

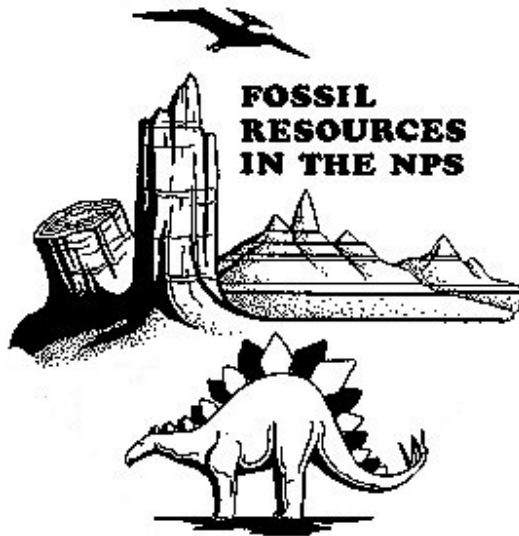
PALEOZOIC LIFE IN THE NATIONAL PARKS

National Park Service
U.S. Department of the Interior



COLORING BOOK

PALEOZOIC LIFE IN THE NATIONAL PARKS COLORING BOOK



National Park Service, Geologic Resources Division, Paleontology Program

<https://www.nps.gov/subjects/fossils/index.htm>

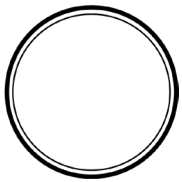
DEDICATION

This Paleozoic Life in the National Parks Coloring Book is dedicated to paleontologist John-Paul (J.P.) Hodnett. During the last decade J.P. has uncovered, identified, and described numerous fossil sharks and other fish from late Paleozoic strata in several national parks. His research has contributed to our understanding of the fossil record at parks including Cuyahoga Valley National Park, Death Valley National Park, Grand Canyon National Park, Grand Teton National Park, Mammoth Cave National Park, Natchez Trace Parkway, and Yellowstone National Park.

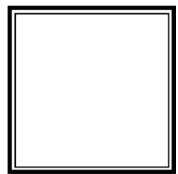
The National Park Service is excited to continue using these graphics as a tool to present more information about ancient life.

Where it lived

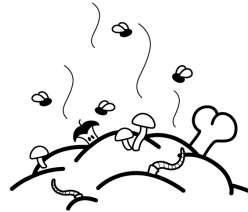
What it ate



Mostly Lived
in Water
Aquatic



Mostly Lived
on Land
Terrestrial



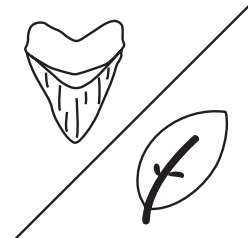
Ate dead plants
and animals
Detritivore/Decomposer



Mostly ate
plants
Herbivore



Mostly ate
meat
Carnivore



Ate a bit of
everything
Omnivore



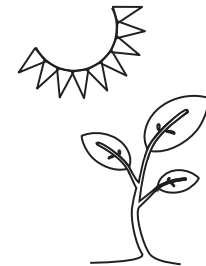
We aren't sure!
Maybe you'll be the
paleontologist who
figures it out!



Mostly ate bugs
Insectivore



Trapped food by
filtering water
Filter Feeder



Nutrients from
sunlight
Photosynthesizer

For example,
if you see:



The square indicates the animal lived on land and the
leaf indicates that it ate plants.
That makes this animal a terrestrial herbivore!

PALEOZOIC ERA

539 – 252 MILLION YEARS AGO

Era		Period	Epoch
252 mya	Triassic		
	Paleozoic	Permian	
		Pennsylvanian	
		Mississippian	
		Devonian	
		Silurian	
		Ordovician	
		Cambrian	
539 mya			

The Paleozoic Era lasted from about 539 to 252 million years ago. Often called the “Age of Invertebrates” due to the dominance of marine life such as trilobites, brachiopods, and early mollusks, it was also significant for the first appearance of many major animal groups, including insects, fish, and the earliest amphibians. Throughout the Paleozoic, life gradually transitioned from oceans to land and several mass extinction events occurred, including the largest one at its end—the Permian-Triassic extinction—which set the stage for the Mesozoic Era that followed. This coloring book shows Paleozoic Era life found in our national parks and natural landmarks within the United States.

This coloring book shows Paleozoic Era life found in our national parks and natural landmarks within the United States.

CAMBRIAN PERIOD

539 – 487 MILLION YEARS AGO

Color the regions below on the next few pages to track how they moved during the Paleozoic.

