

Five Kingdoms of Life

Kingdom	Characteristics	Examples
Monera		
Archaea	Prokaryotic cells; single-celled, differ from bacteria in genetics and chemistry	Methanogens, halophiles, thermophiles
Bacteria	Prokaryotic cells; single-celled, cell walls different from archaea and eukaryotic cells	Cyanobacteria (also called blue-green algae), mycoplasmas
Protista	Eukaryotic cells; single-celled; greater internal complexity than bacteria	Various types of algae, diatoms, protozoans
Fungi	Eukaryotic cells; multicelled; major decomposers and nutrient recyclers	Fungi, yeasts, molds, mushrooms
Plantae	Eukaryotic cells; multicelled; obtain nutrients by photosynthesis	Trees, grasses, roses, rushes, palms, broccoli, poison ivy
Animalia	Eukaryotic cells; multicelled; obtain nutrients by ingestion of preformed organic molecules	Worms, clams, corals, sponges, jellyfish, fishes, amphibians, reptiles, birds, mammals

Early Proterozoic Stromatolites



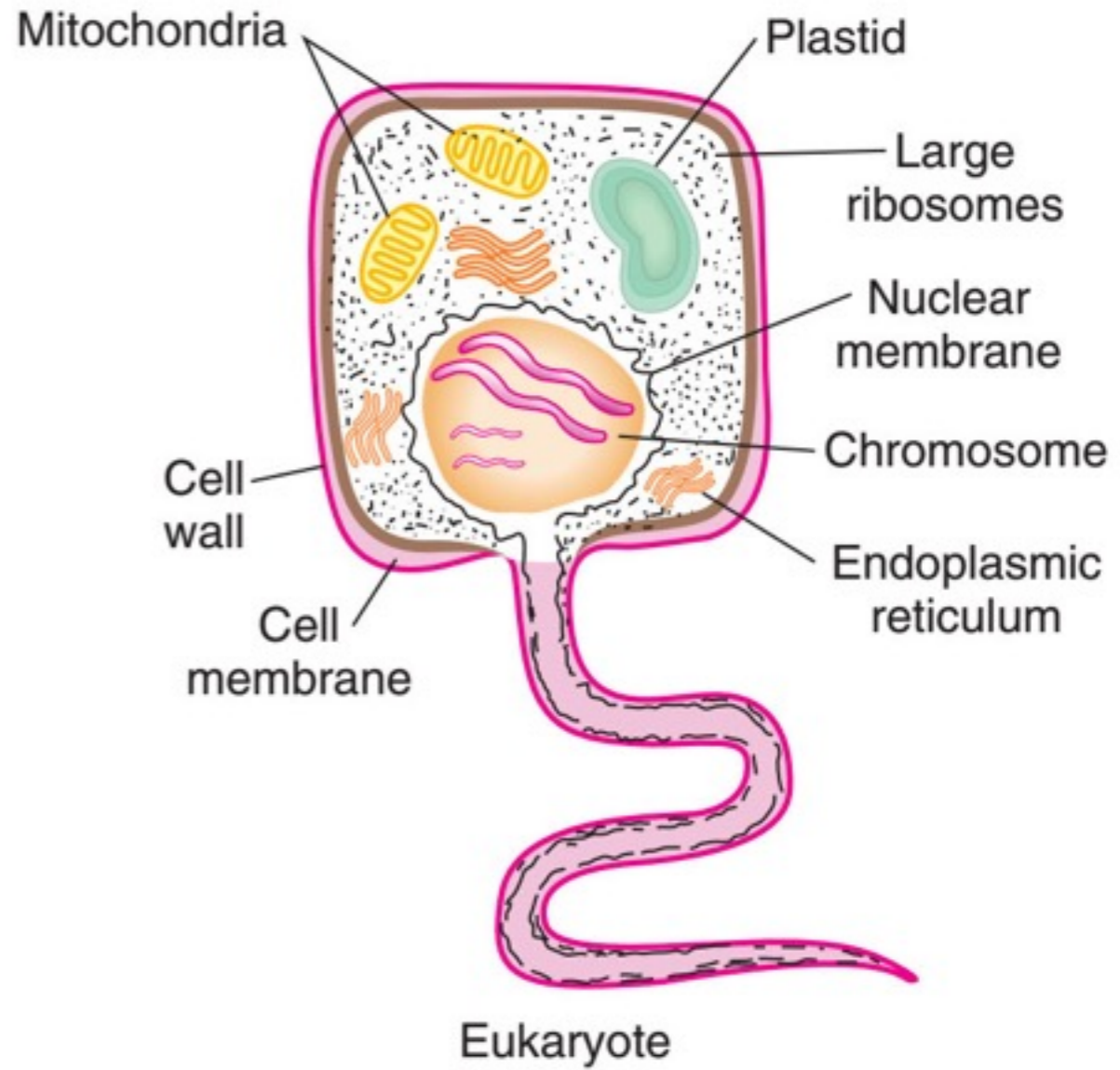
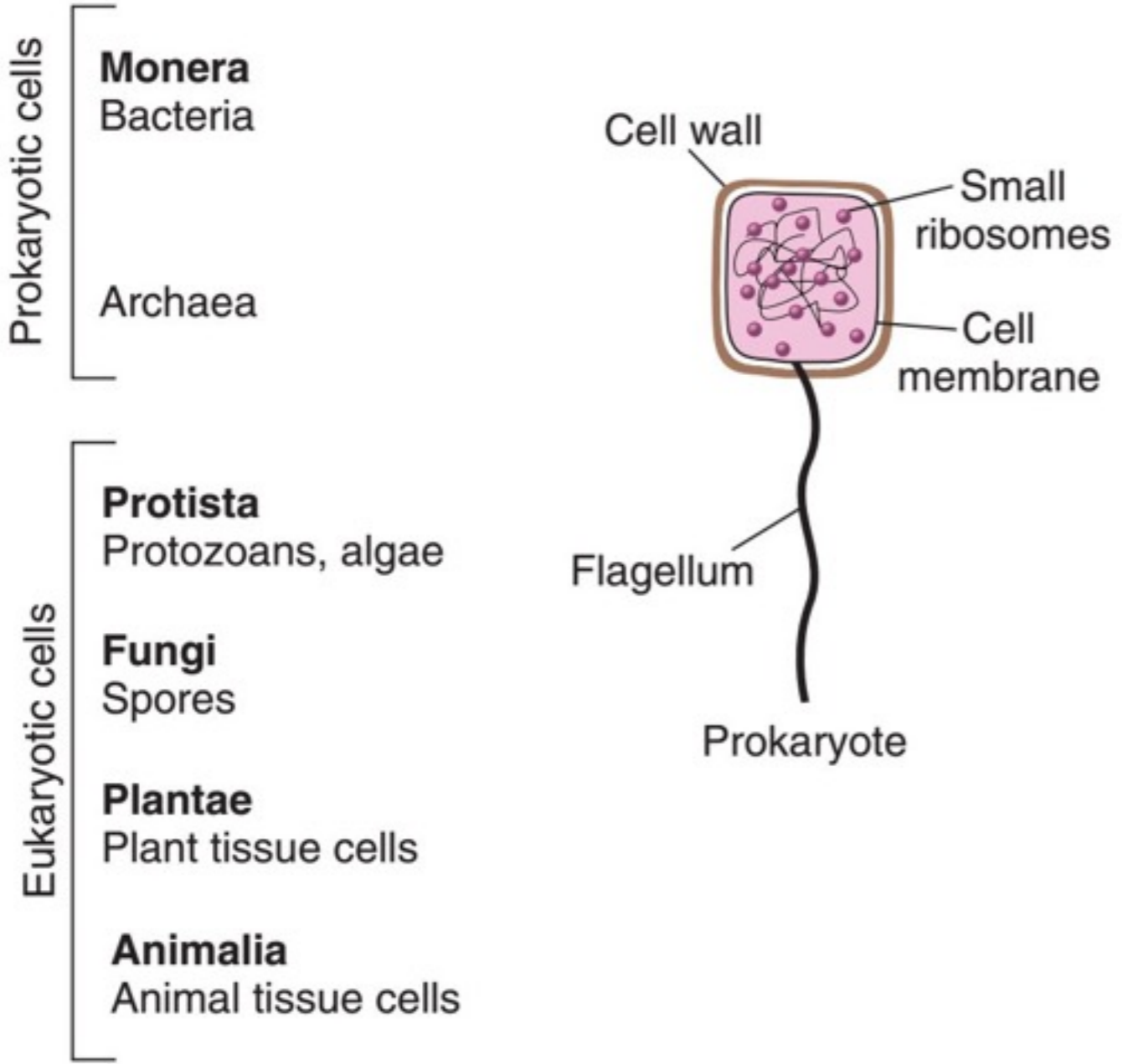
Banded Iron Formation (2.5 - 2.3 Ga)



