GEOLOGIC HISTORY OF NEW YORK STATE

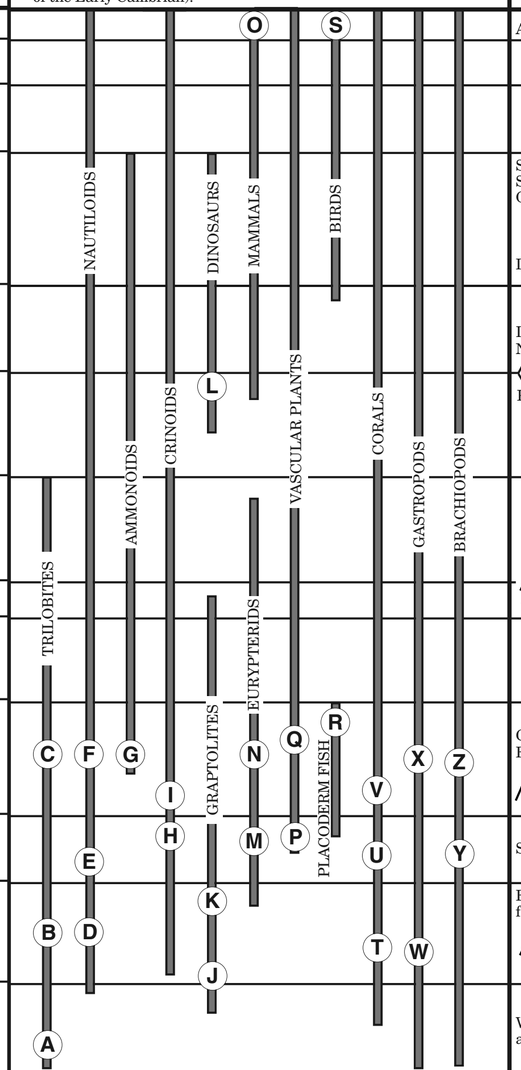
Eon	Era	Period	Epoch	Million years ago	Life on Earth	NY Rock Record
PHANEROZOIC	CENOZOIC	*QUATERNARY*	HOLOCENE	0		Sediment
			PLEISTOCENE	0.01–1.8	Humans, mastodonts, mammoths	
		NEOGENE	PLIOCENE	5.3	Large carnivorous mammals	
			MIOCENE	23.0	Abundant grazing mammals	
		PALEOGENE	OLIGOCENE	33.9	Earliest grasses	
			EOCENE	55.8	Many modern groups of mammals	
			PALEOCENE	65.5	Mass extinction of dinosaurs, ammonoids, and many land plants	
	MESOZOIC	*CRETACEOUS*	LATE			Bedrock
			EARLY	146	Earliest flowering plants Diverse bony fishes	
		JURASSIC	LATE	200	Earliest birds	
			MIDDLE		Abundant dinosaurs and ammonoids	
			EARLY			
		TRIASSIC	LATE		Earliest mammals	
			MIDDLE		Earliest dinosaurs	
			EARLY	251	Mass extinction of many land and marine organisms (including trilobites)	
	PALEOZOIC	*PERMIAN*	LATE			
			MIDDLE		Mammal-like reptiles	
			EARLY	299	Abundant reptiles	
		CARBONIFEROUS — *PENNSYLVANIAN*	LATE			
			EARLY	318	Extensive coal-forming forests	
		CARBONIFEROUS — *MISSISSIPPIAN*	LATE		Abundant amphibians	
			MIDDLE		Large and numerous scale trees and seed ferns (vascular plants); earliest reptiles	
			EARLY	359		
		DEVONIAN	LATE		Earliest amphibians and plant seeds Extinction of many marine organisms	
			MIDDLE		Earth's first forests Earliest ammonoids and sharks	
			EARLY	416	Abundant fish	
		SILURIAN	LATE		Earliest insects Earliest land plants and animals	
			EARLY	444	Abundant eurypterids	
		ORDOVICIAN	LATE		Invertebrates dominant Earth's first coral reefs	
			MIDDLE			
			EARLY	488		
		CAMBRIAN	LATE			
			MIDDLE		Burgess shale fauna (diverse soft-bodied organisms) Earliest fishes	
			EARLY		Extinction of many primitive marine organisms Earliest trilobites	
PROTEROZOIC	LATE			542	Great diversity of life-forms with shelly parts	
	MIDDLE			580	Ediacaran fauna (first multicellular, soft-bodied marine organisms)	
	EARLY			1300	Abundant stromatolites	
ARCHEAN						

