PTEE

aula 04

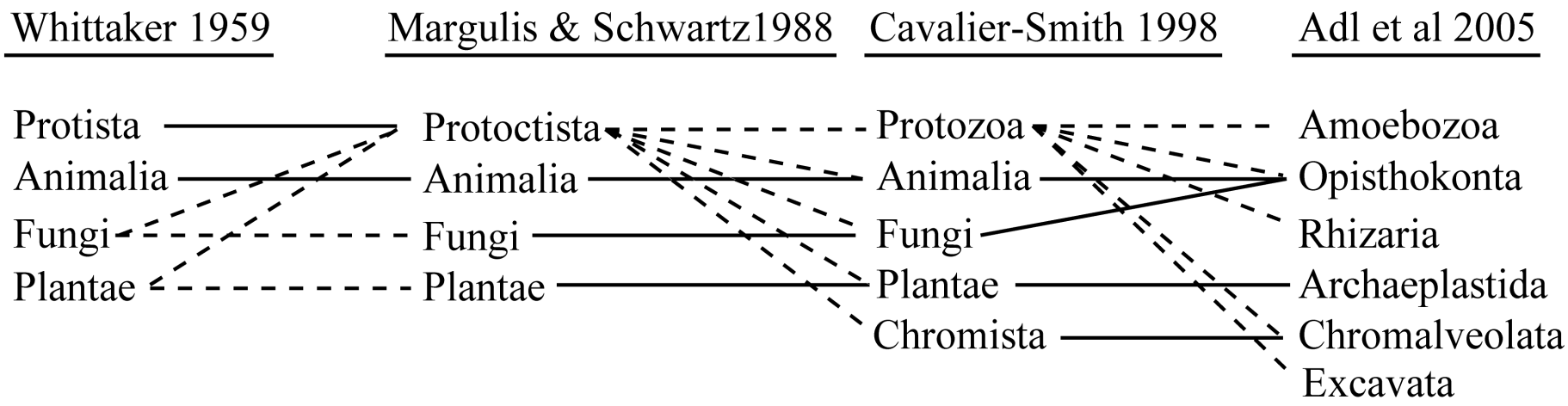
Evidências moleculares

Super-grupos
Chupacabra
Evidências moleculares

Super Grupos

Opisthokonta
‘Plantae’
‘Chromalveolata’
‘Excavata’
‘Amoebozoa’
‘Rhizaria’

Super Grupos



Parfrey, Laura Wegener, Erika Barbero, Elyse Lasser, Micah Dunthorn, Debashish Bhattacharya, David J. Patterson, and Laura A. Katz. 2006. “Evaluating Support for the Current Classification of Eukaryotic Diversity.” PLoS Genetics 2 (12): e220.

Chupacabra

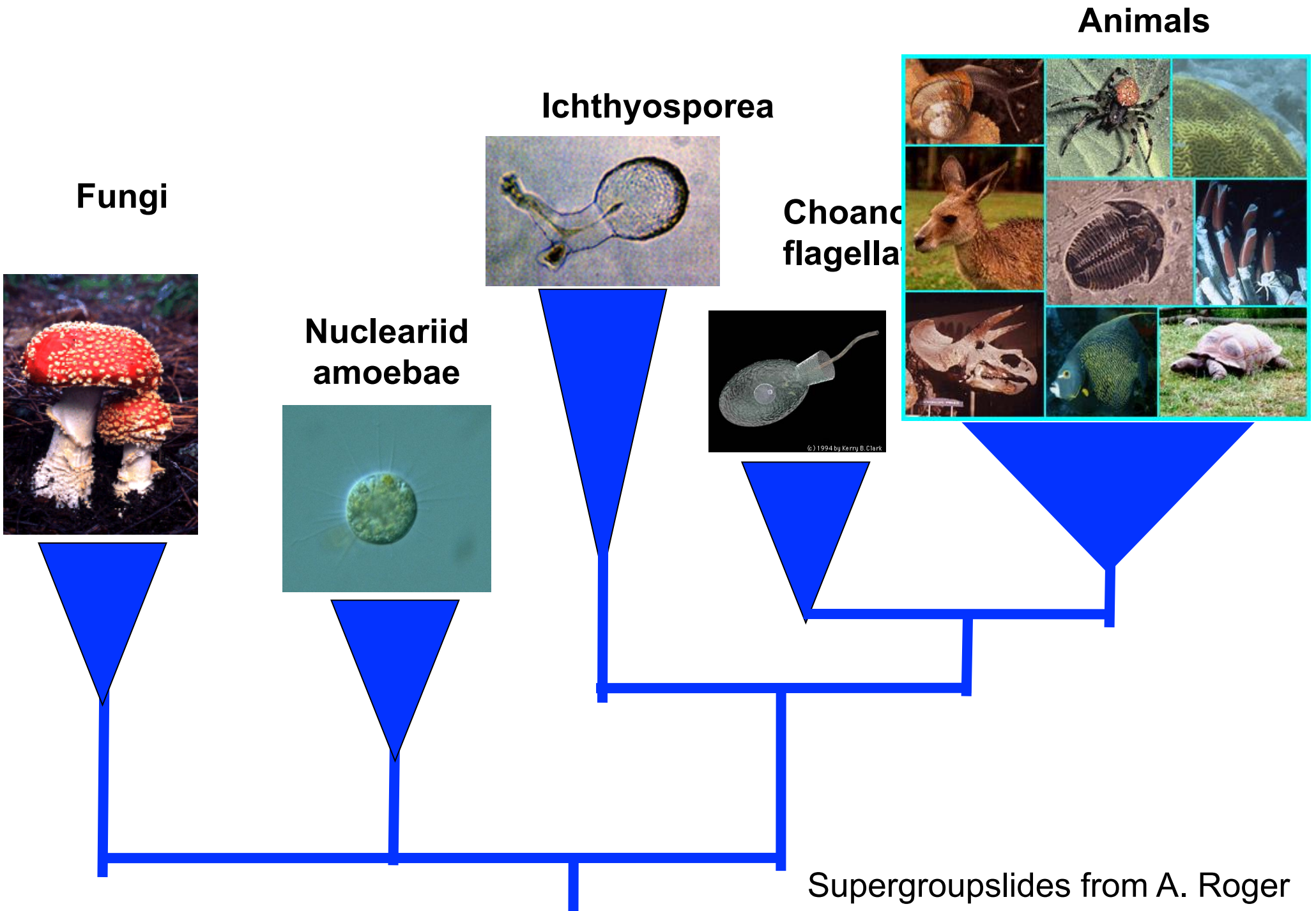


Chupa-cabra

One somewhat discouraging aspect of eukaryotic systematics is the heterogeneity in philosophy for naming higher taxa (i.e., more inclusive clades), which I describe in overly simplistic terms below to highlight the differences in approaches. There is a tendency to subscribe to what could be called the "Chupacabra" approach, whereby clades are named on the basis of only very limited data and upon first sighting. (The Chupacabra is a mythical creature that has been reported in the Americas, parallel to sightings of Big Foot in the Pacific Northwest of the United States). A second discouraging approach is one whereby researchers set out to find data to support a hypothesis, often of the Chupacabra type. Here, a researcher might sift among thousands of observations (e.g., expressed sequence tags, genome sequences) to find a half dozen or so that support a hypothesis and then use these data to conclude that a hypothesis is correct regardless of the insights from the remaining observations. Fortunately, the approaches described above are not adopted by the majority of the field, as most focus on analyses of all available data and draw conclusions based on the preponderance of evidence in manuscripts that discuss both caveats and alternative hypotheses.