Continental Redbeds (starting at 2.3 Ga)



Prokaryotes vs. Eukaryotes



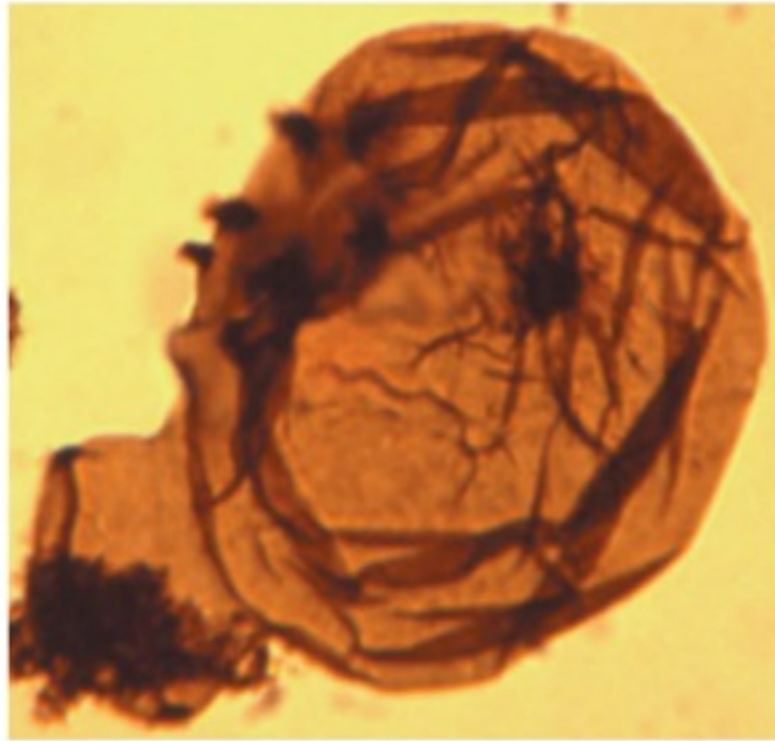
Grypania - oldest known megafossil (2.1 Ga)



Bangiomorpha - oldest accepted eukaryote (1.2 Ga)

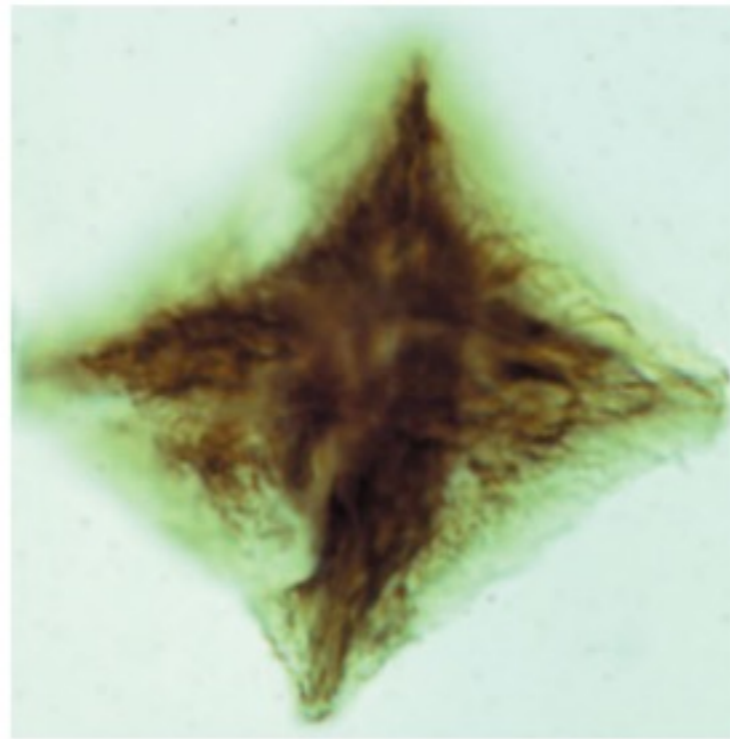


1.4 Ga Arcitarches - possible early eukaryotes



Malgorzata Moczydlowska-Vidal, University of Uppsula, Sweden

(a) The acritarch *Tappania piana* is from Mesoproterozoic rocks in China.



