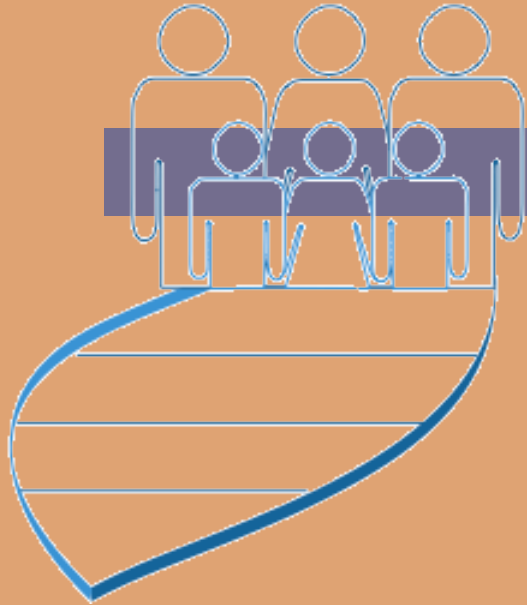


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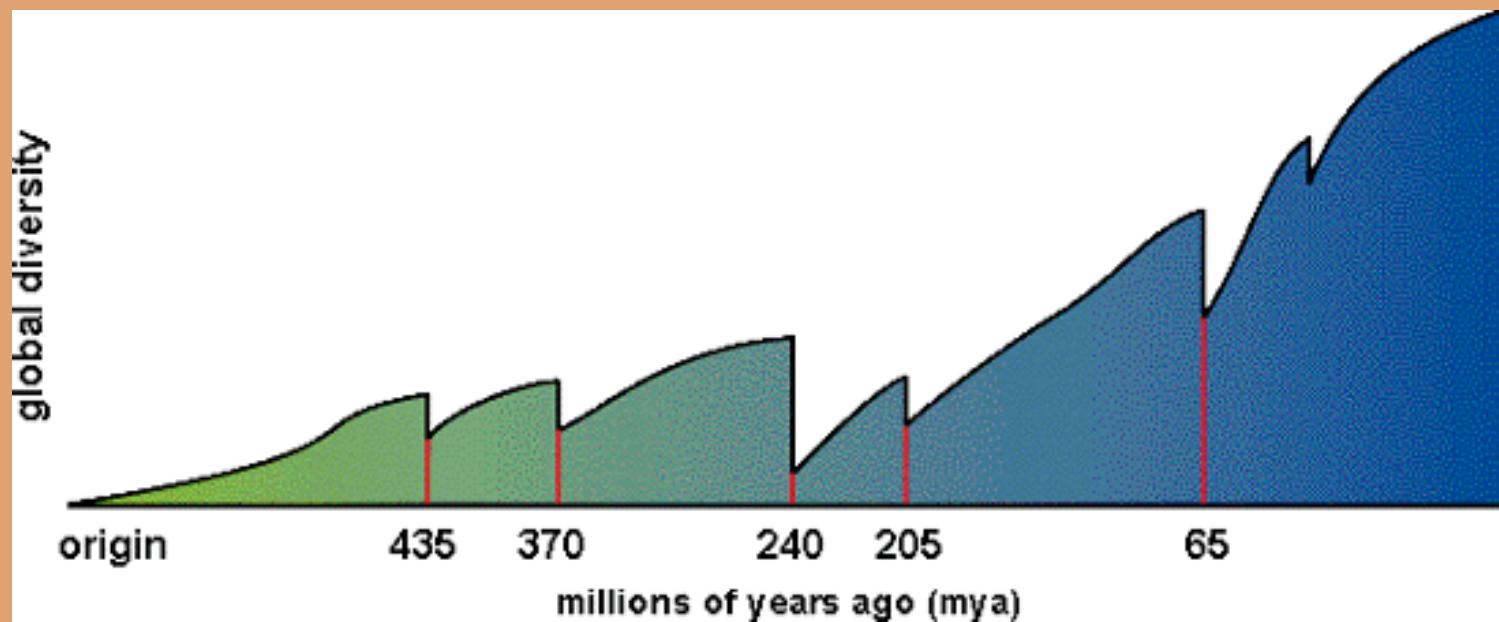


