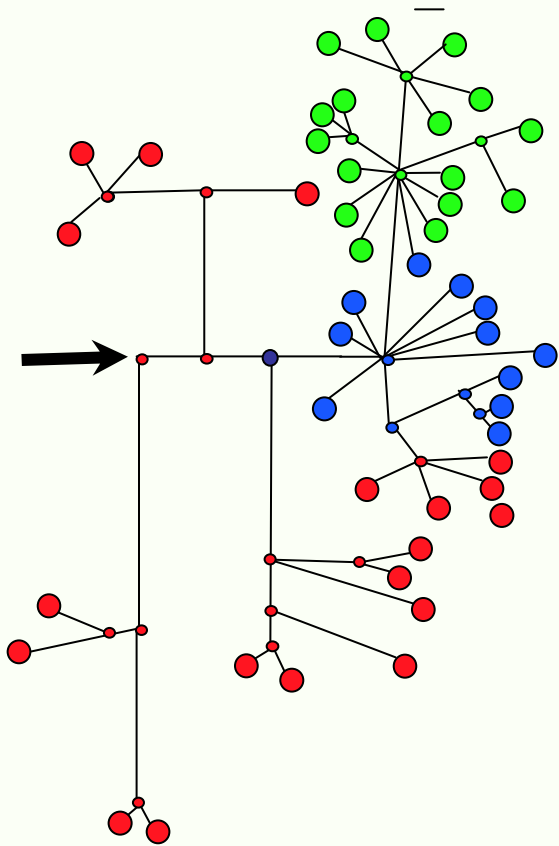


Tito

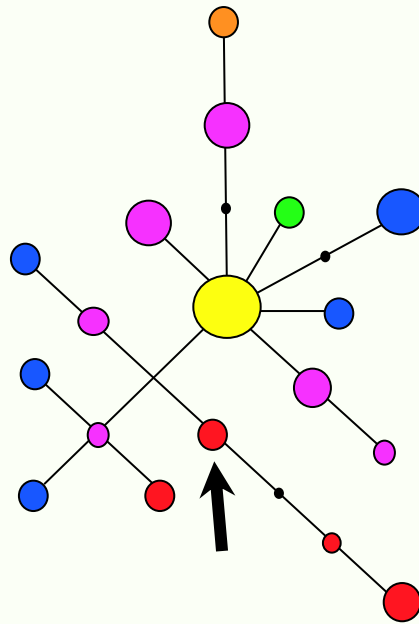


*Polly*

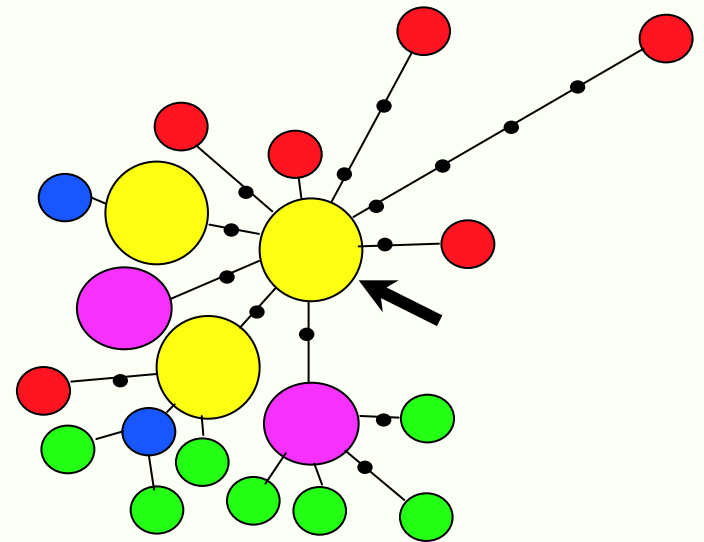




mtDNA



Y-DNA



X-DNA



WE ARE ALL AFRICAN

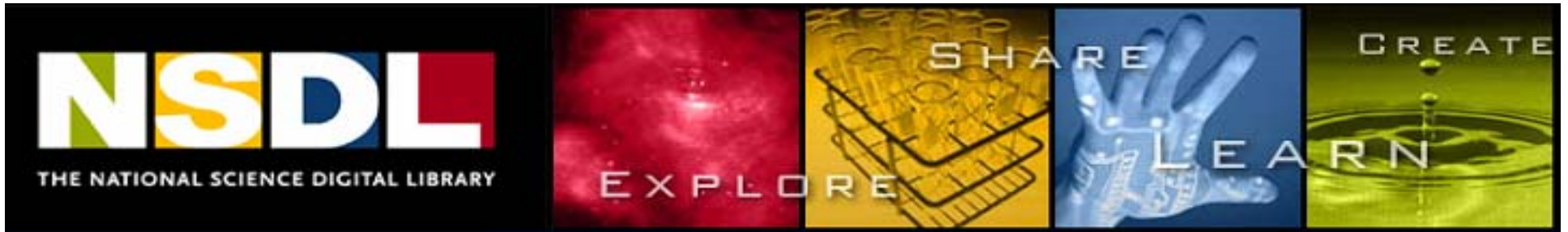


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Dr. Rob DeSalle  
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**THANK  
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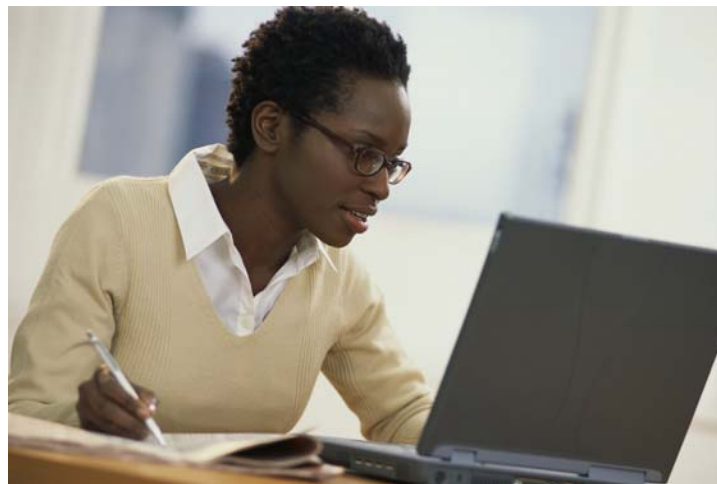




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