1 – Light Blue: Ocean

4 – Light Green: S. America

7 – Purple: Australia

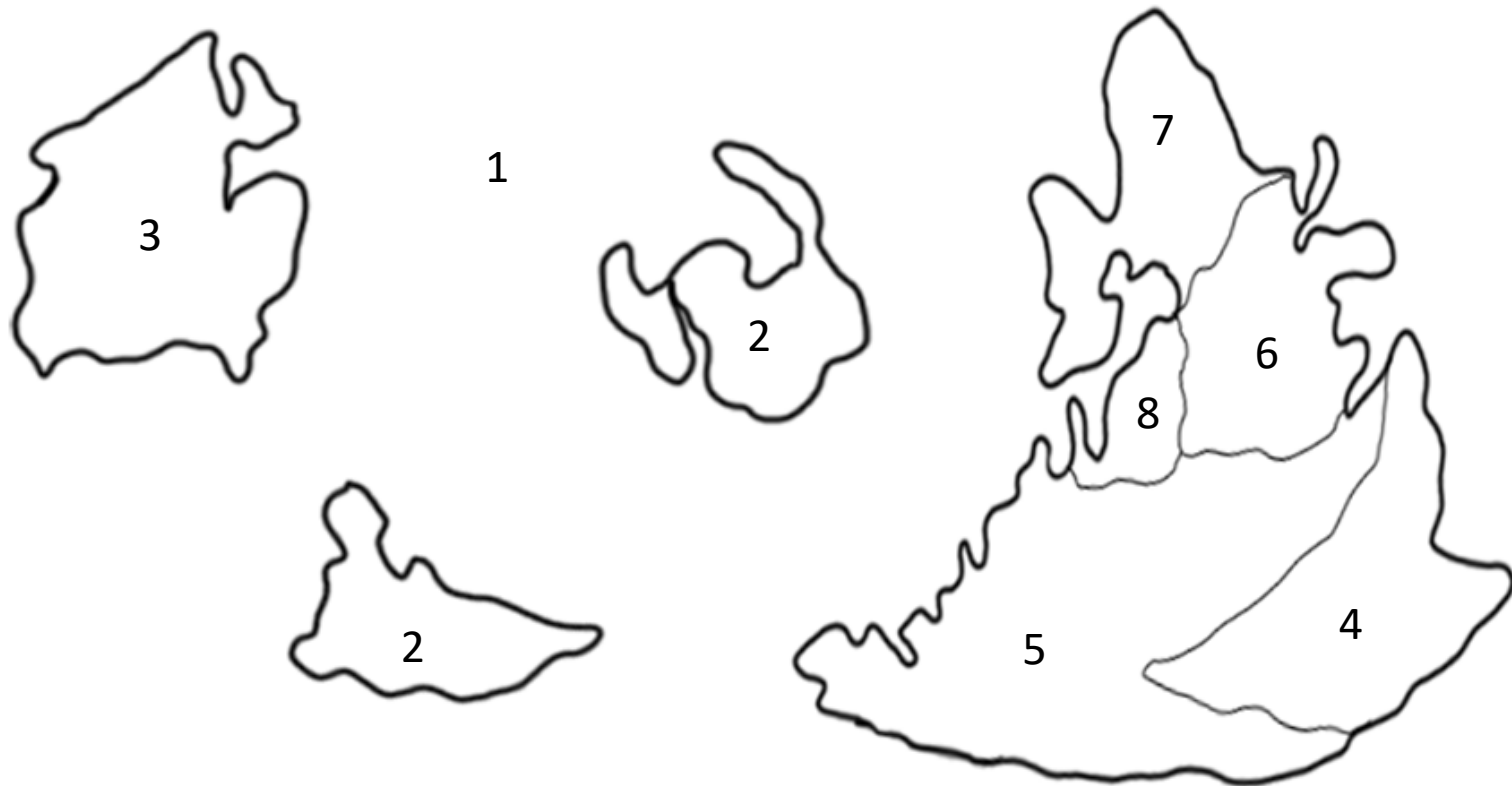
2 – Yellow: Eurasia

5 – Red: Africa

8 – Dark Blue: India

3 – Dark Green: N. America

6 – Pink: Antarctica



ORDOVICIAN INTO SILURIAN

ABOUT 445 MILLION YEARS AGO

1 – Light Blue: Ocean

4 – Light Green: S. America

7 – Purple: Australia

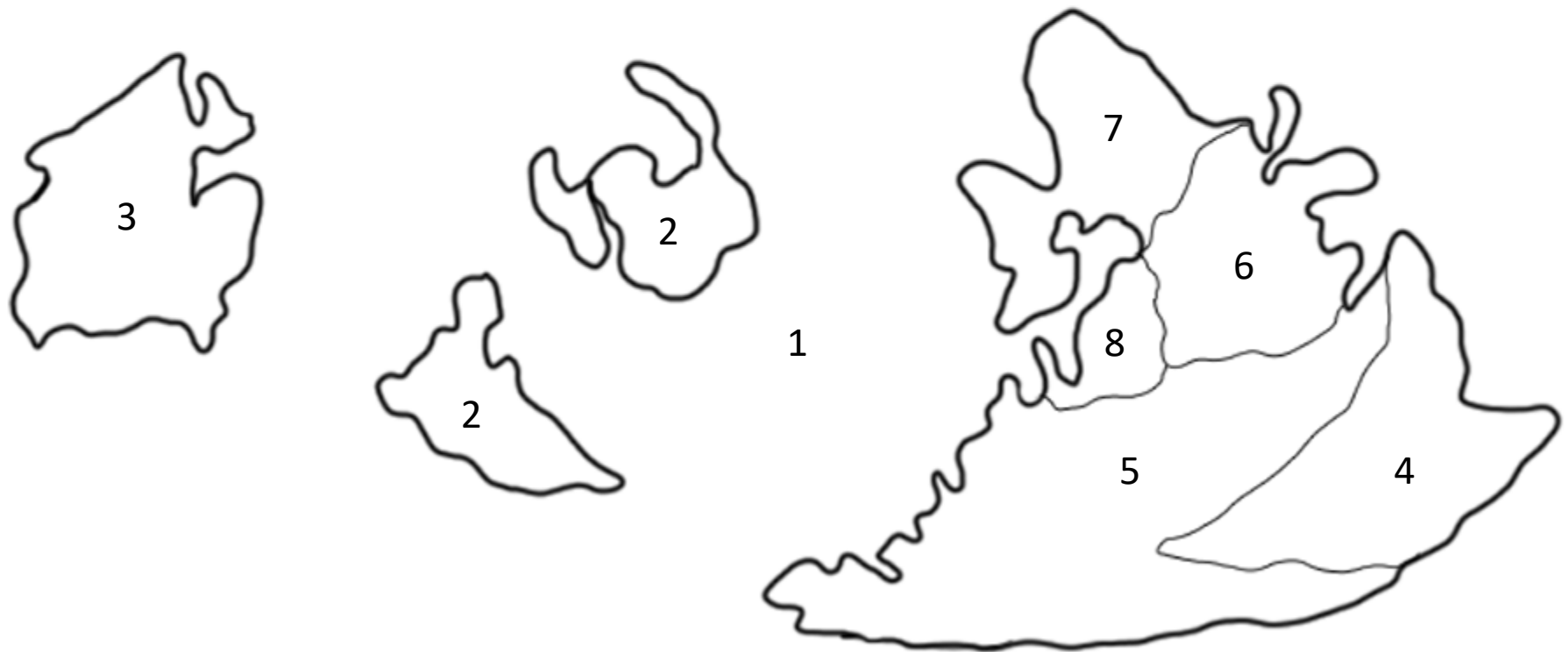
2 – Yellow: Eurasia

5 – Red: Africa

8 – Dark Blue: India

3 – Dark Green: N. America

6 – Pink: Antarctica



DEVONIAN INTO MISSISSIPPIAN

ABOUT 359 MILLION YEARS AGO



- 1 – Light Blue: Ocean
- 2 – Yellow: Eurasia
- 3 – Dark Green: N. America
- 4 – Light Green: S. America
- 5 – Red: Africa
- 6 – Pink: Antarctica
- 7 – Purple: Australia
- 8 – Dark Blue: India

PERMIAN PERIOD

299 – 252 MILLION YEARS AGO

Formation of the supercontinent Pangea



- 1 – Light Blue: Ocean
- 2 – Yellow: Eurasia
- 3 – Dark Green: N. America
- 4 – Light Green: S. America
- 5 – Red: Africa
- 6 – Pink: Antarctica
- 7 – Purple: Australia
- 8 – Dark Blue: India

CAMBRIAN PERIOD

539 – 487 MILLION YEARS AGO

The Cambrian Period is a division of Earth's history that spans from about 539 to 487 million years ago. It is known for the "Cambrian Explosion," a rapid diversification of life when most major animal groups first appeared in the fossil record. The Cambrian oceans were the scene of the spread of complex life with hard parts, with the rise of early arthropods and mollusks. The first jawless fishes appeared in this period. The Cambrian Period is represented by fossils in 43 National Park Service (NPS) units.

Yukonensis yukonensis was an ancient sponge. Fossils have been found at Yukon-Charley Rivers National Preserve, Alaska¹.



Ehmania weedi was an arthropod called a trilobite. Fossils have been found at Yellowstone National Park, Wyoming, Montana and Idaho².

Swartpuntia was one of the last of a group of Precambrian organisms that are difficult to classify. Fossils have been found at Mojave National Preserve, California³.

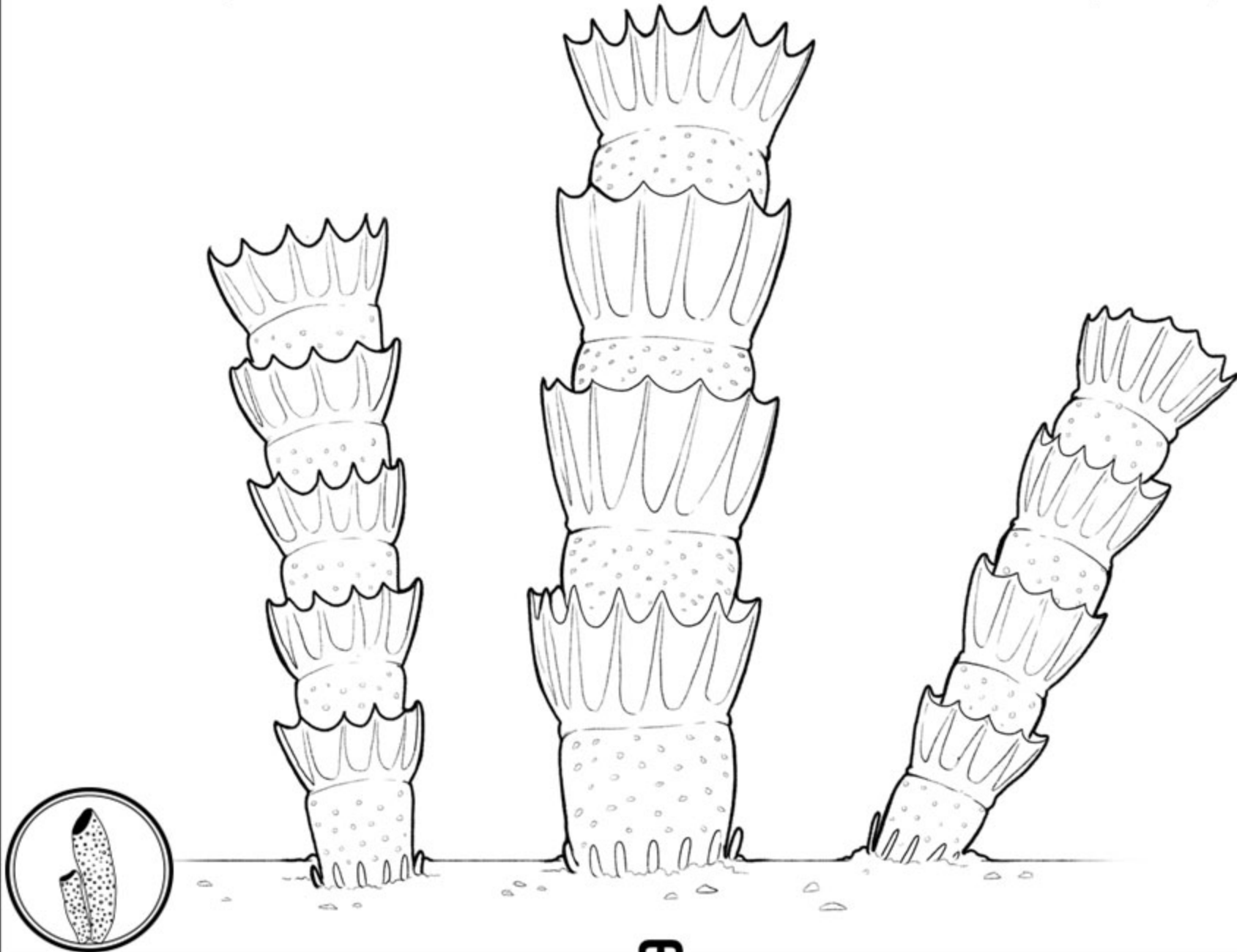
Chancelloria pentacta may have been related to sponges or represented a unique group of early sea creatures; paleontologists are still unsure. Fossils have been found at Grand Canyon National Park, Arizona⁴.