Malgorzata Moczydlowska-Vidal, University of Uppsula, Sweden

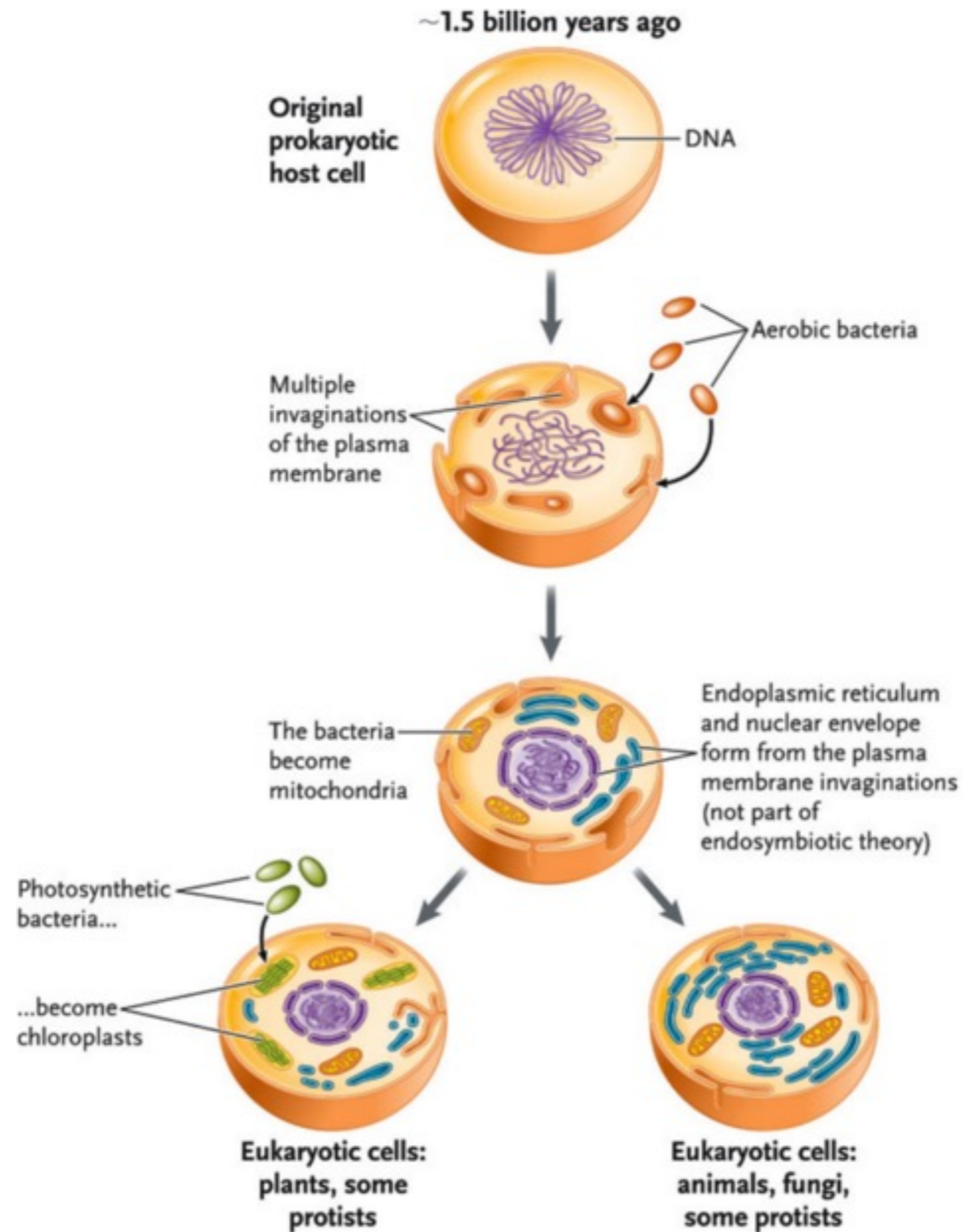
(b) This acritarch, known as *Octoedryxium truncatum*, was found in Neoproterozoic rocks in Sweden.