Katz, Laura A. 2012. "Origin and Diversification of Eukaryotes." Annual Review of Microbiology 66 (1): 411–27. doi:10.1146/annurev-micro-090110-102808.

'OPISTHOKONTA'



Supergroupslides from A. Roger

Opisthokonta

			Membership									Supergroup Monophyly					
Year	Gene	Ref	Mt	Fu	Cf	Cy	Ic	Co	Nu	Mi	Ap	A	C	E	O	P	R
1993	SSU	[24]	●	●	●							—	+		+		
1993	βTub	[27]	●	●										—	+		
1993	Actin	[27]	●	●								—	—	—	+		
1995	SSU	[25]	●	●	●						●	—	—		+	+	—
1996	SSU	[129]	●	●	●	●	●	●			●	—	—		+	+	—
1998	SSU	[130]	●	●	●		●				○		—		+	—	
2003	SSU	[131]	●	●	●	●	●	●	●	●	○	—	—		+	—	+
2003	HSP90	[122]	●	●				●			○		—	—	+	—	
2003	EF1α	[132]	●	●			●					+			+	—	
2006	Multi	[26]	●	●	●	●	●	●	●	●	○	+	+	—	+		
2000	Multi	[115]	●	●								+	+	—	+	+	
2002	SSU	[33]	●	●	●	●	●	●			○	+	—	+	+	—	—
2004	SSU	[49]	●	●	●	●	●	●	●		○	—	—	—	+	—	+

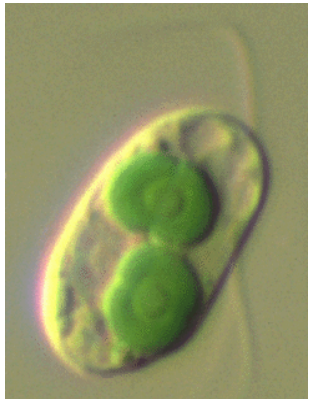
Figure 7. Support for Membership and Supergroup Monophyly from "Opisthokonta"-Targeted Molecular Genealogies

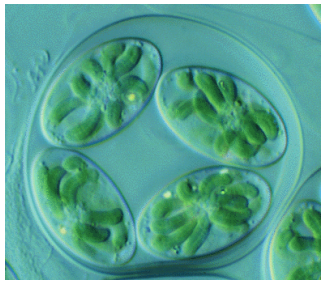
Member taxa: Mt, Metazoa; Fu, Fungi; Cf, Choanomonada; Cy, chytrids; Ic, Ichthyosporea (DRIPs); Cl, *Corallochytrium;* Nu, Nucleariida; Mi, *Ministeria*; Ap, apusomonads. The position of apusomonads, Ap, was not considered when scoring the monophyly of "Opisthokonta" as this organism is highly variable, and it has been removed from recent classifications (see text). See Figure 4 for further notes. References cited in this figure are [24–27,33,49,115,122,129–132].

doi:10.1371/journal.pgen.0020220.g007

'PLANTAE/ARCHAEPLASTIDA'

