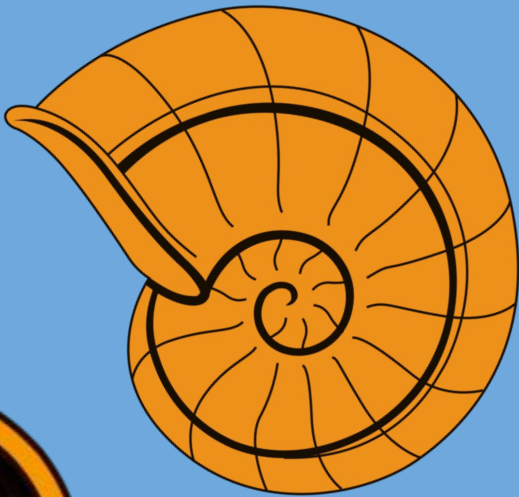


Spineless Wonders: Intro to Invertebrate Paleontology



What is an invertebrate?

- Any organism without a spine
- 95% of living species are invertebrates!

Does anyone know what a majority of animal life on Earth is?

- 85% of living species are Arthropoda - insects, spiders, and crustaceans



What is paleontology?

- The scientific study of the history of life in the **geologic past**
 - The study of fossils to classify organisms and understand how they interacted
- Paleozoic = “ancient life”
- Mesozoic = “middle life”

EON	ERA	PERIOD	EPOCH	Ma							
Phanerozoic	Cenozoic	Quaternary	Holocene		0.011						
			Pleistocene	Late	0.8						
		Early		2.4							
		Tertiary	Neogene	Pliocene	Late	3.6					
					Early	5.3					
				Miocene	Late	11.2					
					Middle	16.4					
			Paleogene	Oligocene	Early	23.0					
					Late	28.5					
				Eocene	Early	34.0					
					Late	41.3					
				Paleocene	Middle	49.0					
					Early	55.8					
		Mesozoic	Cretaceous	Late	61.0						
	Early			65.5							
	Jurassic		Late	99.6							
			Middle	145							
	Triassic		Early	161							
			Late	176							
	Paleozoic		Permian	Early	200						
				Late	228						
			Pennsylvanian	Middle	245						
				Early	251						
		Mississippian	Late	260							
			Middle	271							
		Devonian	Early	299							
			Late	306							
		Silurian	Middle	311							
			Early	318							
		Ordovician	Late	326							
			Middle	345							
		Cambrian	Early	359							
Late			385								
		397	416	419	423	428	444	488	501	513	542

What is a fossil?

- A fossil is any preserved remains or traces of past life
 - Must be >10,000 years old
- Can be body fossils, trace fossils, or chemical fossils
 - Body fossils: evidence of the physical features (morphology) of an organism
 - Trace fossils: evidence of the behavior of an animal (what did it eat? how did it move?)

