

ES 10 Feb 2&5 2001 J. Bartolome

Topics: Origins of Life, Evolution

Subtopics:

1. Definition of Life
2. History of early life forms
3. Evolution: Formation of new species from pre-existing species.
4. Biological Species
5. Taxonomic rules and nomenclature
6. Later evolution of life-- the past 500 million years or so.
7. How many species are there?
8. Key points about species and evolution
9. Links to physical systems.

Some definitions:

Life: the process of being an organizing entity.

Evolution: the formation of new species from pre-existing species.

Taxon (plural Taxa): a grouping of organisms with a similarity in either characteristics or evolution or both.

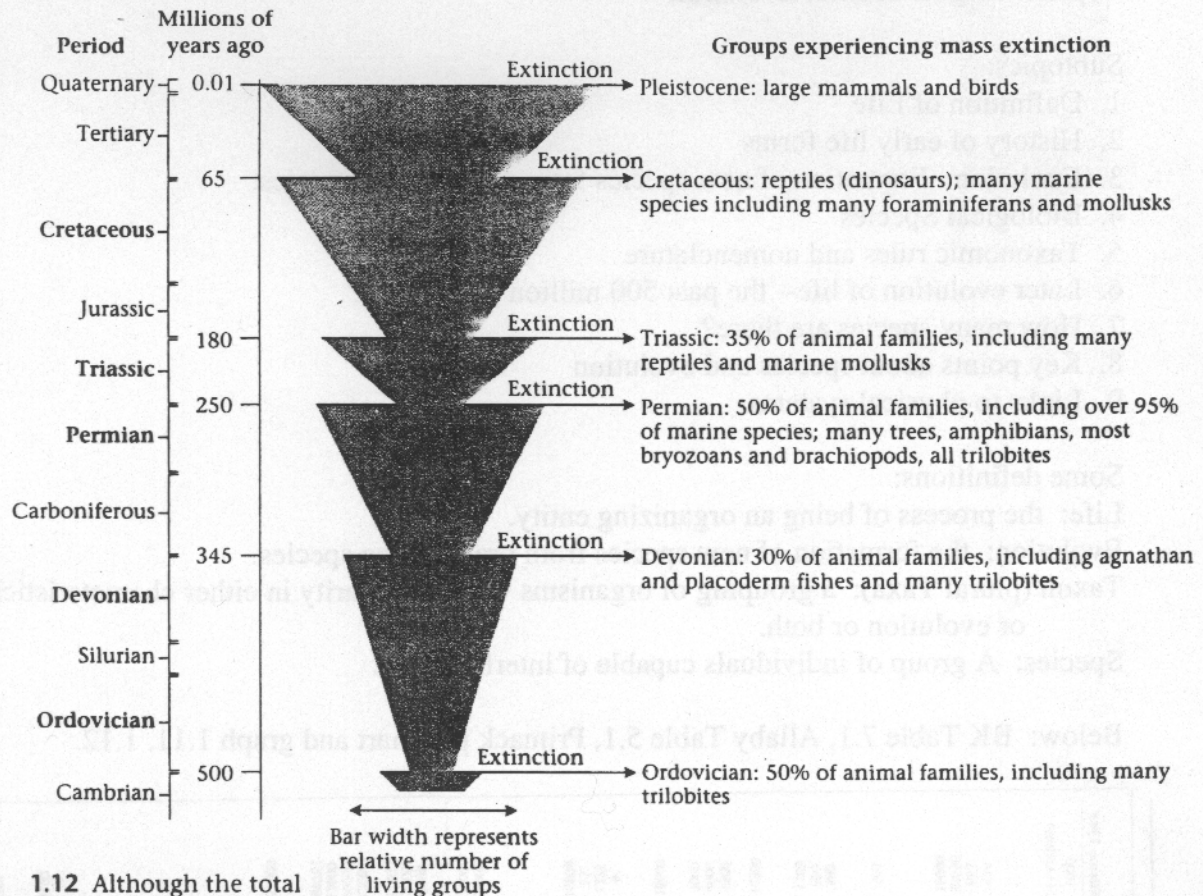
Species: A group of individuals capable of interbreeding.