Glaucocystophytes

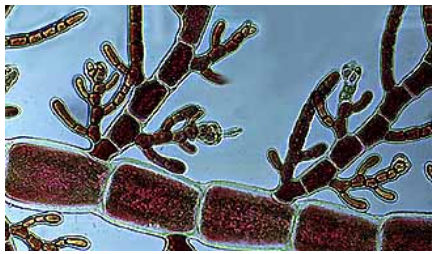




Red Algae

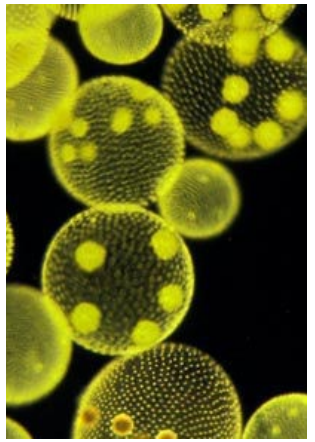


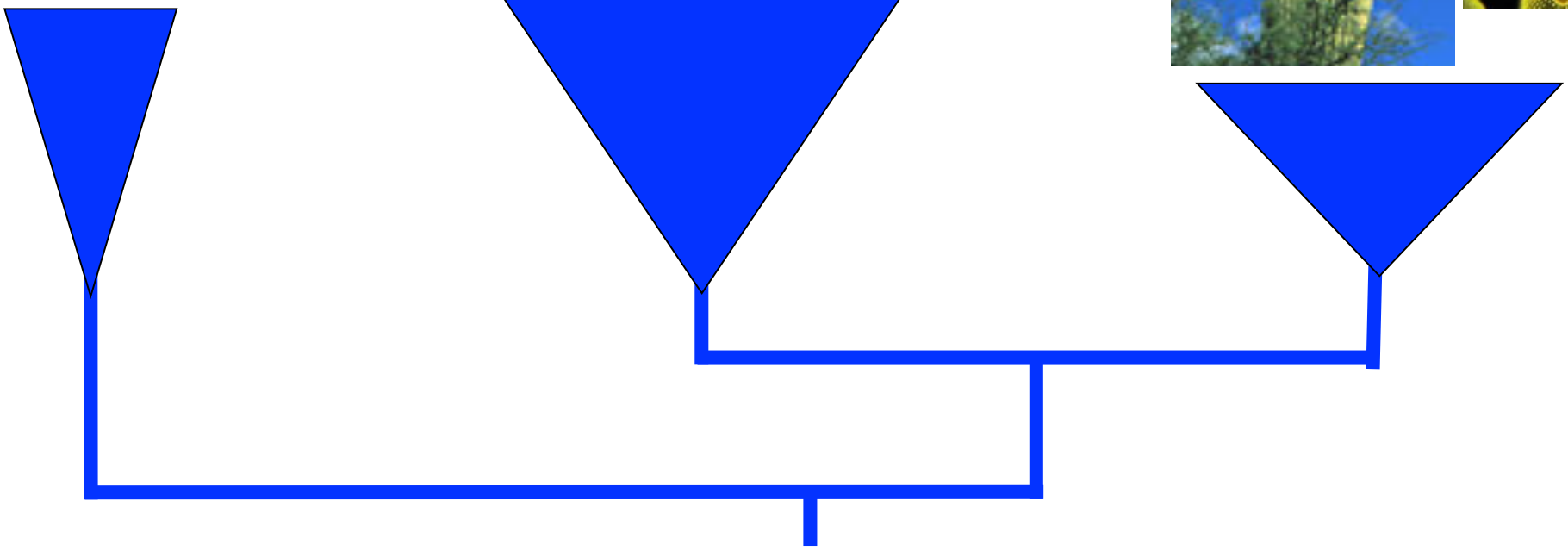




Green algae & Land Plants







Plantae

				Membership			Supergroup Monophyly					
Year	Gene	Loc	Ref	Gr	Rh	Gl	A	C	E	O	P	R
2002	Genome	Pla	[133]	●	●	●		—			+	
2004	Multi	Pla	[134]	●	●	●		—			+	
2004	Genome	Pla	[135]	●	●	●		—			+	
2005	Multi	Pla	[54]	●	●	●		+			+	
1995	SSU	Nuc	[136]	○	○	○	—	—		+	—	+
1997	Actin	Nuc	[137]	●	●	●	+	—		—	+	
2000	EF2	Nuc	[53]	●	●		—	—	—	+	+	
2001	RPB1	Nuc	[138]	○	○		—		—	+	—	
2005	Multi	Nuc	[139]	○	○	○	—	+	+	+	—	
2005	Multi	Nuc	[54]	●	●	●		+		+	+	
2000	Multi	Nuc	[115]	●	●	●	+	+	—	+	+	
2002	SSU	Nuc	[33]	○	○	○	+	—	+	+	—	—
2004	SSU	Nuc	[49]	○	○	○	—	—	—	+	—	+

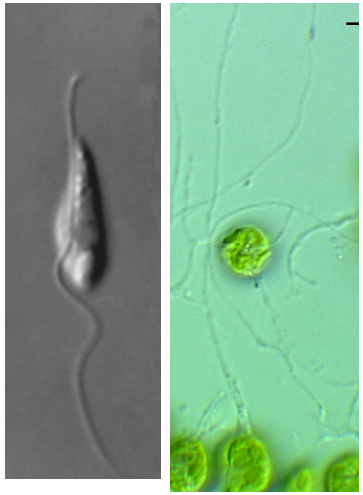
Figure 8. Support for Membership and Supergroup Monophyly from "Plantae"-Targeted Molecular Genealogies

Member taxa: Gr, Chloroplastida = Viridiplantae (Green algae, including land plants); Rd, Rhodophyceae (Red algae); Gl, Glaucophyta. See Figure 4 for general notes and Figure 5 for plastid-specific notes. References cited in this figure are [33,49,53,54,115,133–139].

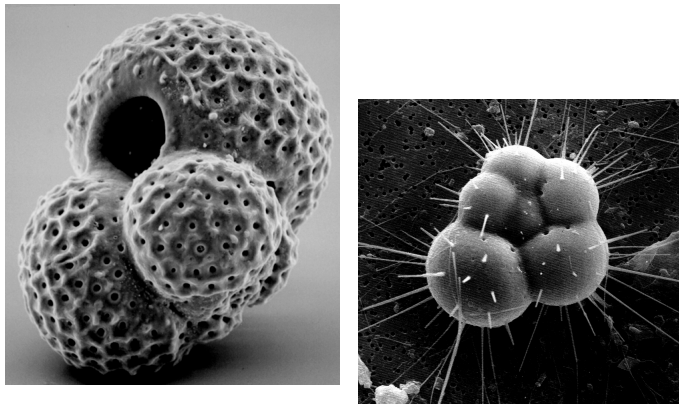
doi:10.1371/journal.pgen.0020220.g008

“Rhizaria”