Ramskoeldia consimilis was an early arthropod called a radiodont. Fossils have been found at Mojave National Preserve, California³.

Haydenoconus gallatinensis was a hyolith, an extinct marine animal with a cone-shaped shell. Fossils have been found at Yellowstone National Park, Wyoming, Montana and Idaho².

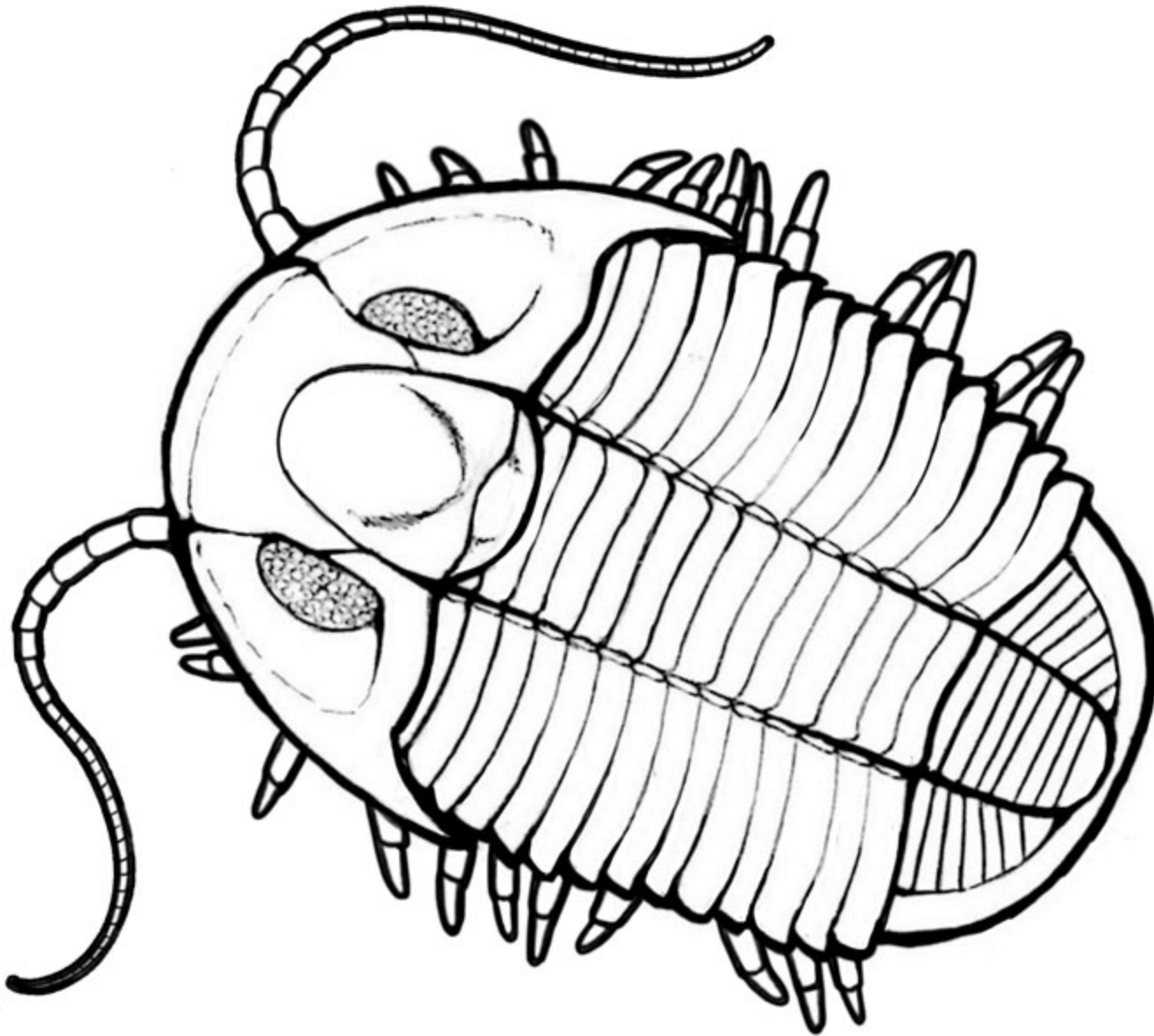
Yukonensis yukonensis

Archaeocyathan Sponge



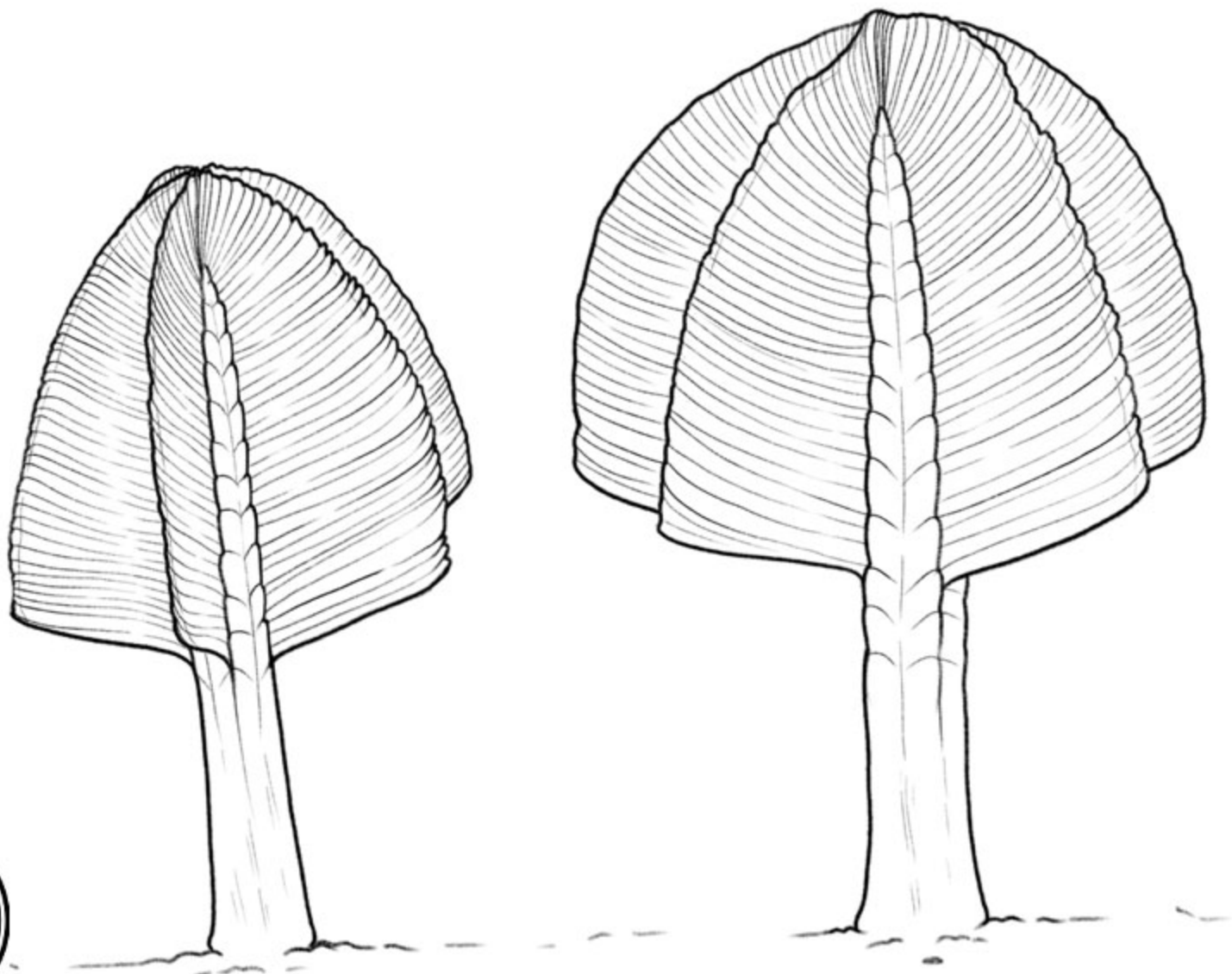
Ehmania weedi

Trilobite



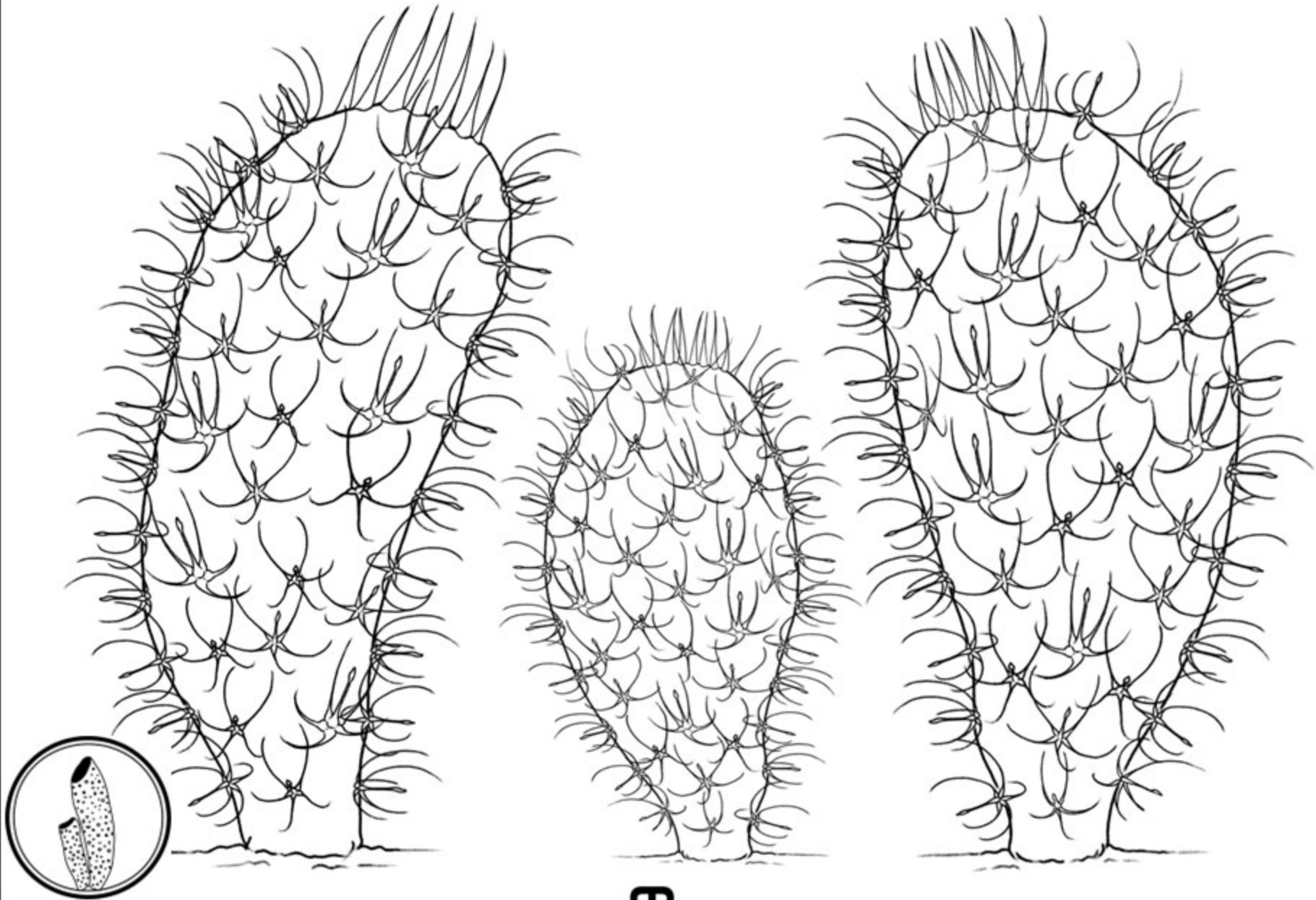
Swartpuntia

Frond Animal