Acutiramus, Silurian, Ontario



Asteriacites, Devonian, Ohio

1.0 cm

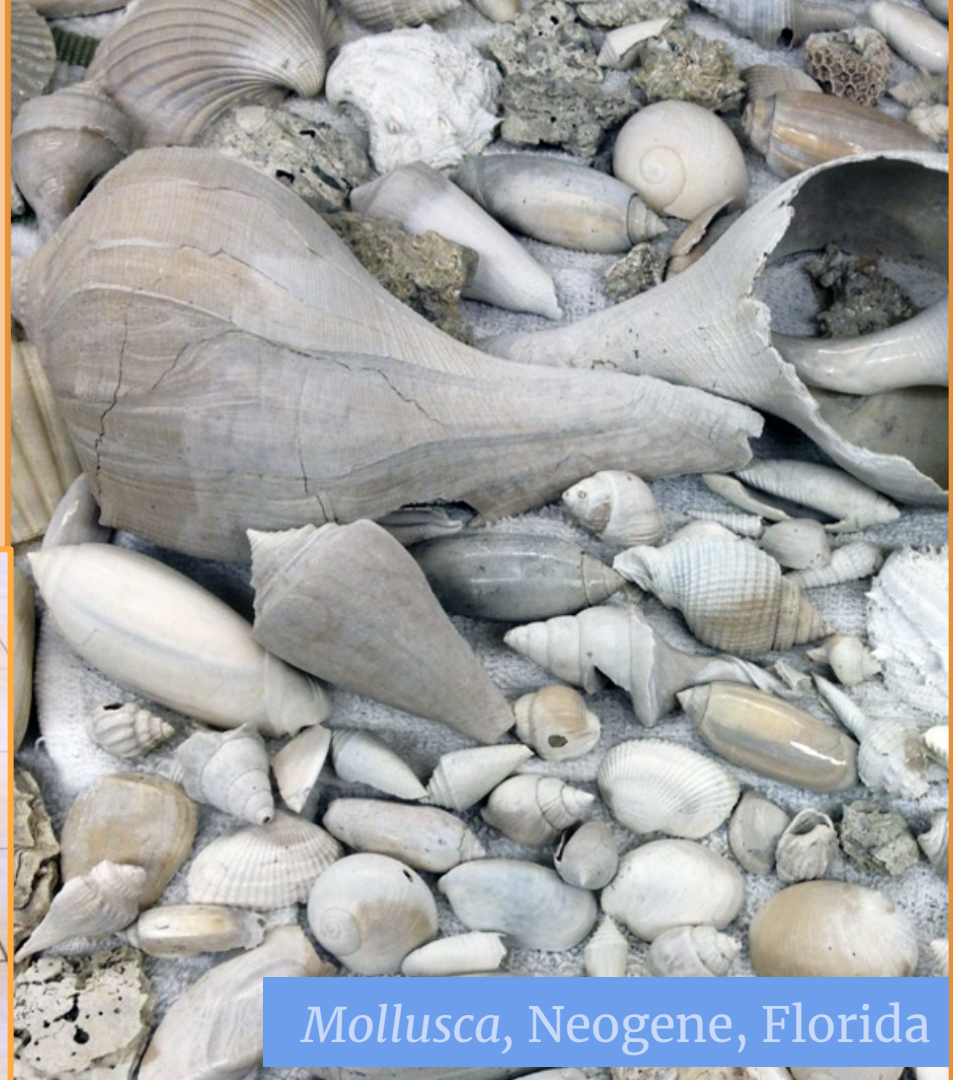


How are organisms fossilized?

- Unaltered fossil remains
 - Original skeleton or shell
 - Permafrost



Mammuthus, Quaternary, Yakutia

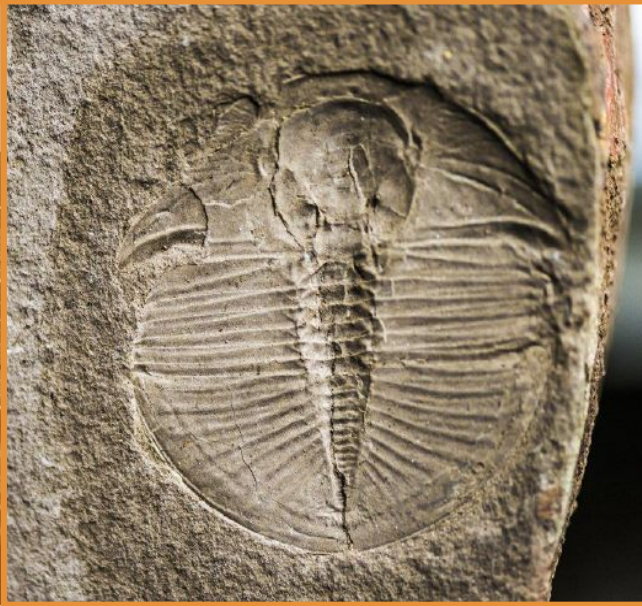


Mollusca, Neogene, Florida

- Altered fossil remains
 - Replacement
 - Recrystallization
 - Carbonization



- Other types of preservation
 - Infill
 - Impression
 - Concretion



Mollusca

- Gastropoda
- Cephalopoda
- Bivalvia

Echinodermata

- Crinoidea

Arthropoda

- Trilobita

Let's talk about
some specific
marine
invertebrates!