- Summer 2006 Workshop
- in Biology and Multimedia
- for High School Teachers

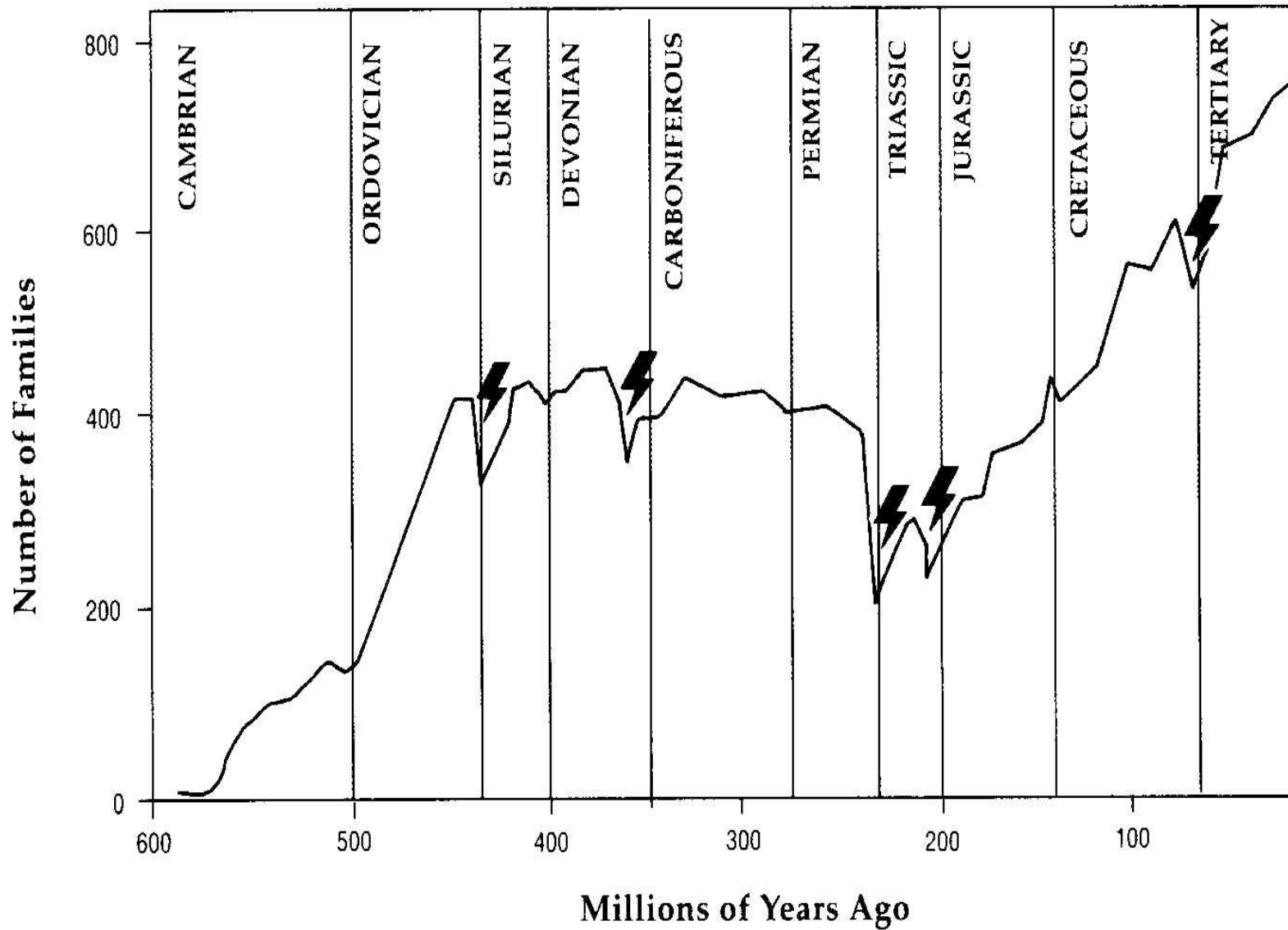
MASS EXTICTION & DIVERSIFICATION

Chronology of Mass Extinctions

- Five major mass extinctions in the history of the planet
 - Ordovician-Silurian
 - Late Devonian
 - Permian-Triassic
 - End Triassic
 - Cretaceous-Tertiary