Below: BK Table 7.1, Allaby Table 5.1, Primack pie chart and graph 1.11, 1.12.

Kingdom/Phylum Subphylum/Class	Mader, 1997	Campbell, 1996	Raven, 1999	Margulis, 1988	E.O. Wilson, 1988
Virus				100000	1000
Monera			100		4760 (+Archaea)
Archaeobacteria			7500		
Cyanobacteria			7000		
Fungi		100000	790	100000	575
Chytridiomycota			1060		665
Zygomycota	600	600	32300	600	28650
Ascomycota	30000	60000	22300	tens of thousands	16000
Basidiomycota	16000	25000		25000	
Deuteromycota	25000	60000		thousands	
Protista			8000		500
Ciliophora	8000		700		
Myxomycota	560		200		
Cryptophyta			2000-4000		
Dinophyta	580		694		580
Comycota	1000		900	800	1100
Euglenophyta	1000			several thousand	
Amoebozoa	40000				
Stramenopila	3600				
Chrysophyta	11000				
Bacillariophyta	1500	850	1000	10000	12500
Phaeophyta	4000	1000	10000	1500	1500
Rhodophyta	4000	1500	4000-12000	4000	4000
Chlorophyta	7000	7000	17000	7000	7000
Plantae				24000	16600
Bryophyta	12000	10000	9500		
Hepatophyta	10000	6500	6000		
Anthoceroophyta	100	100	100		
Psilophyta	several	10-13	several	1000	9
Lycophyta	1000	1000	1000	40	1275
Shenophyta		15	15	12000	15
Filicinophyta					10000
Pteridophyta	12000	12000	11000		
Coniferophyta	550	550	550	550	
Gymnosperms	100	100	140	100	
Cycadophyta	70	70	70	70	
Gnetophyta				230000	
Angiosperms	65000	235000	235000		50000
Monocotyledones	170000				170000
Dicotyledones					
Animalia					
Porifera	5000	>1,000,000		10000	5000
Cnidaria	9000	9000		15000	9000
Platyhelminthes	13000	20000		2000	12200
Rotifera	2000	1800		80000	12000
Nematoda	12000	80000		110000	50000
Mollusca	110000	50000		5400	12000
Annelida	12000	15000		50000	98761
Arthropoda					
Cheliceriformes					
Uniramia					
Insecta					
Arthropoda					
Crustacea					
Brachiopoda					
Echinodermata					
Chordata					
Vertebrata					
Chondrichthyes					
Osteichthyes					
Amphibia					
Reptilia					
Aves					
Mammalia					

Note: With ~15,000 new species described every year, a changing classification system, and no central data registry, it is not surprising that species estimates differ between publications and years.

Sources: E. O. Wilson, 1988; L. Margulis and K. V. Schwartz, 1988; Sylvia L. Mader, 1997; Neil A. Campbell, 1996; P. H. Raven, R. F. Evert, and S. E. Eichhorn, 1999.



1.12 Although the total number of families and species has increased over the eons, during each of five episodes of natural mass extinction a large percentage of these groups disappeared. The most dramatic period of loss occurred about 250 million years ago, at the end of the Permian period. We are now at the start of a sixth episode, the Pleistocene extinction, as human populations eliminate species through habitat loss and overharvesting.

Table 5.1 Number of species described and the likely total number

Group	No. described (thousands)	Estimate of total no. (thousands)
Viruses	5	500
Bacteria	5	400
Fungi	7	1000
Protozoa	40	200
Algae	40	200
Nematodes	15	500
Molluscs	70	150
Crustaceans	40	100
Arachnids	75	600
Insects	950	4000
Vertebrates	45	50
Higher plants	250	300
Total	1605	8000

1.11 Approximately 1,413,000 species have been identified and described by scientists; the majority of these are insects and plants. Large numbers of insects, bacteria, and fungi are still undescribed, and the eventual number of identified species could reach 5 million or more. (Data from Wilson 1992.)

