1. Age: 86.3-83.6mya Time Period: Mesozoic, specifically Santonian	5. Age: 290mya Time period: Early Permian
2. Age: 307 mya Time Period: Pennsylvanian	6. Age: 500mya – some around today Time period: Cambrian – to now
3. Age: 150mya Time period: late Jurassic	7. Age: 375mya Time period: Late Devonian
4. Age: 215-200mya Time period: late Triassic	8. Age: 32.5-10.5mya Time period: Oligocene Miocene

1. **Plesiosaur (with fetus)**: The neck could have served to intercept fast-moving fish in a pursuit. Alternatively, plesiosaurs could have rested on the sea bottom, while the head was sent out to search for prey, which seemed to be confirmed by the fact the eyes were directed relatively upwards. Finally, Conybeare suggested the possibility that plesiosaurs swam on the surface, letting their necks plunge downwards to seek food at lower levels. All these interpretations assumed that the neck was very flexible. The modern insight that the neck was, in fact, rather rigid, with limited vertical movement, has necessitated new explanations. One hypothesis is that the length of the neck made it possible to surprise schools of fish, the head arriving before the sight or pressure wave of the trunk could alert them. "Plesiosauromorphs" hunted visually, as shown by their large eyes, and perhaps employed a directional sense of olfaction.

   The chalk formed from the accumulation of coccoliths from microorganisms living in what was once the Western Interior Seaway, an inland sea that divided the continent of North America during much of the Cretaceous. It underlies much of the Great Plains of the US and Canada.

   https://en.wikipedia.org/wiki/Plesiosauria
   https://www.sciencemag.org/news/2011/08/sea-monster-had-bun-oven
   https://www.nationalgeographic.com/news/2011/8/110811-plesiosaurs-live-birth-fossils-young-science-chiappe-dinosaurs-fetus/
   http://news.bbc.co.uk/2/hi/science/nature/4341204.stm

2. **The Tully monster, or *Tullimonstrum gregarium***, is found only in the Mazon Creek region of Illinois, 50 miles from Chicago. Its strange body plan unlike anything found anywhere in the world completely puzzled scientists for decades.

   307 million years to the Carboniferous period. They are strange, soft-bodied, tubular creatures that were aquatic and ranged in size from 6-12 inches. Their eyes were on stalks and they possessed a skinny snout that ended in a toothy claw-like appendage.
   https://en.wikipedia.org/wiki/Tullimonstrum

   The Tully monsters' "jaws" and apparent swimming abilities suggest that they attacked other marine animals such as jellyfish and shrimp, perhaps piercing their prey with their "teeth" and sucking out the juices.
   https://www.isgs.illinois.edu/outreach/geology-resources/illinois-state-fossil-tullimonstrum-gregarium

3. **Archaeopteryx**: https://www.thoughtco.com/archaeopteryx-dino-bird-1093774
   According to one recent analysis, the feathers of Archaeopteryx were structurally weaker than those of similarly sized modern birds, suggesting that this dino-bird probably glided for short intervals (possibly from branch to branch on the same tree)

rather than actively flapping its wings. However, not all paleontologists concur, some arguing that Archaeopteryx actually weighed far less than the most widely accepted estimates, and thus may have been capable of brief bursts of powered flight.

True, this animal did possess a coat of feathers, a bird-like beak, and a wishbone, but it also retained a handful of teeth, a long, bony tail, and three claws jutting out from the middle of each of its wings, all of which are extremely reptilian characteristics that are not seen in any modern birds.

Some researchers suggest that it was primarily adapted to life on the ground,[59] while other researchers suggest that it was principally arboreal on the basis of the curvature of the claws[60] which has since been questioned.[61] The absence of trees does not preclude *Archaeopteryx* from an arboreal lifestyle, as several species of bird live exclusively in low shrubs. Various aspects of the morphology of *Archaeopteryx* point to either an arboreal or ground existence, including the length of its legs and the elongation in its feet; some authorities consider it likely to have been a generalist capable of feeding in both shrubs and open ground, as well as along the shores of the lagoon.[57] It most likely hunted small prey, seizing it with its jaws if it was small enough, or with its claws if it was larger.