<http://www.biology.iupui.edu/biocourses/N100/2k4ch17spec.html>



http://www.globalchange.umich.edu/globalchange1/current/lectures/complex_life/complex_life.html

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Timeline for Mass Extinctions Millions of Years Ago

- Ordovician-Silurian - 435 mya
- Late Devonian - 370 mya
- Permian-Triassic - 240 mya
- End Triassic - 205 mya
- Cretaceous-Tertiary - 65 mya

Organisms Affected by Massive Extinctions

Ordovician - Silurian	Late Devonian	Permian - Triassic	End Triassic	Cretaceous - Tertiary
25% Families	22% Families	53% Families	22% Families	16% Families
50% Genera	57% Genera	84% Genera	52% Genera	47% Genera
85% Species	82% Species	96% Species	76% Species	76% Species including the dinosaurs

Percentage of Species Wiped Out

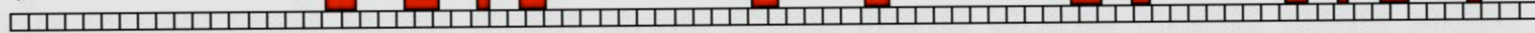
- Ordovician-Silurian - 85%
- Late Devonian - 82%
- Permian-Triassic - 96%
- End Triassic - 76%
- Cretaceous-Tertiary - 76%

Major Indirect Causes for Mass Extinctions

1. Continental -Flood Basalt Lava (3 of 5)
2. Abrupt Falls in Sea Levels (1 of 5)
3. Asteroid Impact (4 of 5)

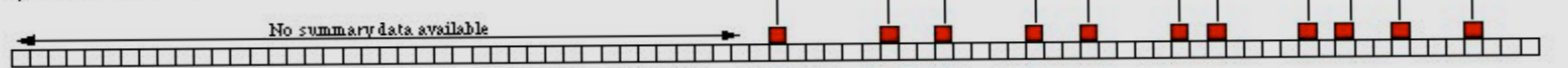
Eustatic Sea Level Falls

(Data from Hallam 1992)