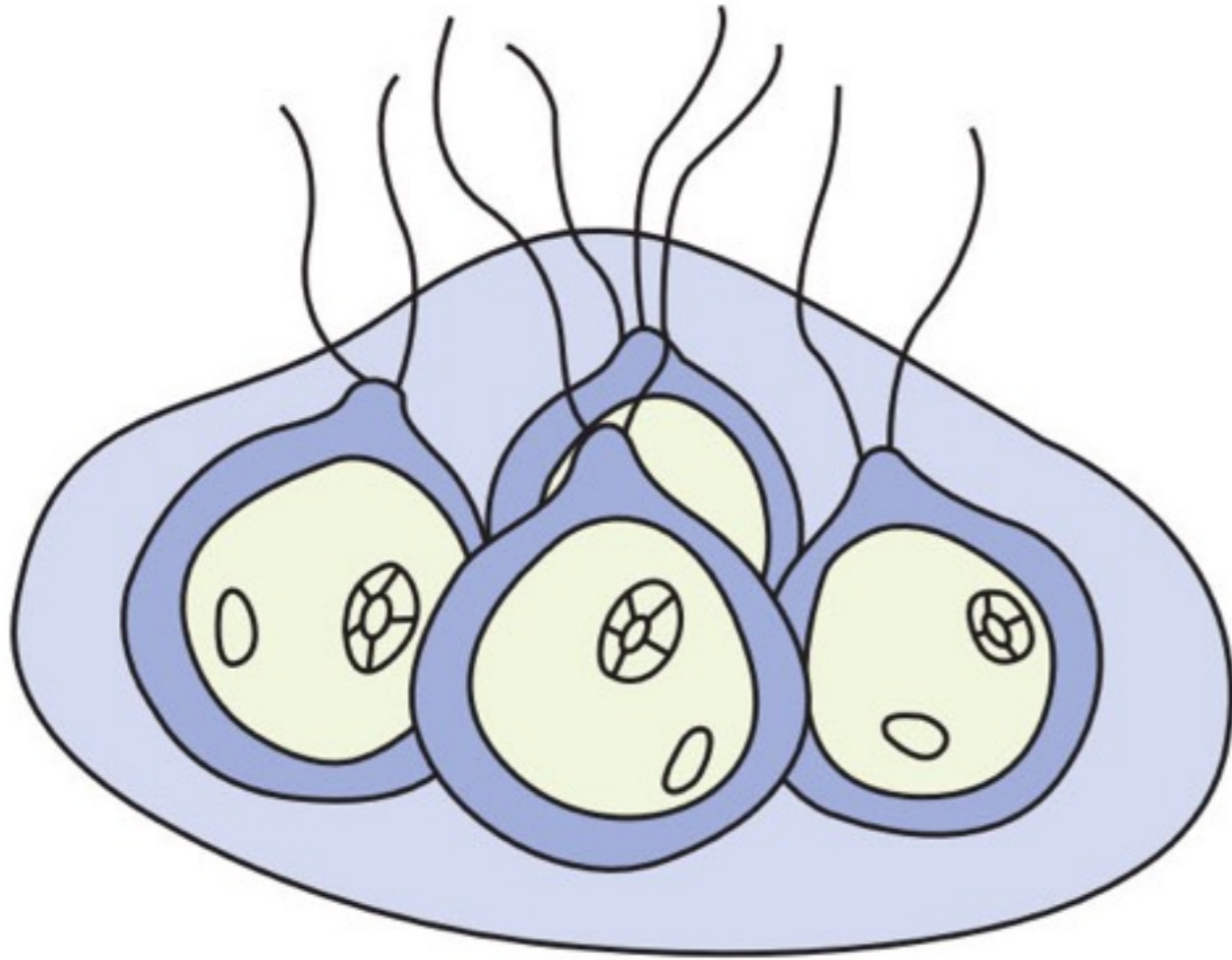
Courtesy of Bonnie Bloeser

(c) This vase-shaped microfossil from Neoproterozoic rocks in the Grand Canyon in Arizona is a cyst from some kind of algae.