4. **Coelophysis**: The teeth of Coelophysis were typical of predatory dinosaurs, blade-like, recurved, sharp and jagged with fine serrations on both the anterior and posterior edges. Its dentition shows that it was carnivorous, probably preying on the small, lizard-like animals that were discovered with it.[43] It may also have hunted in packs to tackle larger prey.

   Coelophysis was a bipedal, carnivorous, theropod dinosaur that was a fast and agile runner.

   The discovery of over 1000 specimens of Coelophysis at the Whitaker quarry at Ghost Ranch, has suggested gregarious behavior to researchers like Schwartz and Gillette.[48] There is a tendency to see this massive congregation of animals as evidence for huge packs of Coelophysis roaming the land.[23] No direct evidence for flocking exists; the deposits only indicate that large numbers of Coelophysis, along with other Triassic animals, were buried together. Some of the evidence from the taphonomy of the site indicates that these animals may have been gathered together to feed or drink from a depleted water hole or to feed on a spawning run of fish, and then became buried in a catastrophic flash flood[23][48] or a drought.[23] The Cleveland Museum of Natural History's Coelophysis block, originally American Museum of Natural Historyblock XII collected by Colbert in 1948.[10]

   With 30 specimens of C. rhodesiensis found together in Zimbabwe some palaeontologists have suggested that Coelophysis was indeed gregarious. Again there is no direct evidence of flocking in this case and it has also been suggested

that these individuals were also victims of flash flooding as it appears to have been commonplace during this period

https://en.wikipedia.org/wiki/Coelophysis

5. **Helicoprion**: Using the detailed computer images that the CT scans produced the team were able to deduce that the spiral teeth were located at the back of the jaw, the teeth did not project forwards from the lower part of the mouth, nor was this structure located on another part of the fish. Dr. Leif Tapanila of the department of Geosciences at Idaho State University and his colleagues have been able to clear up this mystery surrounding the whorl of teeth.

   He stated: *"We were able to answer where the set of teeth fit in the animal. They fit in the back of the mouth, right next to the back joint of the jaw. We were able to refute that it might have been located at the front of the jaw."*

   Analysis of the wear pattern on the teeth also provided the researchers with an insight into what this predator may have eaten as it swam in the Permian seas. It is unlikely that these teeth were used to crush hard bodied creatures such as shellfish or marine snails. It is more likely that Helicoprion tackled soft bodied members of the Phylum Mollusca such as cephalopods (squid and octopi).

   The jaw was able to produce a rolling-back and slicing action, ideally suited to tackling soft and slippery prey. The research has also suggested that Helicoprion was not a type of shark, but that it is more likely closely related to the extant rat fish, making it a basal, but very specialised member of the Holocephalan group called the Euchondrocephali.

   Dr. Tapanila added:"New CT scans of a unique specimen from Idaho show the spiral of teeth within the jaws of the animal, giving new information on what the animal looked like and how it ate."

6. **Crinoids**: http://www.fossilcrinoids.com/

Crinoids can very basically be described as upside-down starfish with a stems. The stem of a crinoid extends down from what would be the top of a starfish, leaving the mouth of the organism opening skyward, with the arms splayed out. However, crinoid arms look articulated and feathery. The stalk extends down from the aboral surface of the calyx. The stalk column has holdfasts which attach the animal to substrate.
https://www.fossilera.com/pages/about-crinoids
Tube feet are arranged along pinnules which project from the jointed arms. The visual effect makes the arms appear feathery and allows the crinoid to comb the water for suspended food.
plankton and decaying organic matter.

https://en.wikipedia.org/wiki/Crinoid
Most modern crinoids, i.e., the feather stars, are free-moving and lack a stem as adults. Examples of fossil crinoids that have been interpreted as free-swimming include *Marsupitsa*, *Saccocoma* and *Uintacrinus*.[21] In general, crinoids move to new locations by crawling, using the cirri as legs. Such a movement may be induced in relation to a change in current direction, the need to climb to an elevated perch to feed, or because of an agonistic behaviour by an encountered individual.[22] Crinoids can also swim. They do this by co-ordinated, repeated sequential movements of the arms in three groups. At first the direction of travel is upwards but soon becomes horizontal, travelling at about 7 cm (2.8 in) per second with the oral surface in front. Swimming usually takes place as short bursts of activity lasting up to half a minute, and in the comatulid *Florometra serratissima* at least, only takes place after mechanical stimulation or as an escape response evoked by a predator.[22]
In 2005, a stalked crinoid was recorded pulling itself along the sea floor off the Grand Bahama Island. While it has been known that stalked crinoids could move, before this recording the fastest motion known for a stalked crinoid was 0.6 metres (2 feet) per hour. The 2005 recording showed one of these moving across the seabed at the much faster rate of 4 to 5 cm (1.6 to 2.0 in) per second (144 to 180 metres per hour).[23]

