

INVERTEBRATE CLADOGRAM

PHYLUM MOLLUSCA

Appeared ~545 million years ago.
 Has a muscular foot or sucker-bearing tentacles.
 Performed protostomic development.
 For example, *Loligo vulgaris* (European squid).



Image source: https://en.wikipedia.org/wiki/Turquoise_squid#/media/File:Udger_squid.jpg

PHYLUM ARTHROPODA

Appeared ~545 million years ago.
 Moults to expand to a larger size.
 Performed protostomic development.
 For example, *Procambarus alleni* (blue cray fish).



Image source: https://www.123rf.com/photo/2449922_Blue-crayfish-fresh-water-debater-on-white-background.html

PHYLUM CNIDARIA

Appeared ~580 million years ago.
 Usually has two stages of life - polyp and medusa.
 Neither protostome nor deuterostome, as it has a two-way digestive system.
 For example, *Chrysaora Melanaster* (jellyfish).



Image source: <https://imgrent.wal.edu/stockstore/beringsea/3.html>

PHYLUM NEMATODA

Appeared ~400 million years ago.
 Exoskeleton is covered by a layer of cuticle.
 Performed protostomic development.
 For example, *Necator Americanus* (hookworm).



Image source: http://www.tubercinonion.com/wiki/real_hookworm

PHYLUM ANNELIDA

Appeared ~518 million years ago.
 Has setae that helps with movement.
 Performed protostomic development.
 For example, *Hirudo medicinalis* (European medicinal leech).



Image source: <https://www.britannica.com/animal/medicinal-leech>

PHYLUM ECHINODERMATA

Appeared ~545 million years ago.
 Uses the water vascular system to move, eat, excrete, and breath.
 Performed deuterostomic development.
 For example, *Asterias rubens* (common starfish).



Image source: https://en.wikipedia.org/wiki/Common_starfish#/media/File:Asterias_rubens.jpg

PHYLUM PORIFERA

Appeared ~700 million years ago.
 Is sessile and asymmetrical.
 Neither protostome nor deuterostome, as it has a two-way digestive system.
 For example, *Xestospongia muta* (giant barrel sponge).



Image source: https://www.panglossagen.com/images/45947/giant_sponge_barrel_sail

PHYLUM PLATYHELMINTHES

Appeared ~540-500 million years ago.
 Shows cephalization.
 Neither protostome nor deuterostome, as it has a two-way digestive system.
 For example, *Opisthorchis sinensis* (liver fluke).

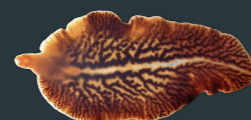


Image source: <https://www.parasitology2020.eu/news/mag/parasitology-of-liver-fluke/>