Million years ago: 0, 500, 1000, 2000, 3000, 4000, 4600

- LATE PROTEROZOIC: First sexually reproducing organisms
- MIDDLE PROTEROZOIC: Oceanic oxygen begins to enter the atmosphere
- EARLY PROTEROZOIC: Oceanic oxygen produced by cyanobacteria combines with iron, forming iron oxide layers on ocean floor
- LATE ARCHEAN: Earliest stromatolites; Oldest microfossils
- MIDDLE ARCHEAN: Evidence of biological carbon
- EARLY ARCHEAN: Oldest known rocks
- Estimated time of origin of Earth and solar system

Time Distribution of Fossils
(including important fossils of New York)

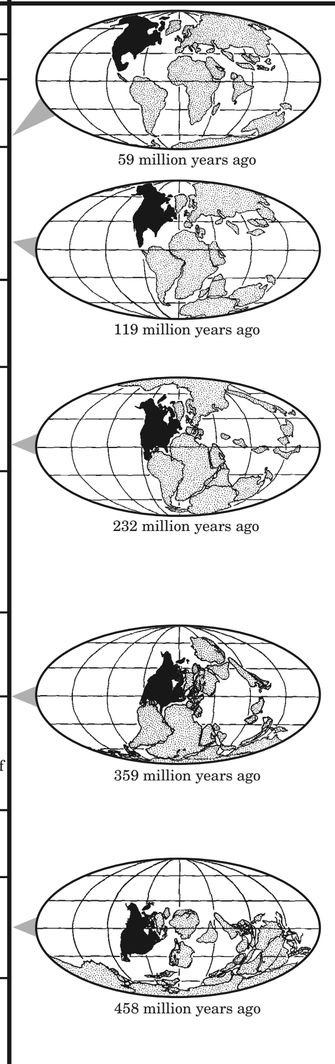
The center of each lettered circle indicates the approximate time of existence of a specific index fossil (e.g. Fossil (A) lived at the end of the Early Cambrian).



Important Geologic Events in New York

- Advance and retreat of last continental ice
- Sands and clays underlying Long Island and Staten Island deposited on margin of Atlantic Ocean
- Dome-like uplift of Adirondack region begins
- Initial opening of Atlantic Ocean
  North America and Africa separate
- Intrusion of Palisades sill
- Pangaea begins to break up
- **Alleghenian orogeny** caused by collision of North America and Africa along transform margin, forming Pangaea
- Catskill delta forms
  Erosion of Acadian Mountains
- **Acadian orogeny** caused by collision of North America and Avalon and closing of remaining part of Iapetus Ocean
- Salt and gypsum deposited in evaporite basins
- Erosion of Taconic Mountains; Queenston delta forms
- **Taconian orogeny** caused by closing of western part of Iapetus Ocean and collision between North America and volcanic island arc
- Widespread deposition over most of New York along edge of Iapetus Ocean
- Rifting and initial opening of Iapetus Ocean
- Erosion of Grenville Mountains
- **Grenville orogeny:** metamorphism of bedrock now exposed in the Adirondacks and Hudson Highlands

Inferred Positions of Earth's Landmasses

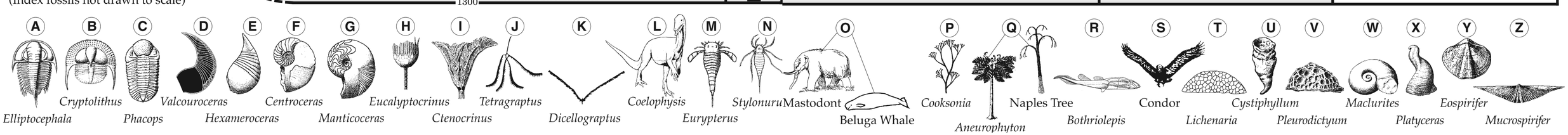


59 million years ago

119 million years ago

232 million years ago

359 million years ago

458 million years ago

(Index fossils not drawn to scale)