7. Tiktaalik

https://www.livescience.com/42527-tiktaalik-roseae-a-new-discovery.html
Tiktaalik's ability to swim as well as support itself on the substrate underscores the idea that the mechanisms that allowed vertebrates to invade land evolved in the water first.
https://en.wikipedia.org/wiki/Tiktaalik
technically a fish, complete with scales and gills - but it has the flattened head of a crocodile and unusual fins. Its fins have thin ray bones for paddling like most fishes', but they also have sturdy interior bones that would have allowed Tiktaalik to prop itself up in shallow water and use its limbs for support as most four-legged animals do. Those fins and a suite of other characteristics set Tiktaalik apart as something special; it has a combination of features that show the evolutionary transition between swimming fish and their descendants, the four-legged vertebrates - a clade which includes amphibians, reptiles, birds and mammals
However, the proximal series can be directly compared to the ulnare and intermedium of tetrapods. The fin was clearly weight bearing, being attached to a massive shoulder with expanded scapular and coracoid elements and attached to the body armor, large muscular scars on the ventral surface of the humerus, and highly mobile distal joints. The bones of the forefins show large muscle facets, suggesting that the fin was both muscular and had the ability to flex like a wrist joint. These wrist-like features would have helped anchor the creature to the bottom in fast moving current.[5][6]
Skull showing spiracle holes above the eyes
The alligator gar is an extant fish that bears some resemblance to *Tiktaalik*.

Also notable are the spiracles on the top of the head, which suggest the creature had primitive lungs as well as gills. This attribute would have been useful in shallow water, where higher water temperature would lower oxygen content. This development may have led to the evolution of a more robust ribcage, a key evolutionary trait of land-living creatures.[7] The more robust ribcage of *Tiktaalik* would have helped support the animal's body any time it ventured outside a fully aquatic habitat. *Tiktaalik* also lacked a characteristic that most fishes have—bony plates in the gill area that restrict lateral head movement. This makes *Tiktaalik* the earliest known fish to have a neck, with the pectoral girdle separate from the skull. This would give the creature more freedom in hunting prey either on land or in the shallows.

8. ***Neoparadoxia cecilialina*, belongs to Desmostylia** which is an extinct genus of large, herbivorous aquatic mammals

https://en.wikipedia.org/wiki/Neoparadoxia
The ancient creature, named *Neoparadoxia cecilialina*, belongs to Desmostylia, an extinct order of marine mammals whose closest living relatives are elephants, sea cows and manatees.

Desmostylians were large-bodied herbivores with enhanced adaptations for life in water and bulk aquatic feeding.

Desmostylians are believed to be aquatic because of a combination of characteristics. Their legs seemed to be adapted for terrestrial locomotion, while a number of other parameters confirms their aquatic nature:[1]
Fossils have been found in marine strata.
The nares are retracted and the orbits are raised like in other aquatic mammals.
Levels of stable isotopes in their tooth enamel suggest an aquatic diet and environment (carbon and oxygen) and fresh or brackish water (strontium).
Their spongy bone structure is similar to that of cetaceans.

Based on a comparison of trunk and limb proportions, Gingerich 2005 concluded[8] that desmostylians were more terrestrial than aquatic and clearly fore limb-dominated swimmers, hence they were more similar to "sea bears" than "sea sloths" (as proposed by other researchers.) However, a more recent and detailed analysis of desmostylian bone structure has revealed them to be fully aquatic, like sirenians and cetaceans,[9] with their limbs being incapable of supporting their own weight on land. More recent studies vindicate this assessment, as desmostylians had a thoracic morphology more similar to sirenians and cetaceans than to that of semiaquatic mammals.[10] Its less dense bone structure suggests that *Desmostylus* had a lifestyle of active swimming and possibly feeding at the surface, while other desmostylians were primarily slow swimmers and/or bottom walkers and sea grass feeders.[9]