Mollusca, Gastropoda: Slugs & Snails

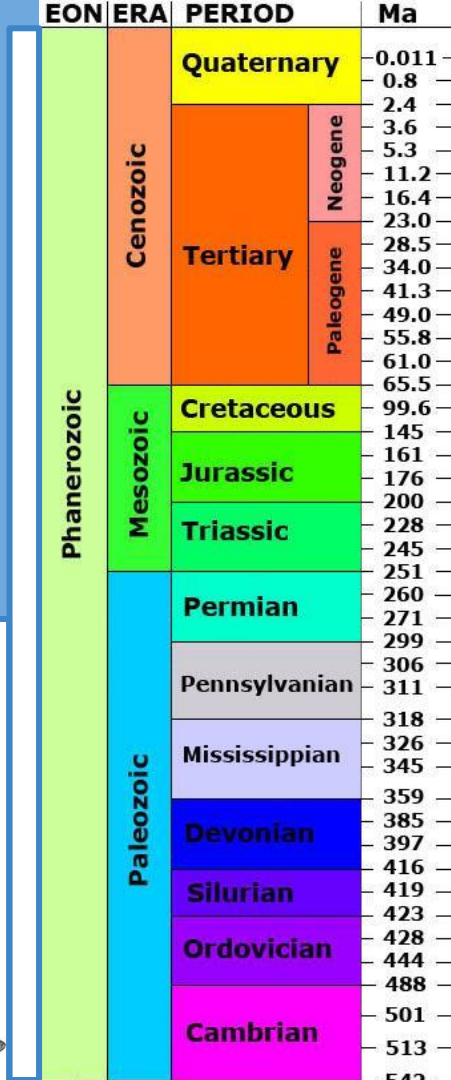
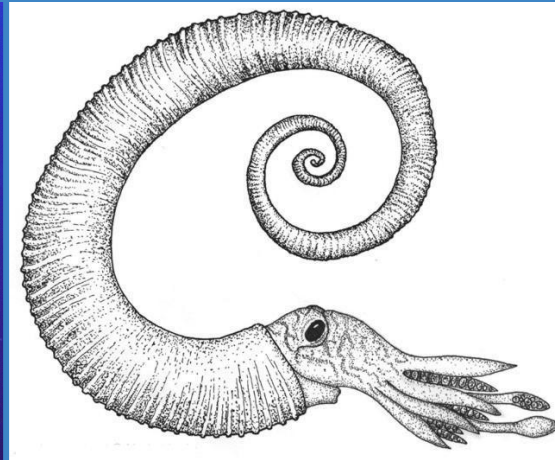
- Aquatic and terrestrial
- Some with shells, some without
- What is preserved?



EON	ERA	PERIOD	Ma		
Phanerozoic	Cenozoic	Quaternary	0.011		
		Tertiary	Neogene	0.8	
				Paleogene	2.4
					3.6
			5.3		
			11.2		
			16.4		
			23.0		
			28.5		
			34.0		
	41.3				
	Mesozoic	Cretaceous	49.0		
			55.8		
			61.0		
		Jurassic	65.5		
			99.6		
		Triassic	145		
161					
Paleozoic	Permian	176			
		200			
	Pennsylvanian	228			
		245			
	Mississippian	251			
		260			
		271			
		299			
Devonian	306				
	311				
	318				
	326				
	345				
	359				
Silurian	385				
	397				
	416				
	419				
	423				
Ordovician	428				
	444				
	488				
Cambrian	501				
	513				
			542		

Mollusca, Cephalopoda: Squids & Nautilus

- Marine
- Some with shells, some without
- What is preserved?



Mollusca, Bivalvia: Clams & Oysters

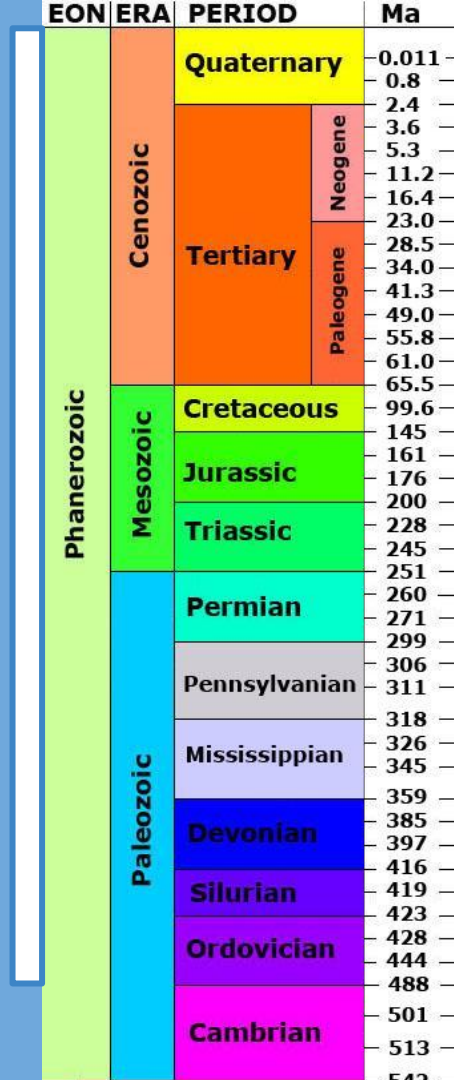
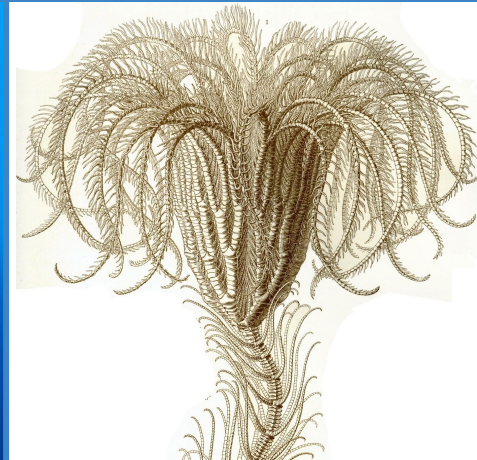
- Aquatic
- Exoskeleton of 2 half-shells
- What is preserved?