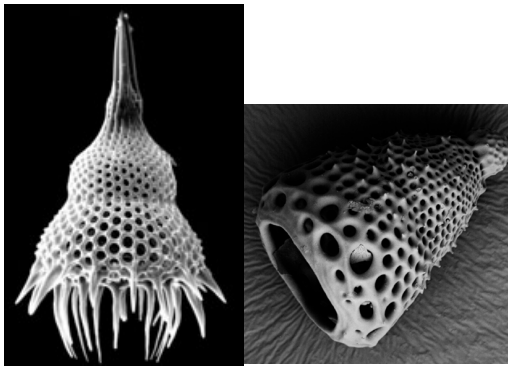
Cercomonads
Chlorarchniophyte

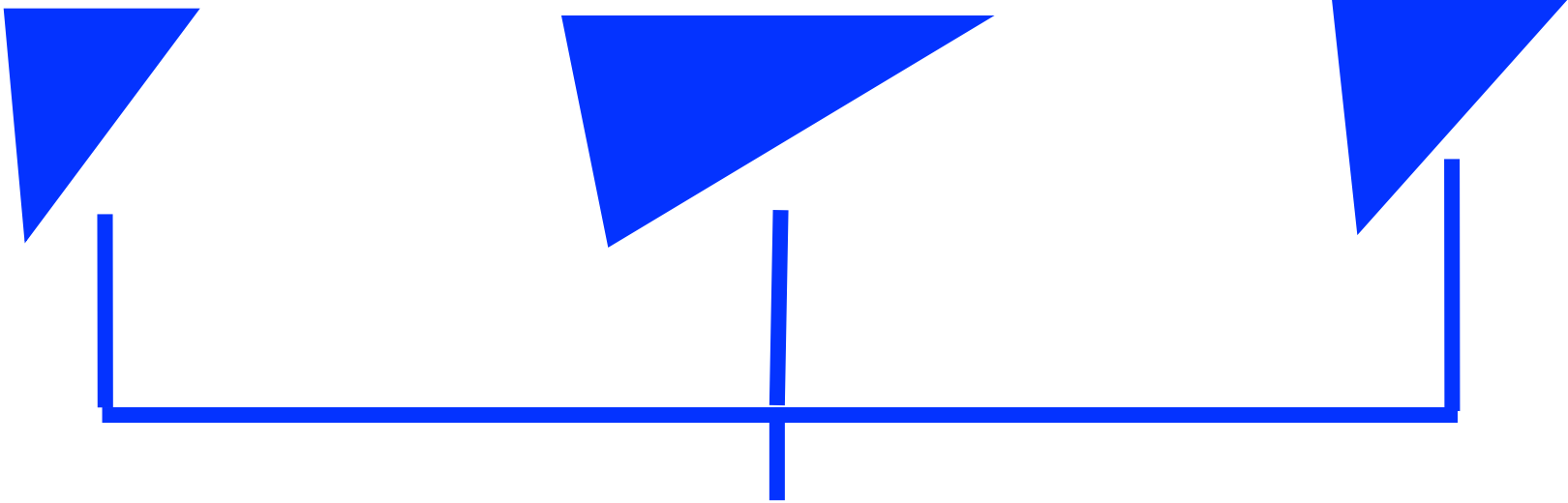


Foraminifera

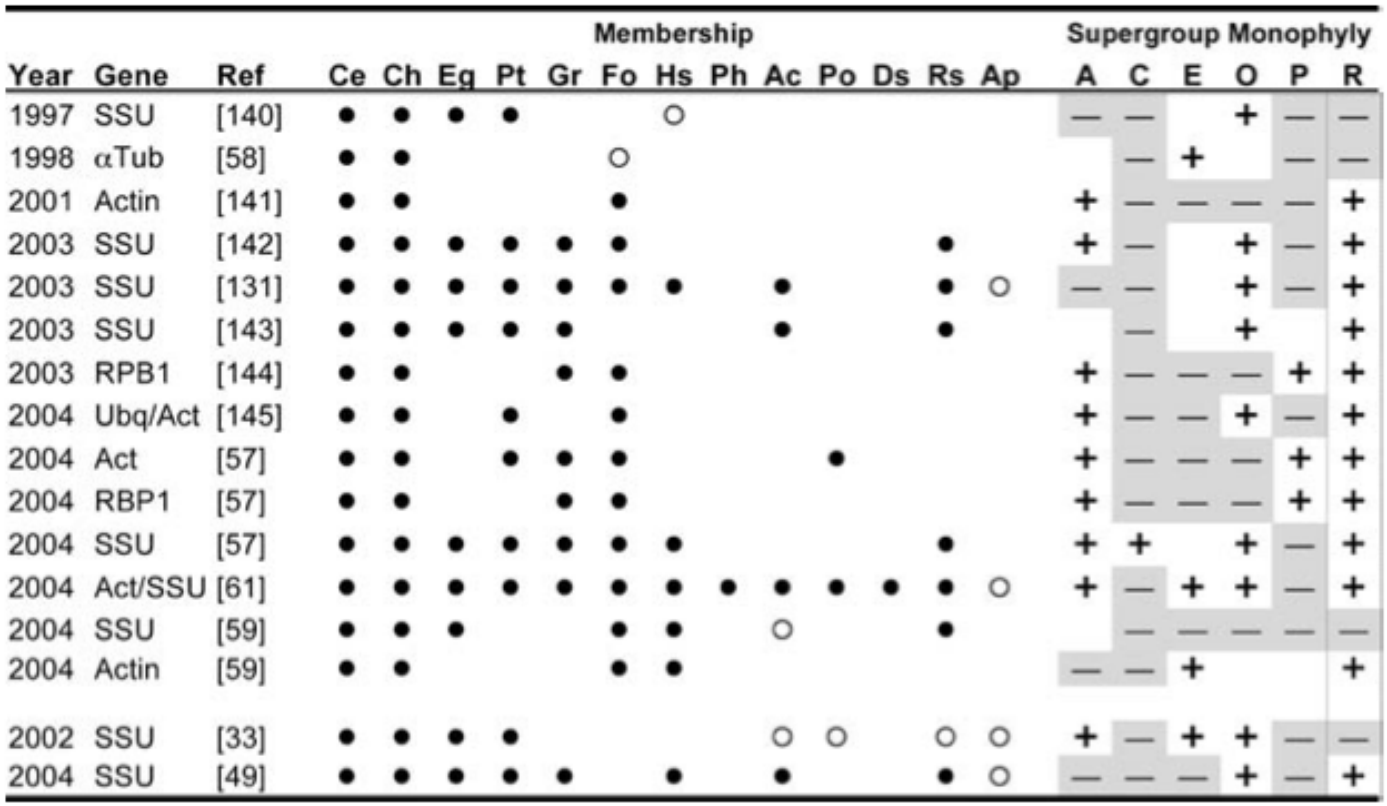


Radiolaria





Rhizaria



			Membership													Supergroup Monophyly					
Year	Gene	Ref	Ce	Ch	Eg	Pt	Gr	Fo	Hs	Ph	Ac	Po	Ds	Rs	Ap	A	C	E	O	P	R
1997	SSU	[140]	●	●	●	●			○							—	—		+	—	—
1998	αTub	[58]	●	●				○									—	+		—	—
2001	Actin	[141]	●	●				●								+	—	—	—	—	+
2003	SSU	[142]	●	●	●	●	●	●						●		+	—		+	—	+
2003	SSU	[131]	●	●	●	●	●	●	●		●			●	○	—	—		+	—	+
2003	SSU	[143]	●	●	●	●	●				●			●			—		+		+
2003	RPB1	[144]	●	●			●	●								+	—	—	—	+	+
2004	Ubq/Act	[145]	●	●		●		●								+	—	—	+	—	+
2004	Act	[57]	●	●		●	●	●				●				+	—	—	—	+	+
2004	RBP1	[57]	●	●			●	●								+	—	—	—	+	+
2004	SSU	[57]	●	●	●	●	●	●	●					●		+	+		+	—	+
2004	Act/SSU	[61]	●	●	●	●	●	●	●	●	●	●	●	●	○	+	—	+	+	—	+
2004	SSU	[59]	●	●	●			●	●		○			●			—	—	—	—	—
2004	Actin	[59]	●	●				●	●							—	—	+			+
2002	SSU	[33]	●	●	●	●					○	○		○	○	+	—	+	+	—	—
2004	SSU	[49]	●	●	●	●	●		●		●			●	○	—	—	—	+	—	+

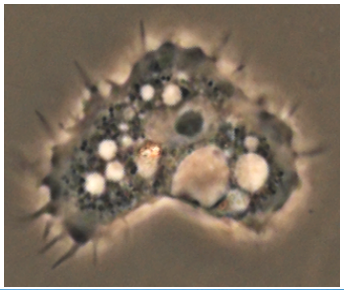
Figure 9. Support for Membership and Supergroup Monophyly from "Rhizaria"-Targeted Molecular Genealogies

Member taxa: Ce, Cercomonadida; Ch, Chlorarachniophyta; Eg, euglyphids; Pt, Phytomyxea (plasmophorids); Ph, Phaeodarea; Gr, *Gromia;* Fo, Foraminifera; Hs, Haplosporidia (Ascetosporea); Po, Polycystinea; Ac, Acantharia; Ds, desmothoracids; Rs, residua; Ap, apusomonads. The position of apusomonads, Ap, was not considered when scoring the monophyly of "Rhizaria" as the position of this organism is highly variable, and it has been removed from recent classifications (see text). See Figure 4 for further notes. References cited in this figure are [33,49,57–59,61,131,140–145].

doi:10.1371/journal.pgen.0020220.g009

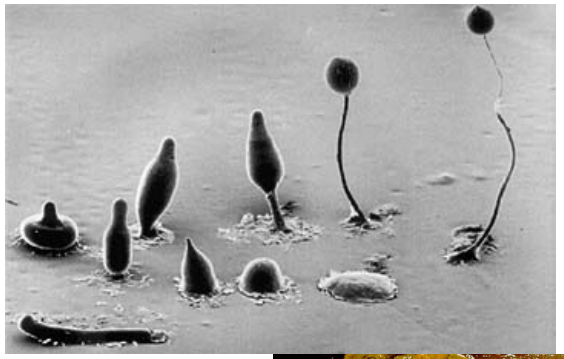
“AMOEBOZOA”