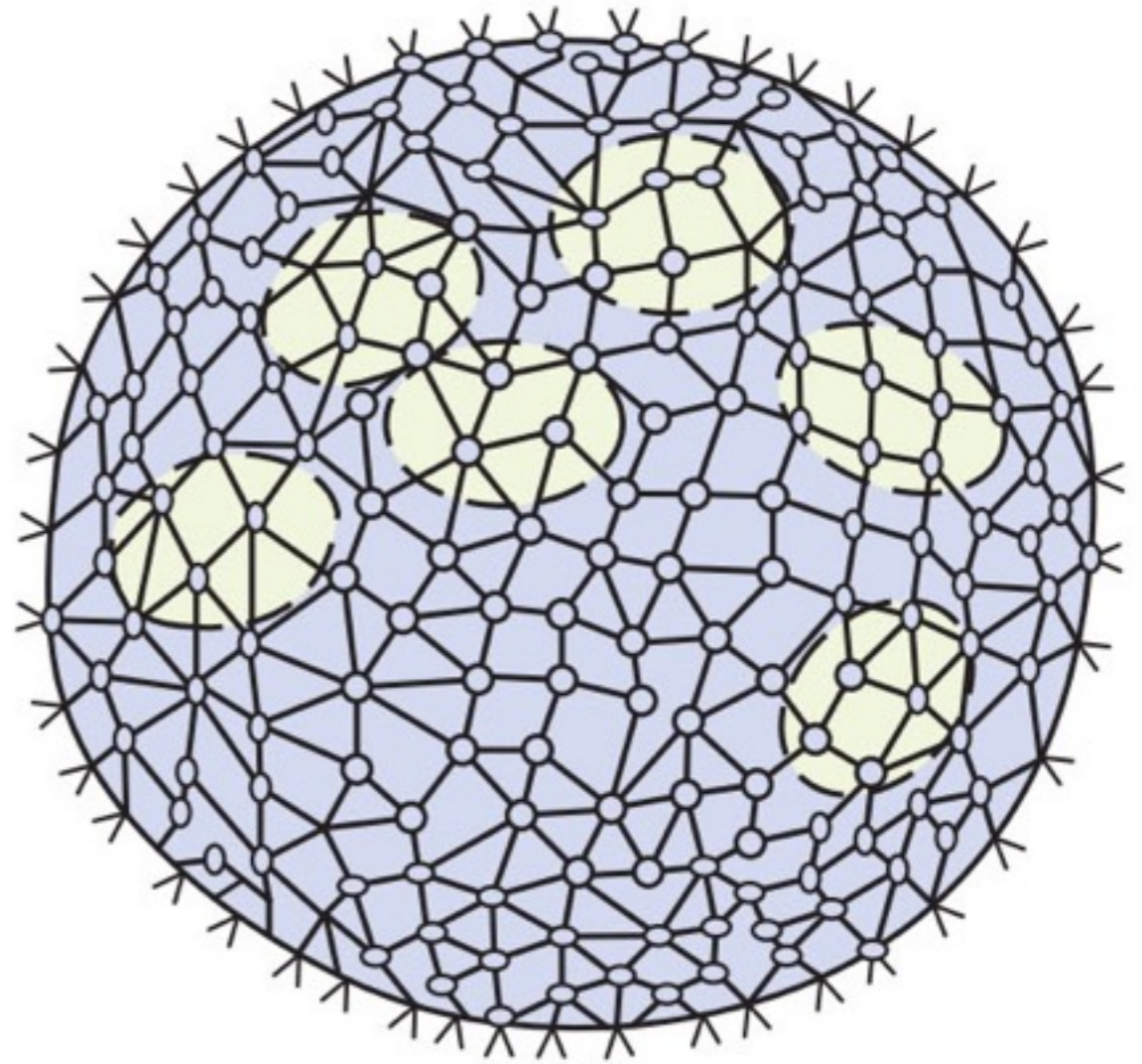
Endosymbiosis Theory



Earliest Multi-cellular Organisms ? (900 Ma)



Gonium



Volvox

Ediacara Fauna (~640 Ma)