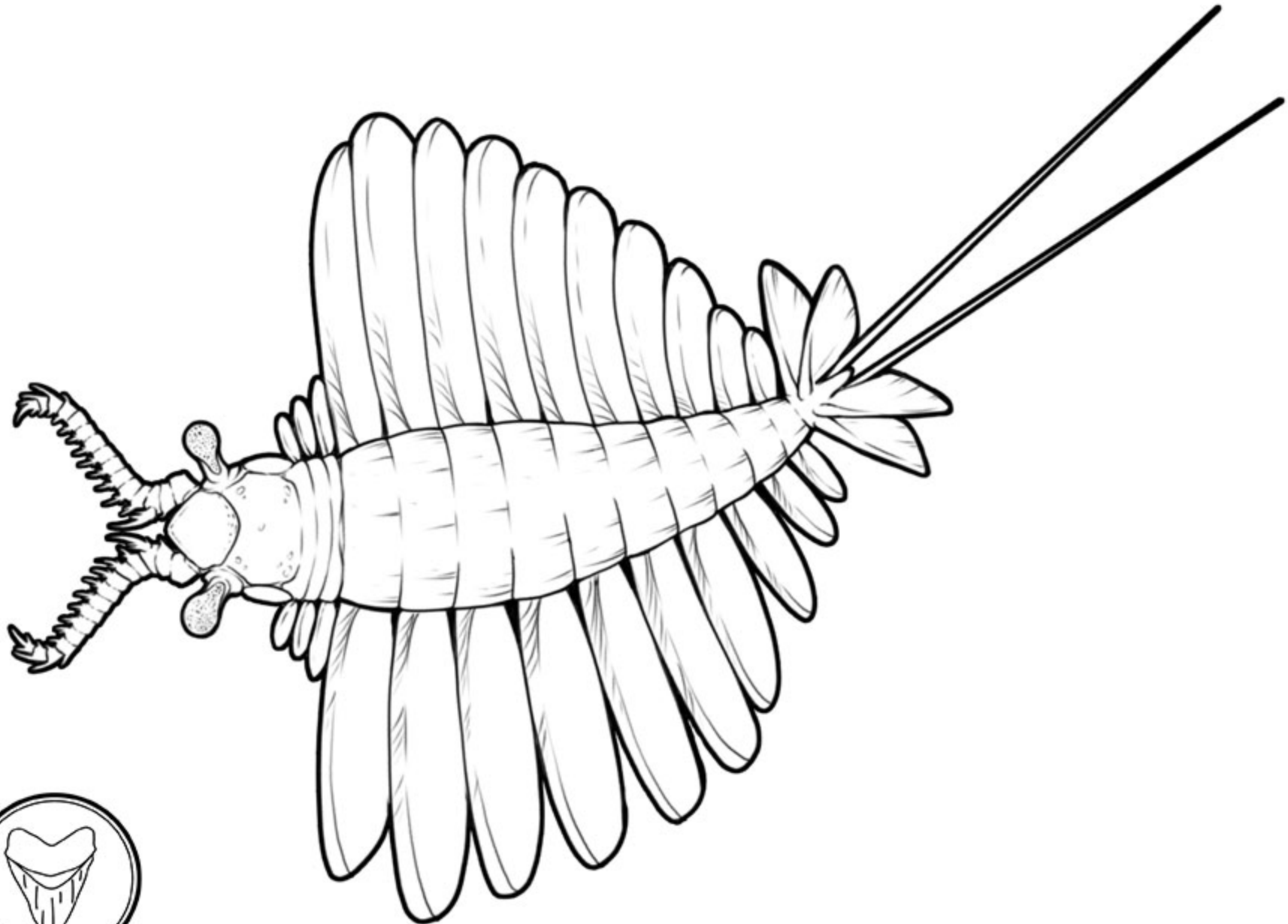
Chancelloria pentacta

Sponge-like Animal



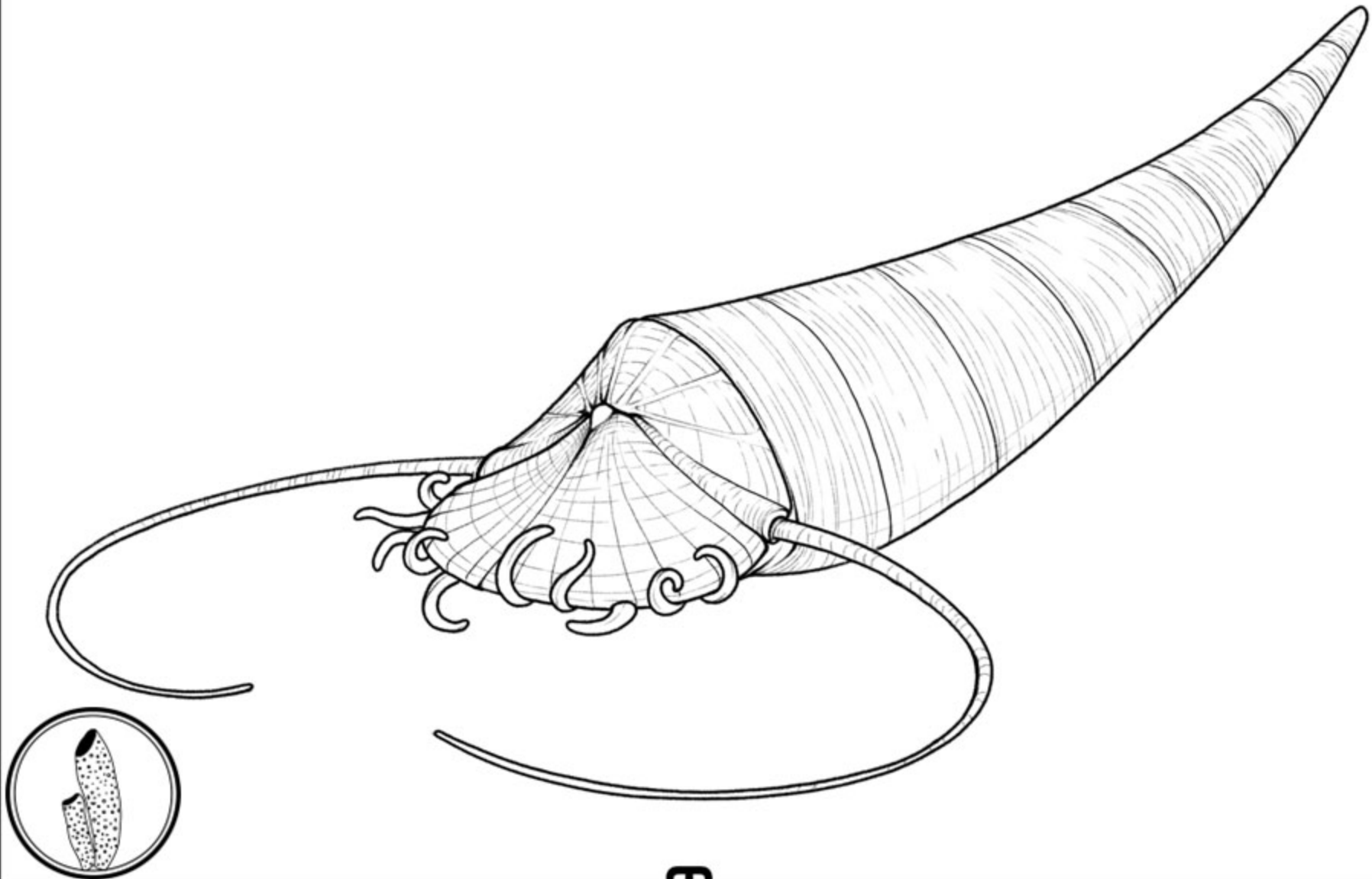
Ramskoeldia consimilis

Radiodont



Haydenoconus gallatinensis

Hyolith



TRICKY TRILOBITE PARTS

The name “trilobite” comes from the three sections that run from the head to the tail — the left, right and center **lobes**. This ancient ocean creature didn’t have a backbone, but it had a tough shell—kind of like a crab, that they shed as they grew! That shed shell or “**molt**” is what we see