Lobose Amoebae

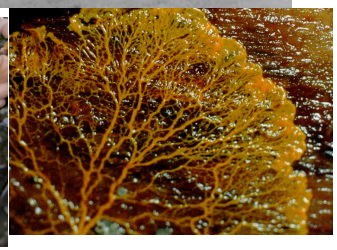




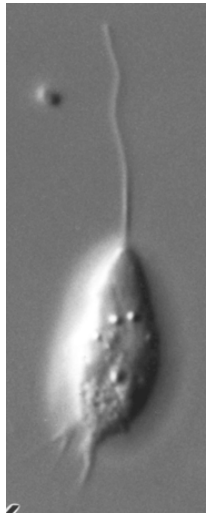
Slime molds





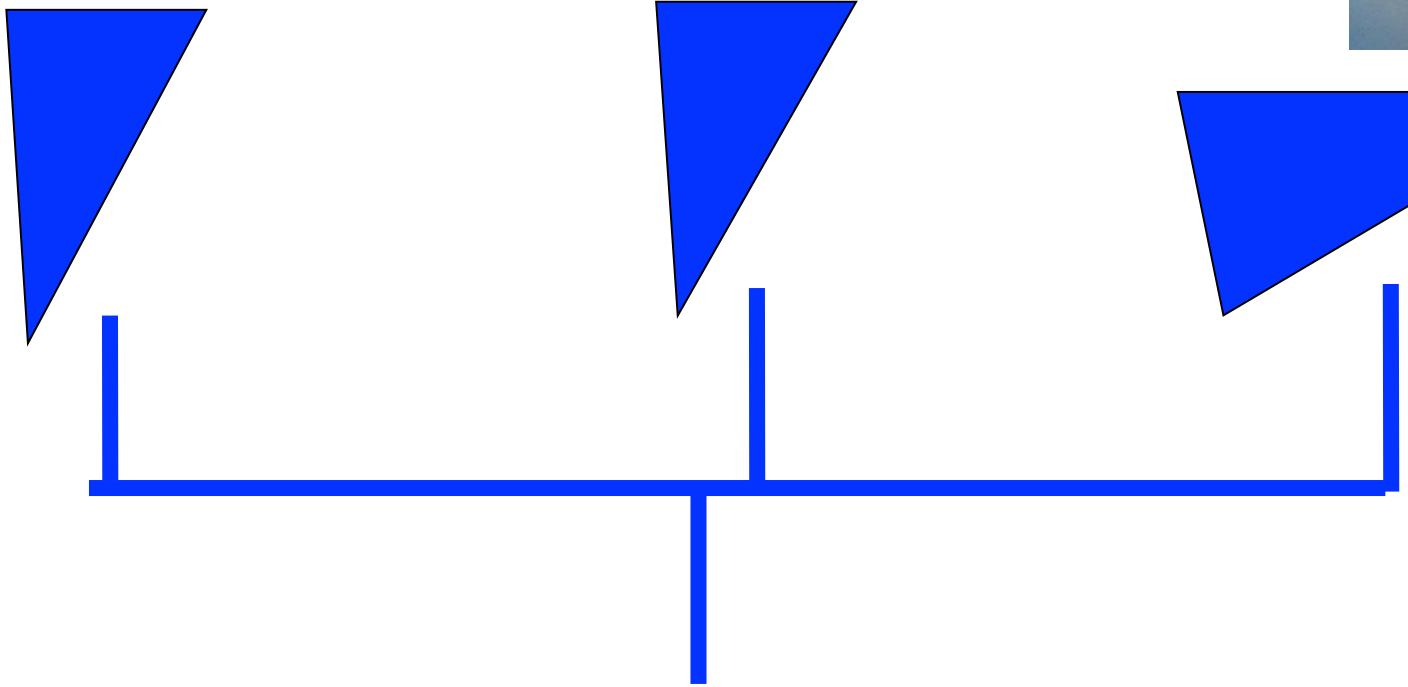


Pelobionts & *Entamoeba*









Amoebozoa

			Membership										Supergroup Monophyly					
Year	Gene	Ref	My	Dc	Tu	Am	Fl	Pe	Ma	En	Rs	Br	A	C	E	O	P	R
1995	SSU	[25]	○	○	○	○			○	○			—	—		+	+	—
1997	SSU	[114]	○	○	○	○			○	○			—	—		+	—	—
2001	SSU	[84]	●	●	●	●	●		●	●	●	○	+	—	—	+	—	—
2002	Multi	[97]		●					●	●			+	+	—	+	+	
2003	Actin	[48]	●	●	●	●	●	●	●	●			+	+	+	+	—	
2003	SSU	[48]	●	●	●	●	●	●	●	●	●		+	—	+	+	—	—
2004	SSU	[45]	●	●	●	●	●	●	●	●	●	○	+	—	—	+	—	+
2000	Multi	[115]	●	●		●							+	+	—	+	+	
2002	SSU	[33]	●	●	●	●			●	●			+	—	+	+	—	—
2004	SSU	[49]	○	○	●	●	○	●	●	●	○	○	—	—	—	+	—	+

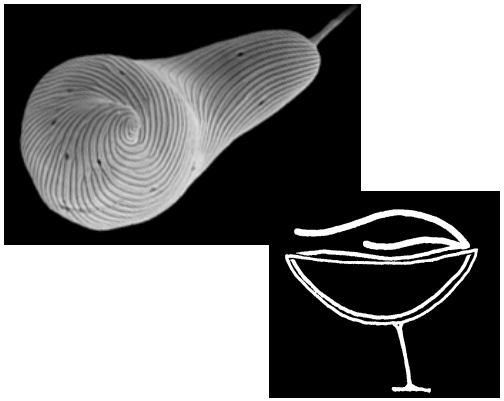
Figure 4. Support for Membership and Supergroup Monophyly from "Amoebozoa"-Targeted Molecular Genealogies

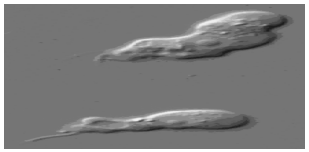
Membership: ● indicates the member taxon falls within the supergroup Amoebozoa; ○ indicates that the member taxon is excluded from the Amoebozoa clade, or no clade is formed. Papers below blank line survey eukaryotic diversity [33,49,115] and are included in all analyses. Member taxa: My, Mycetozoa; Dc, Dictyosteliids; Tu, Tubulinea (Lobosea, Gymnamoebea *sensu stricto*); Am, Acanthamoebidae; Fl, Flabellinea (Discosea, Glycostylea); Pe, *Pelomyxa*; Ma, Mastigamoebidae; En, Entamoebidae; Rs, residua; Br, *Breviata,* "*Mastigamoeba invertans sensu* NCBI." Supergroup Monophyly, + indicates monophyly; — indicates group is para- or polyphyletic, and blank indicates insufficient data available. Supergroup definition based on Adl et al. 2005 [4]: A, Amoebozoa; C, Chromalveolata; E, Excavata; O, Opisthokonta; P, Plantae; R, Rhizaria. The position of *Breviata,* Br, was not considered when scoring the monophyly of Amoebozoa as this organism was misidentified and affiliations are unknown (see text). Some nodes were constrained in reference [97]. References cited in this figure are [25,33,45,48,49,84,97,114,115].