EON	ERA	PERIOD	Ma	
Phanerozoic	Cenozoic	Quaternary	0.011	
			0.8	
		Tertiary	Neogene	2.4
				3.6
			Paleogene	5.3
				11.2
				16.4
	Mesozoic	Cretaceous	23.0	
			28.5	
			34.0	
		Jurassic	41.3	
			49.0	
		Triassic	55.8	
			61.0	
			65.5	
Paleozoic	Permian	99.6		
		260		
		271		
	Pennsylvanian	299		
		306		
	Mississippian	311		
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		501		
		513		
		542		

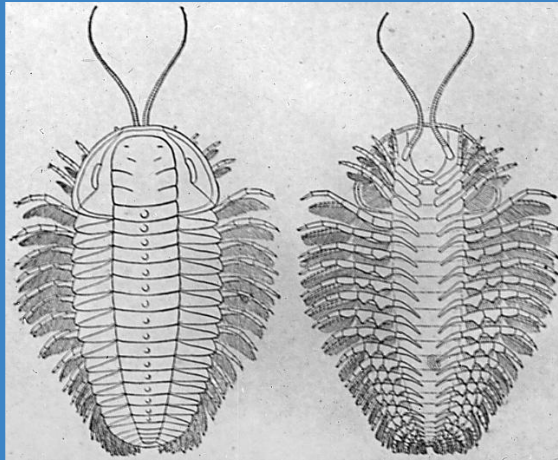
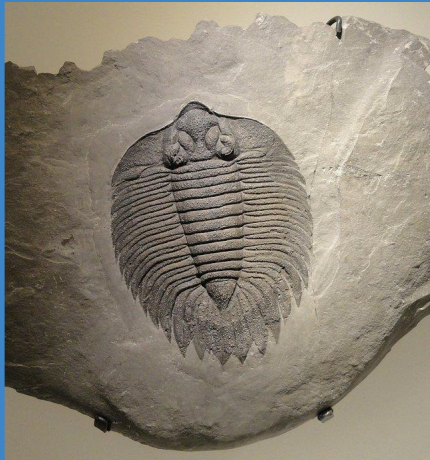
Echinodermata, Crinoidea

- Marine
- Filter-feeding
- What is preserved?



Arthropoda, Trilobita

- Marine
- Ate small invertebrates and detritus
- What is preserved?



EON	ERA	PERIOD	Ma		
Phanerozoic	Cenozoic	Quaternary	0.011 - 0.8		
		Tertiary	Neogene	2.4 - 5.3	
				Paleogene	11.2 - 23.0
			28.5 - 34.0		
			41.3 - 49.0		
			55.8 - 61.0		
			65.5 - 99.6		
			Mesozoic		Cretaceous
				Jurassic	161 - 228
	Triassic	245 - 251			
	Paleozoic	Permian	260 - 271		
			299 - 306		
		Pennsylvanian	311 - 318		
			326 - 345		
		Mississippian	359 - 385		
			397 - 416		
			419 - 423		
			428 - 444		
	Ordovician	448 - 488			
501 - 513					
Cambrian	542 -				

Activity: Identifying Marine Invertebrates

1. *What is it?*
2. *Is it a fossil?*
3. *How was it preserved?*