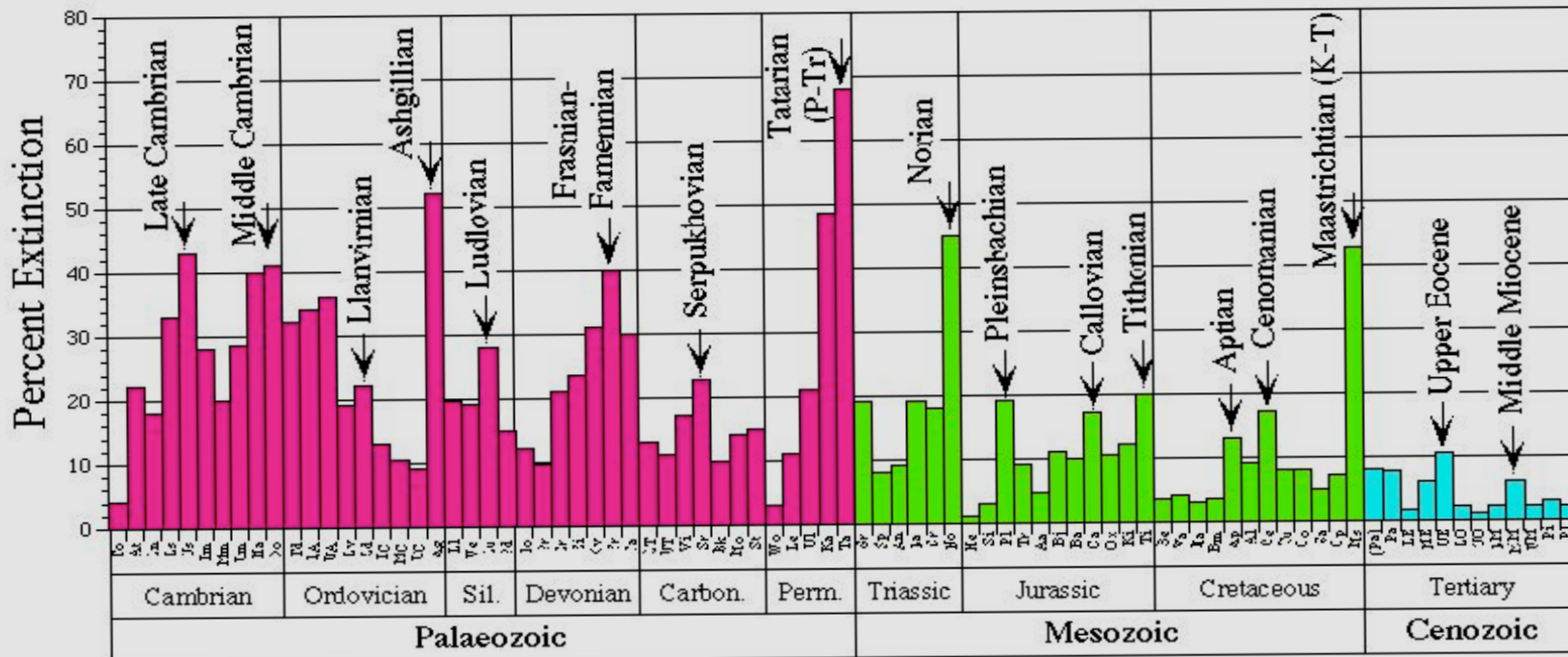
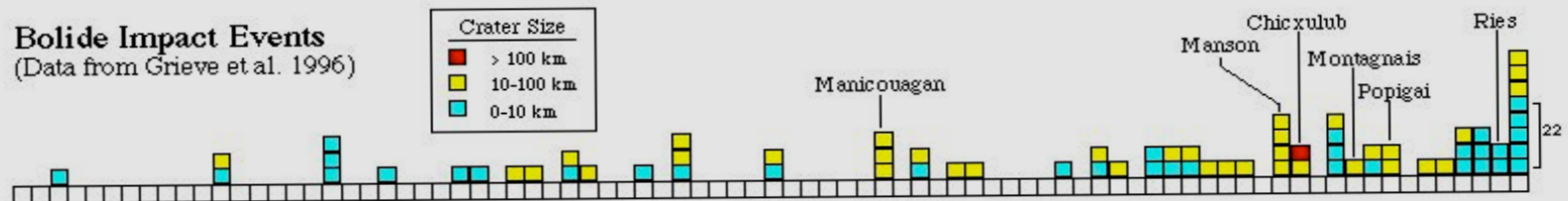
Major Continental Flood-Basalt Eruptions

(Data from Courtillot et al. 1996)



Bolide Impact Events

(Data from Grieve et al. 1996)



http://www.firstscience.com/SITE/articles/mac_f2.asp

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Diversification and Speciation after Mass Extinctions

Surviving Species take over vacant habitats and
resources

Speciation takes every 100 to 100,000 year

10 to 10,000 new species per year

	PERIOD	ONSET	MAJOR EVENTS	ME
Paleozoic	Cambrian	540 Ma	most animal phyla present, diverse algae	
	Ordovician	490 Ma	first jawless fishes, animal diversification	1st
	Silurian	445 Ma	first bony fishes, colonization of land	
	Devonian	420 Ma	first insects and amphibians, fish diversify	2nd
	Carboniferous	355 Ma	extensive forests, first reptiles, insects radiate	
	Permian	290 Ma	reptiles radiate, insects are diverse	3rd
Mesozoic	Triassic	250 Ma	early dinosaurs, first mammals, marine inverts. diversify	4th
	Jurassic	200 Ma	first birds, diverse dinosaurs	
	Cretaceous	145 Ma	flowering plants and mammals diversity, dinosaurs continue diversification	5th
Cenozoic	Tertiary	65 Ma	radiation of mammals, birds, flowering plants, pollinating insects	
	Quaternary	2 Ma	humans evolve, extinctions of large mammals	

Phylogenetic Tree of Life



<http://cmex.ihmc.us/VikingCD/Puzzle/Advanced.html>

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Is there a potential Sixth Major Extinction?

Species are becoming extinct at a rate of about

4000/year

100/day

1 species every 15 minutes

2050

- 50% of all species on the planet will be either endangered or extinct
 - Habitat destruction
 - Global Warming
- 25% mammalian species
- 15% bird species