doi:10.1371/journal.pgen.0020220.g004

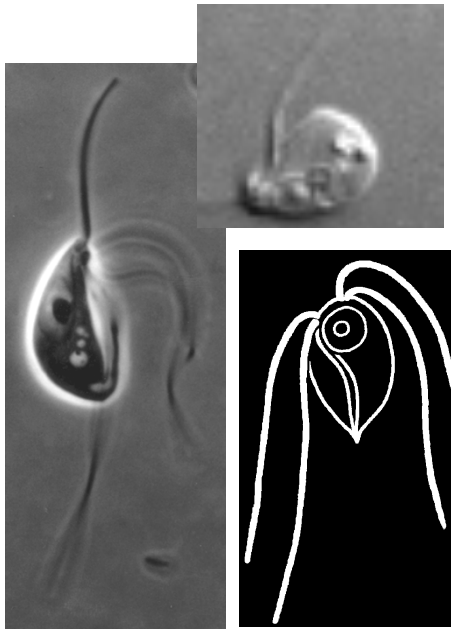
“EXCAVATA”

Euglenozoa, Heterolobosea & Jakobids

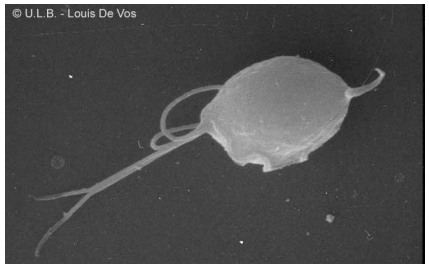




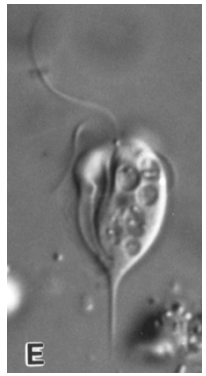
Trimastix*, Oxymonads & *Malawimonas



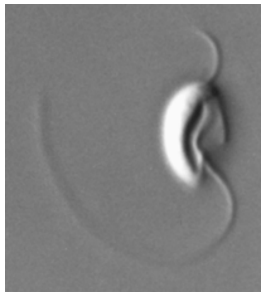
Parabasalia

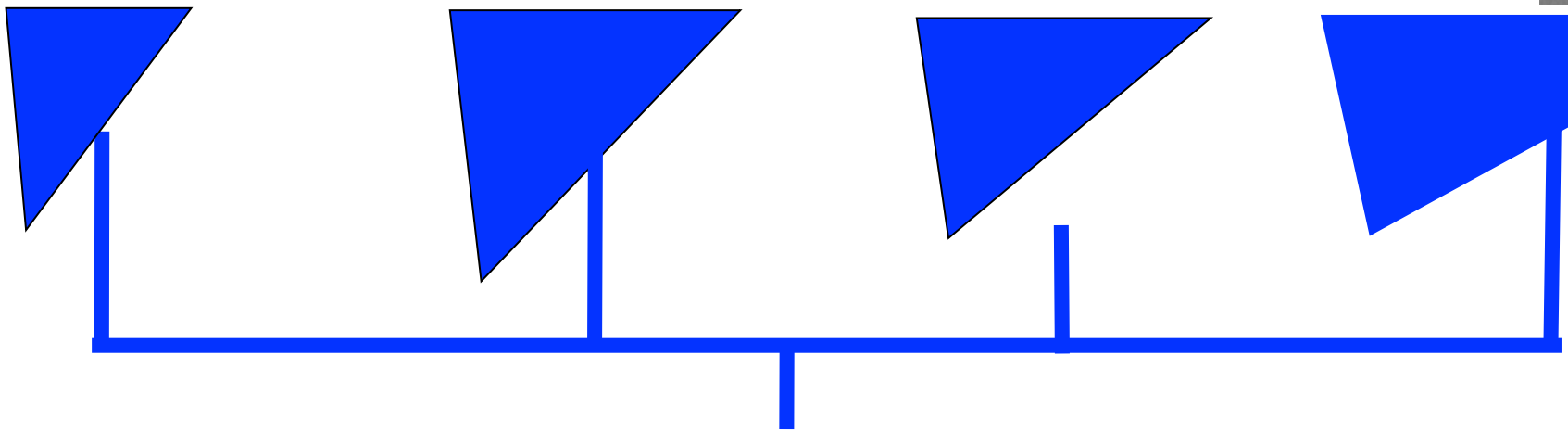


Diplomonads, Retortamonads & *Carpediemonas*









Excavata

			Membership											Supergroup Monophyly					
Year	Gene	Ref	Di	Rt	Cp	Tr	Ox	Ht	Eu	Ml	Jk	Pa	Dy	A	C	E	O	P	R
2001	SSU	[123]	○			■	■	○	○			○		—	—	—	+	+	
2002	SSU	[124]	⬟	⬟		■	■	♦	♦			○		—	—	—	+	—	+
2002	SSU	[125]	⬟	⬟	⬟	○		○	○	○	○	○		—	—	—	+	—	+
2002	Tub	[125]	⬟		⬟			♦	♦	○	○	○			—	—	+	—	—
2003	SSU	[40]	⬟	⬟	⬟	■	■	♦	♦	○	○	○		—	—	—	+	—	+
2003	SSU	[60]		⬟	⬟	■	■	♦	♦	●	●	●	○	+	—	+	+	—	+
2003	SSU	[126]	○			■	■	○	○			○		—		—	+	—	
2005	Multi	[127]	⬟		⬟	■	■	♦	♦	○	○	○		+	+	—	+	+	
2005	Multi	[128]	●						●			●			+	+	+	+	
2000	Multi	[115]	○					♦	♦			○		+	+	—	+	+	
2002	SSU	[33]	●					●	●		●	●		+	—	+	+	—	—
2004	SSU	[49]			○	■	■		○	○	○		○	—	—	—	+	—	+

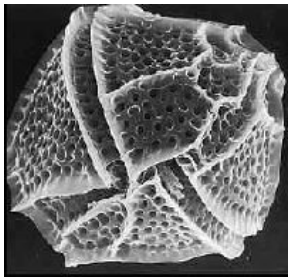
Figure 6. Support for Membership and Supergroup Monophyly from "Excavata"-Targeted Molecular Genealogies

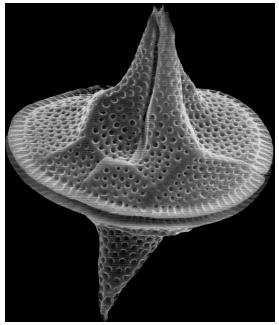
Member taxa: Di, Diplomonadida; Rt, Retortamonadida; Cp, *Carpediemonas*; Tr, *Trimastix*; Ox, Oxymonadida; Ht, Heterolobosea; Eu, Euglenozoa; Ml, *Malawimonas;* Jk, Jakobida; Pa, Parabasalia; Dy, *Diphylleia*. Hypothesized subgroups: ⬟ Fornicata clade (Di + Rt + Cp) monophyletic, ■ Preaxostyla clade (Ox + Tr) monophyletic, ♦ Discicristata clade (Ht + Eu) monophyletic. The position of *Diphylleia,* Dy, was not considered when scoring the monophyly of "Excavata" as the inclusion of this organism within "Excavata" is controversial and has been removed from recent classifications (see text). See Figure 4 for further notes. References cited in this figure are [33,40,49,60,115,123–128].