with most trilobite fossils. When trilobites felt scared, they could roll up into a ball to stay safe, like pill bugs do! They came in all shapes and sizes, but their body parts were always the same! Let’s look at the different parts of the trilobite.

1 – Yellow: **Cephalon**

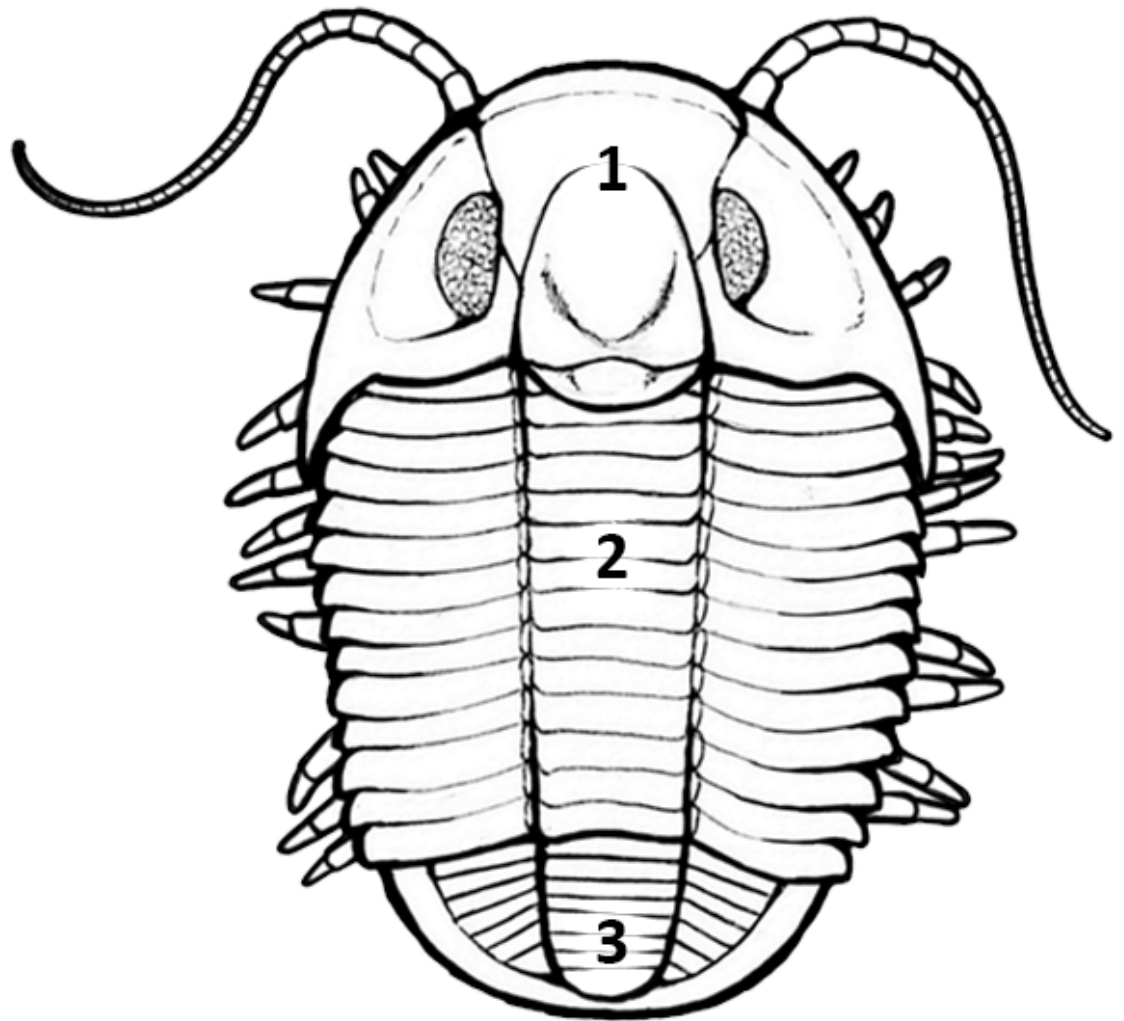
This is the head of the trilobite. While some trilobites didn’t have eyes at all, this one had big, complex eyes that helped it see underwater. And that bump between its eyes isn’t a brain—it covered the stomach!