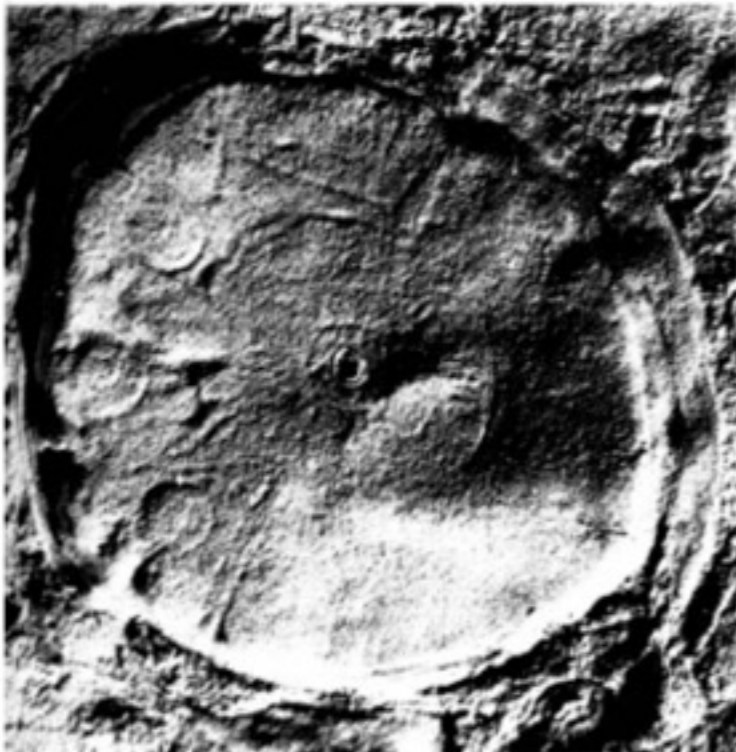
A



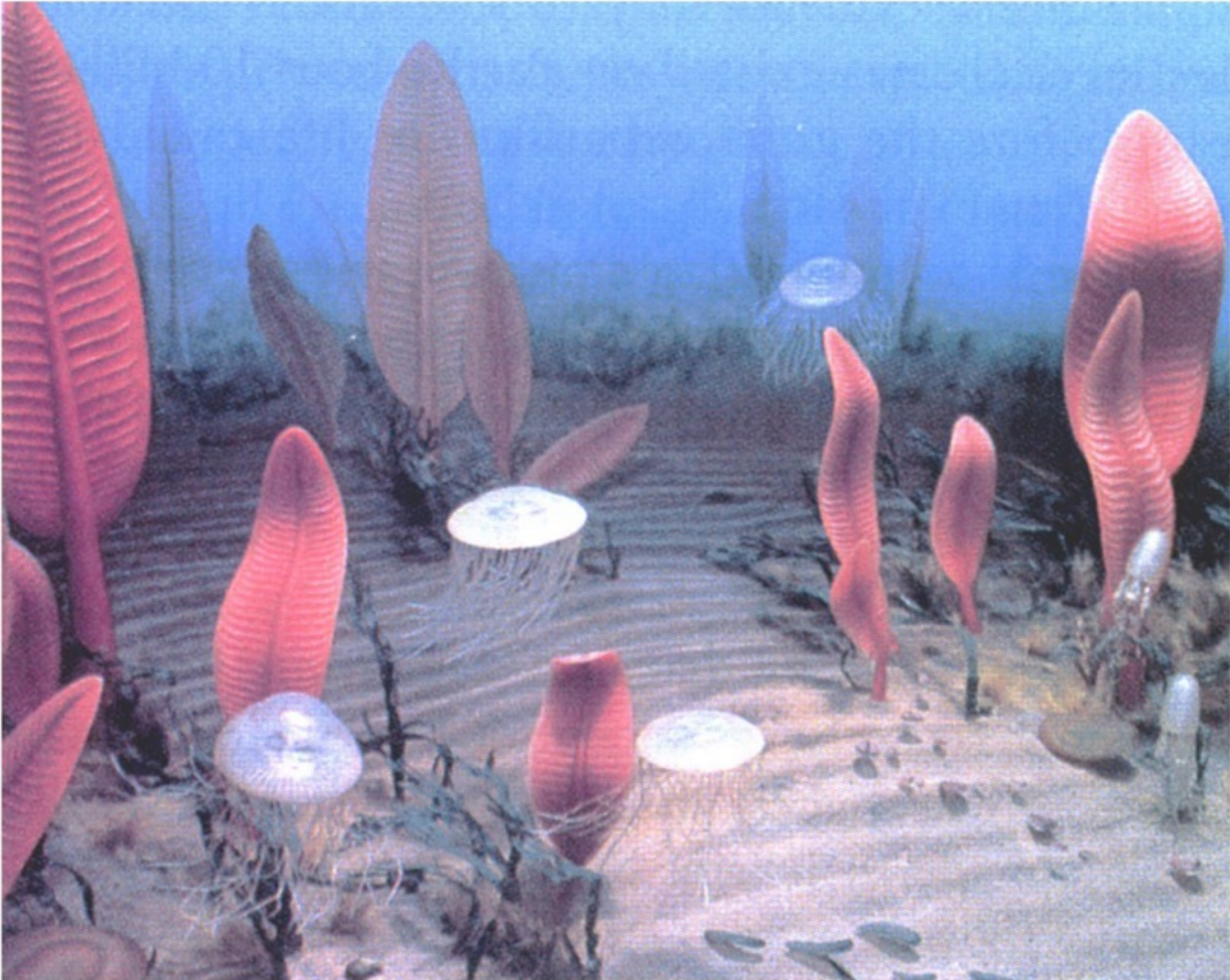
B

Representatives of the late Precambrian Ediacara fauna of Australia. *A.* A problematic flat, segmented form (life size). *B.* An animal that appears to be intermediate in form between a segmented worm and an arthropod (magnified 1.7 times). *C.* An animal that may be a jellyfish (0.7 life size). *D.* An animal that may be a sea pen (0.6 life size). *E.* Imprint of the underside of what appears to be a primitive soft-bodied mollusk that had a broad, creeping foot.