doi:10.1371/journal.pgen.0020220.g006

'CHROMALVEOLATES'

Dinoflagellates







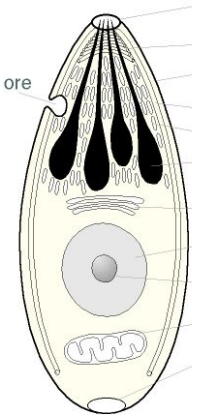
Ciliates





Apicomplexa





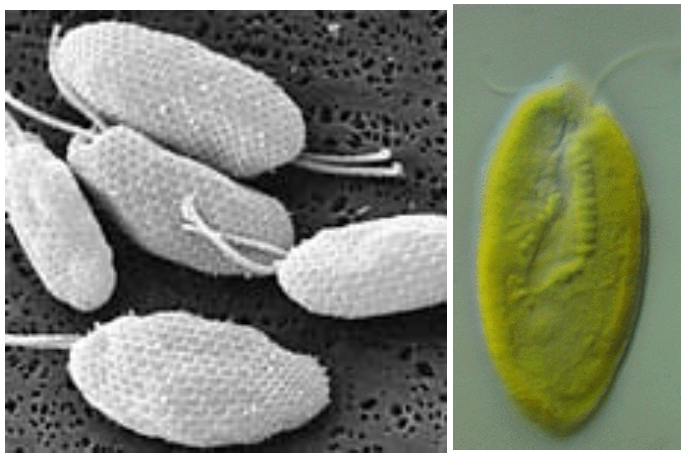
Alveolates

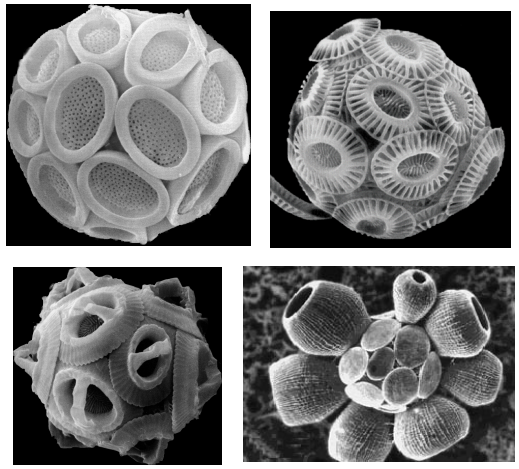
'CHROMALVEOLATES'

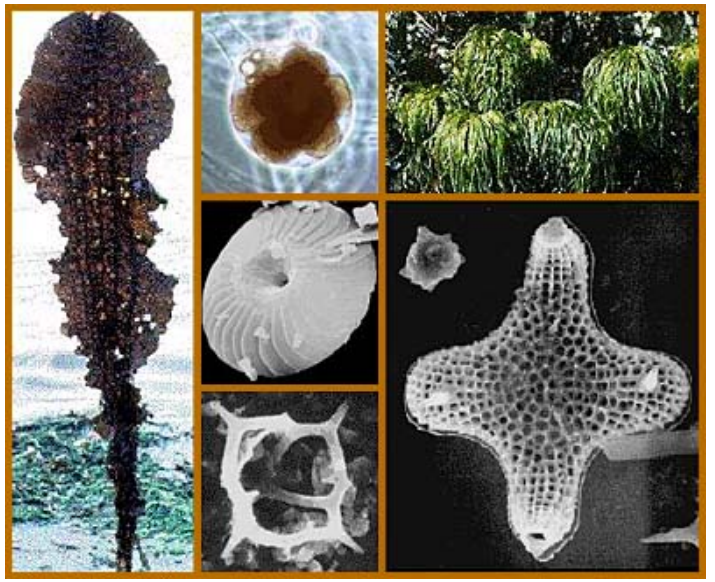
Stramenopiles

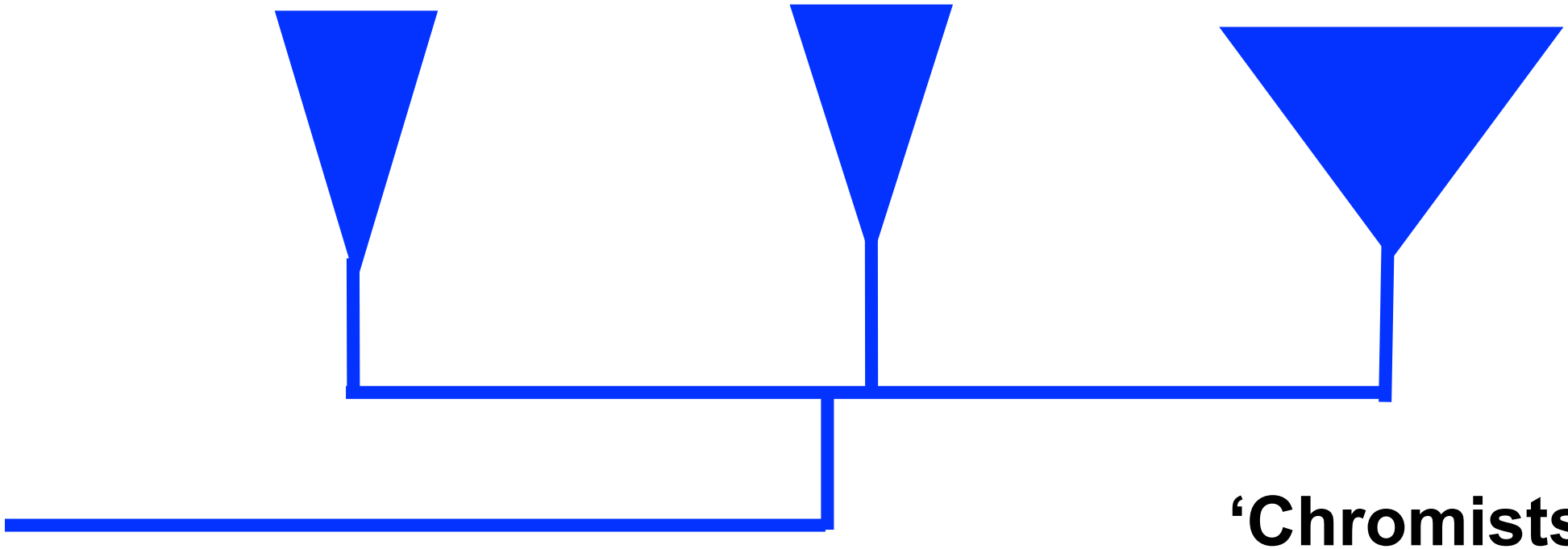
Cryptomonads

Haptophytes









‘Chromists’