2 – Green: **Thorax**

This section is the body. It is made up of many plates allowing the trilobite to be flexible.

3 – Blue: **Pygidium**

This piece is the trilobite's tail. When trilobites rolled up, the pygidium tucked up under the cephalon.



ORDOVICIAN PERIOD

487 – 443 MILLION YEARS AGO

The Ordovician Period spanned from about 487 to 443 million years ago. During this time, marine life continued to diversify in what scientists call the Great Ordovician Biodiversification Event. Coral reefs began to form and were also filled with brachiopods, bryozoans, and mollusks. Small plants began to grow on land. The Ordovician featured giant volcanic eruptions and high sea levels, and a major ice age occurred near the end. It ended with one of the largest mass extinctions in Earth's history. This period is represented by fossils in 32 National Park Service (NPS) units.



ORDOVICIAN PERIOD

487 – 443 MILLION YEARS AGO

Cryptolithoides ulrichi was a small trilobite that had a distinctive, lacy-looking fringe on its head, which may have helped it filter food from the water. Fossils have been found at Chickasaw National Recreation Area, Oklahoma⁵.

Pycnocrinus multibrachiatus was a crinoid or “sea lily” related to sea stars. It lived attached to the sea floor. Fossils have been found at Mississippi National River and Recreation Area, Minnesota⁶.

Amecystis woodi was an ancient sea creature called a cystoid. It had a rounded body covered in small plates, a whip-like appendage at one end to move it along the sea floor, and two appendages at the other end to used to feed. Fossils have been found at Mississippi National River and Recreation Area, Minnesota⁶.

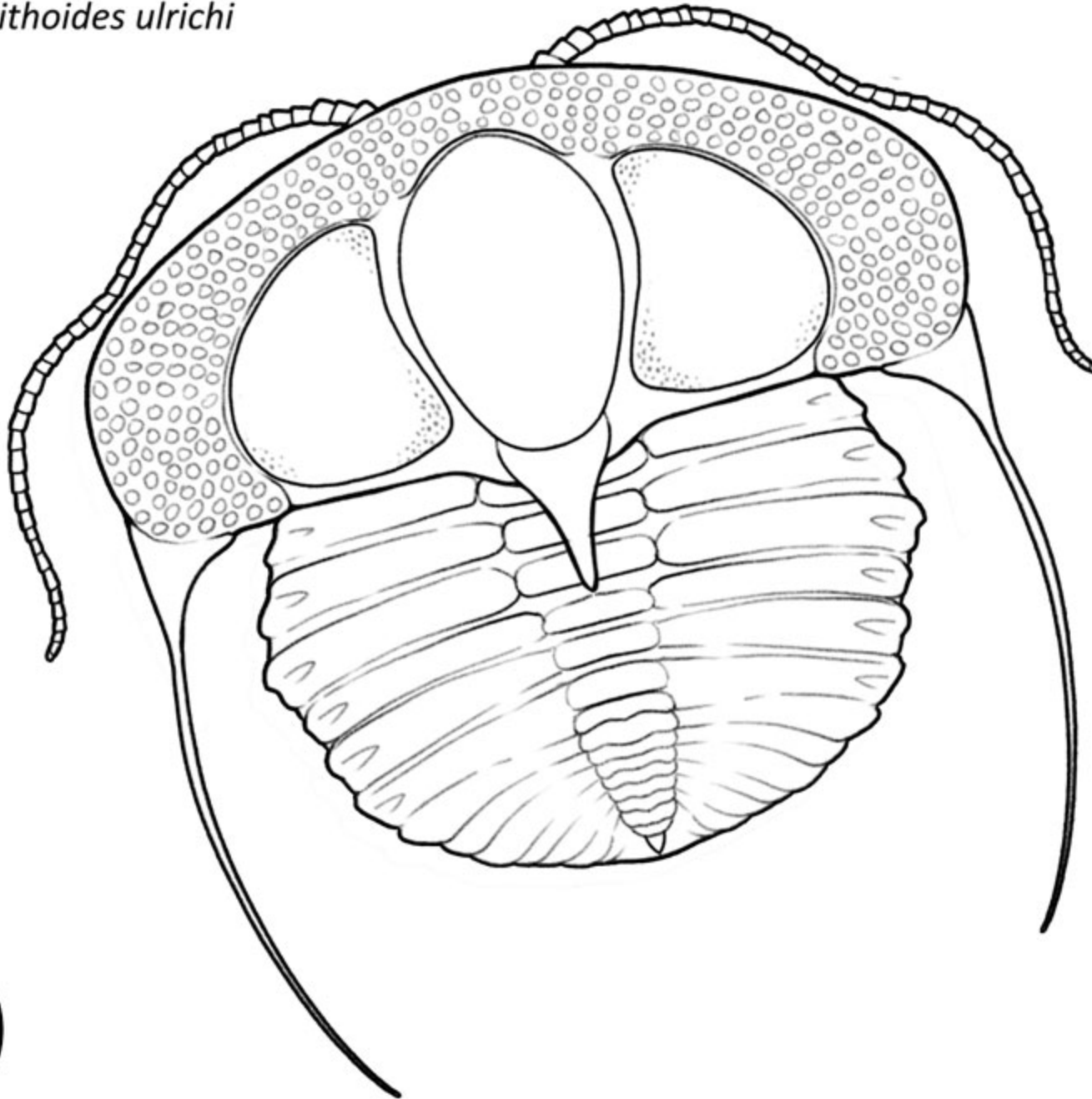
Mcqueenoceras cariniferum was an early cephalopod, distantly related to modern squids and octopi. It had a long tapering shell and likely swam through the oceans using water jet propulsion like modern squids. Fossils have been found at the Chesapeake & Ohio Canal National Historical Park, District of Columbia, Maryland, and West Virginia⁷.

Foerstediscus splendens was an echinoderm, of the group that includes sea stars and sea urchins. It was an edrioasteroid, sometimes called a “seated star” because of its appearance and how it attached to rocks or shells and didn’t move. Fossils have been found at Mississippi National River and Recreation Area, Minnesota⁶.