Ediacara Fauna



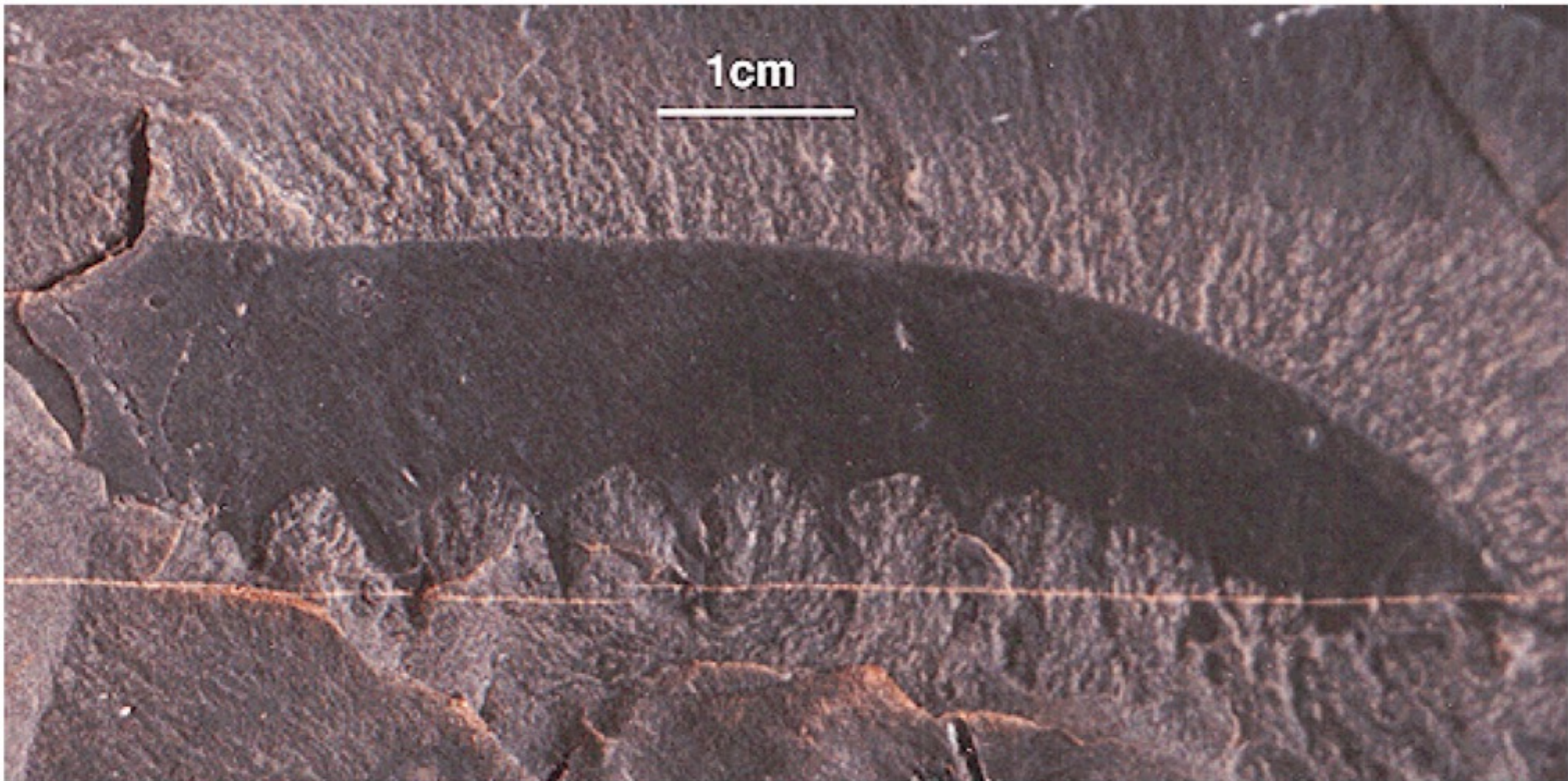
Edicara Paleocommunity



Tommotian Fauna - first hard-shelled metazoans



Anomalocaris - earliest known predator



541 Ma - The Cambrian Explosion of Life