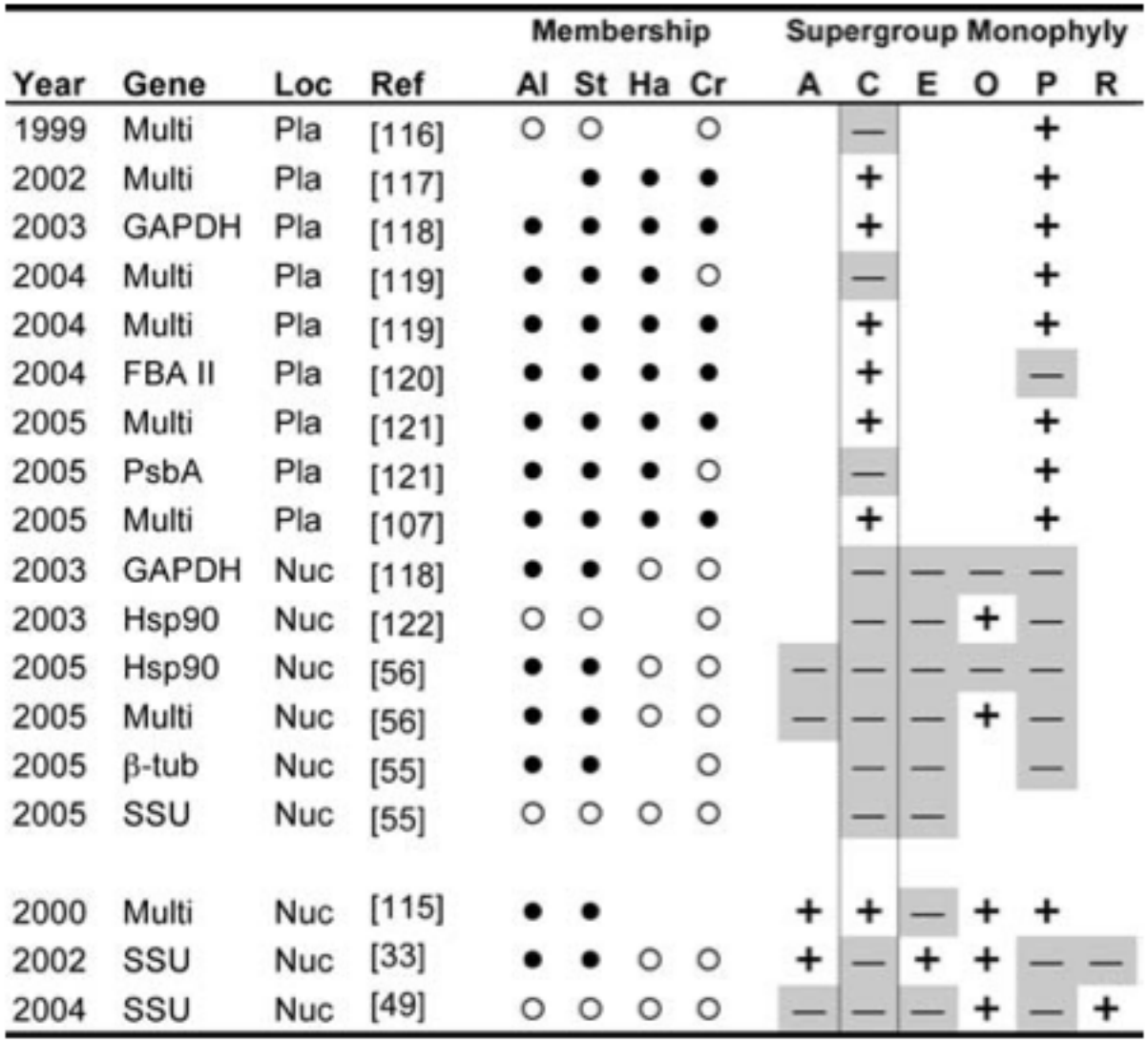
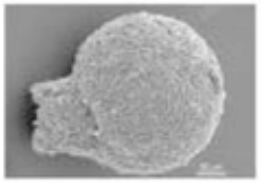
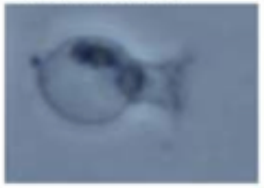
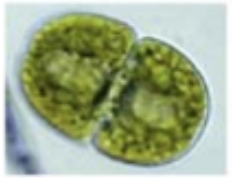
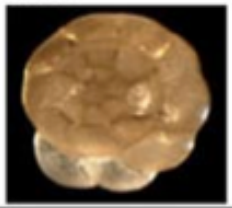


Figure 5. Support for Membership and Supergroup Monophyly from "Chromalveolata"-Targeted Molecular Genealogies

Member taxa: Al, Alveolata; St, Stramenopiles (Heterokonts); Ha, Haptophyta; Cr, Cryptophyceae. Monophyletic "Plantae" from plastid genealogies includes secondarily derived plastids. See Figure 4 for further notes. References cited in this figure are [33,49,55,56,107,108,115–122]. Loc, location (genome) from which the gene of interest originated; Pla, plastid genome; Nuc, nuclear genome; Mit, mitochondrial genome.

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Supergroup	Representatives: Groups	Representatives: Genera	Assessment: Nuclear	Assessment: Plastid
"Amoebozoa"				
	Lobose amoebae Slime molds Pelobionts	*Amoeba* *Dictyostelium* *Entamoeba*	+	
"Chromalveolata"				
	Ciliates Stramenopiles Apicomplexa	*Tetrahymena* *Phytophthora* *Plasmodium*	-	+
"Excavata"				
	Diplomonads Euglenozoa Parabasalids	*Giardia* *Trypanosoma* *Trichomonas*	-	
"Opisthokonta"				
	Animals Fungi Choanoflagellates	*Drosophila* *Encephalitozoon* *Monosiga*	+ + +	
"Plantae"				
	Green algae Red algae Glaucophytes	*Arabidopsis* *Porphyra* *Cyanophora*	+	+ + +
"Rhizaria"				
	Cercomonads Foraminifera Euglyphids	*Cercomonas* *Allogromia* *Paulinella*	+	

ensaios

- - quantidade de informações em um mesmo parágrafo deve ser condizente com o tamanho do parágrafo
- - temas: focar em assuntos científicos
- - pessoal dos "tijolinhos" - dar o próximo passo
- - conexões entre frases:

- **Você escreveu:** *"Temos uma visão restritamente macroscópica dos organismos. Avistamos uma carpa ou uma tartaruga em um lago. Animais, às vezes plantas e ainda menos os fungos são mencionados. O advento da microscopia de luz, junto com outras técnicas, permitiu aprofundar essa visão."*

- **Eu sugiro:** *"A maioria dos seres humanos percebe com facilidade os elementos macroscópicos que compõe a natureza. Ao observar uma paisagem natural, somos capazes de enumerar as rochas, as plantas e animais ali presentes. Os mais observadores percebem também alguns fungos. No entanto, a biodiversidade é composta adicionalmente por uma enorme gama de organismos microscópicos, invisíveis a olho nu. Esta micro-biodiversidade só foi sistematicamente explorada quando surgiram os primeiros microscópios com preços acessíveis, na época da revolução industrial (REF)."*

ensaios

- finalismo ainda presente:

"A multicelularidade entre os organismos eucariontes não é critério para definição de grupos filogenéticos."

"Por vezes sofremos em tentativas futeis de criar classificações arbitrárias, tentando encaixar o nosso ambiente em caixas que nós mesmos criamos."