The **Chazy fossil reef** is one of the oldest fossilized reefs in the world to be composed of many different organisms. It preserves evidence of sponges, snails, cephalopods, echinoderms, brachiopods (shelled animals resembling clams), corals, and bryozoans (tiny colonial animals that built "apartment buildings" of many different shapes and looked like small corals). This reef is preserved at Chazy Fossil Reef National Natural Landmark, New York, and Vermont^A.

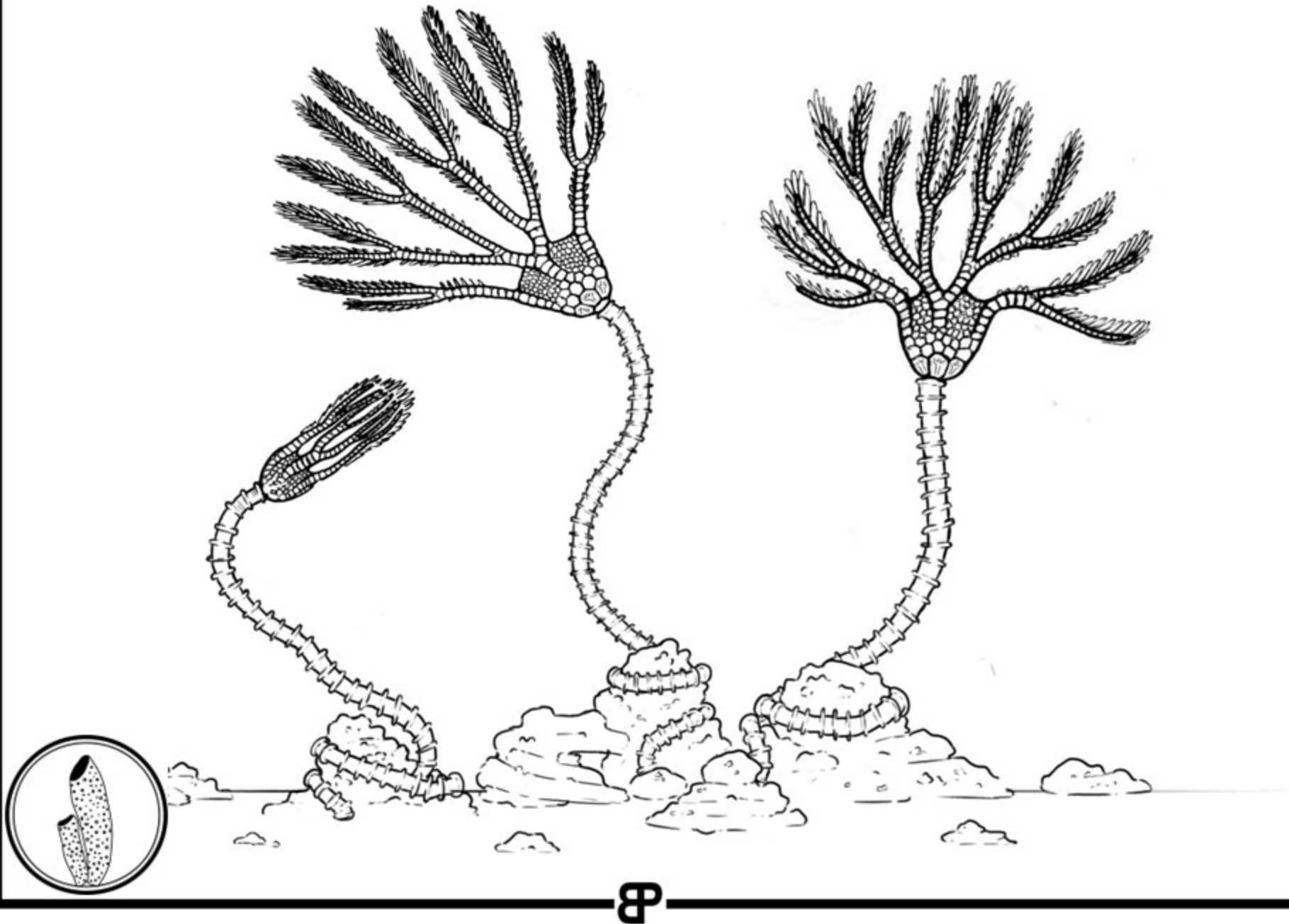
Cryptolithoides ulrichi

Trilobite



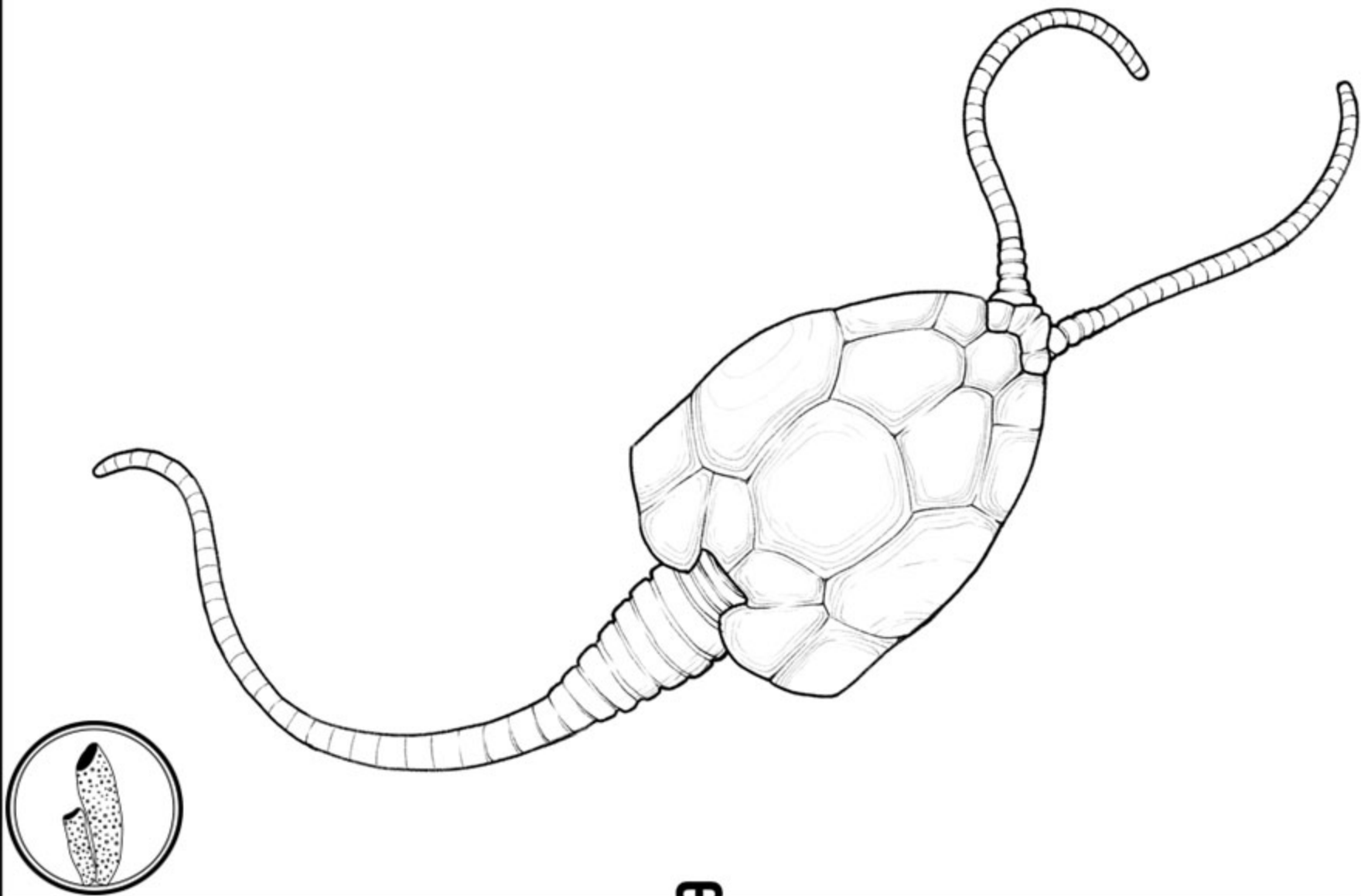
Pycnocrinus multibrachiatus

Ancient Crinoid



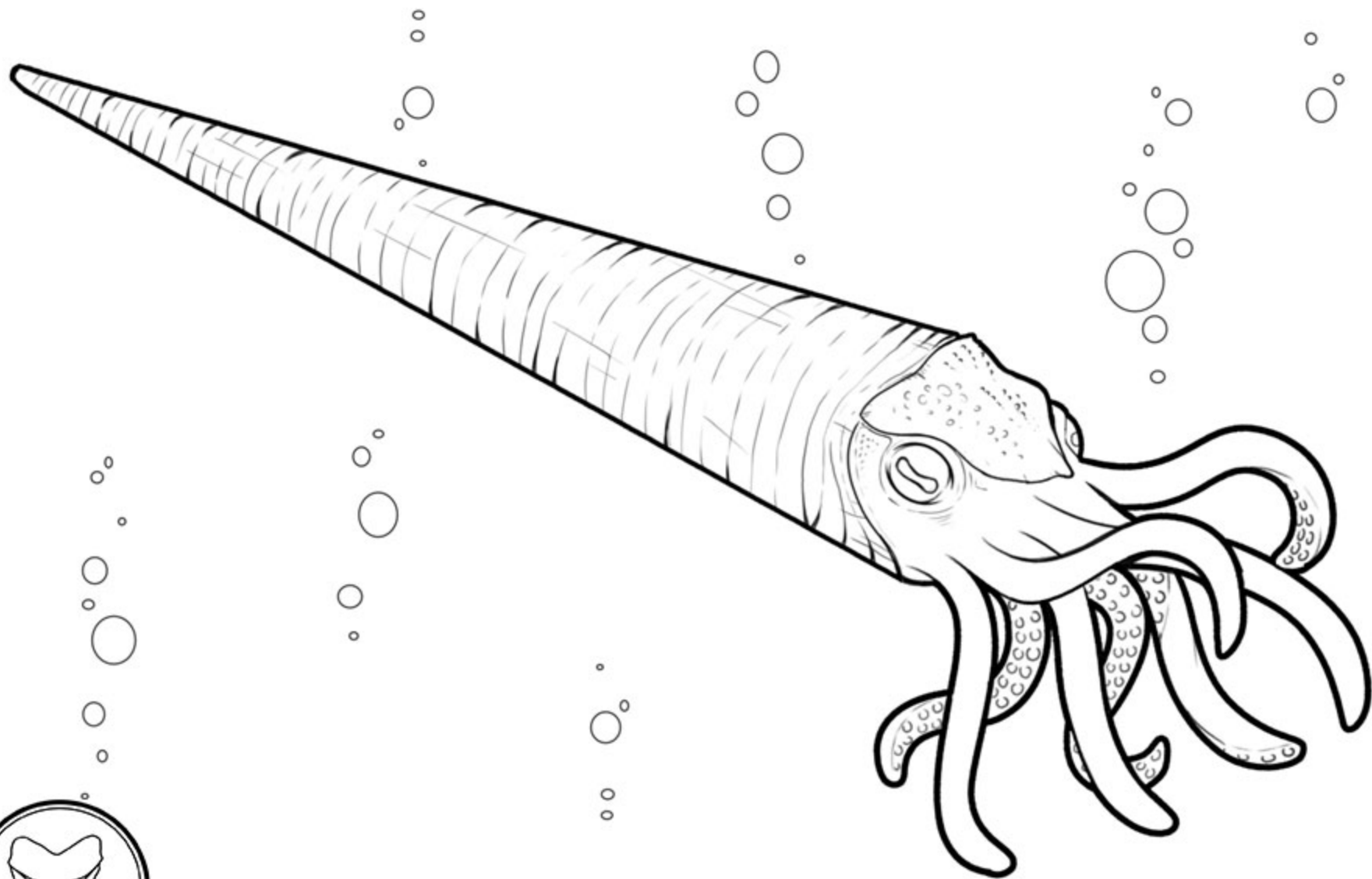
Amecystis woodi

Ancient Pleurocystitid



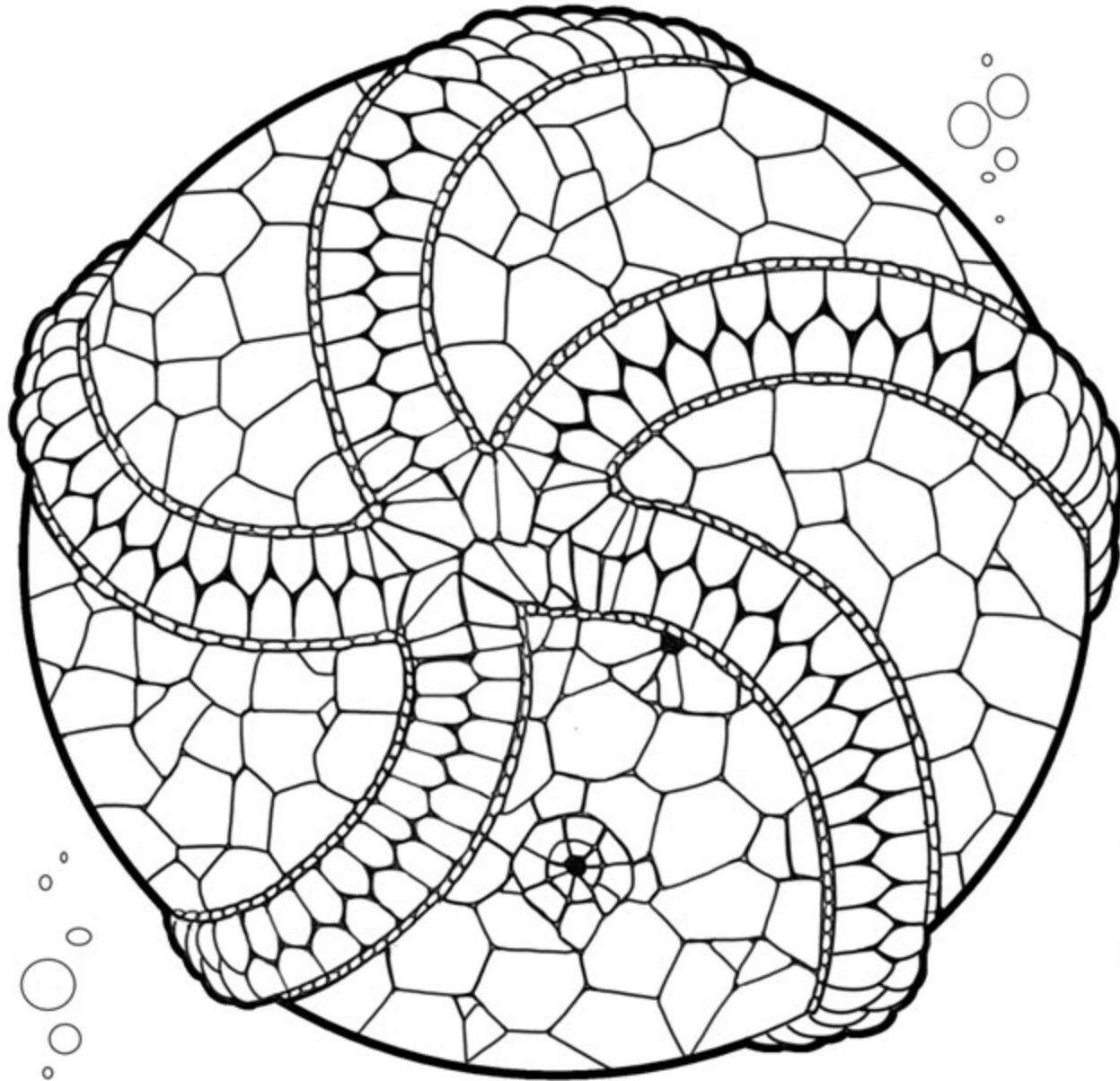
Mcqueenoceras cariniferum

Endocerid Cephalopod



Foerstediscus splendens

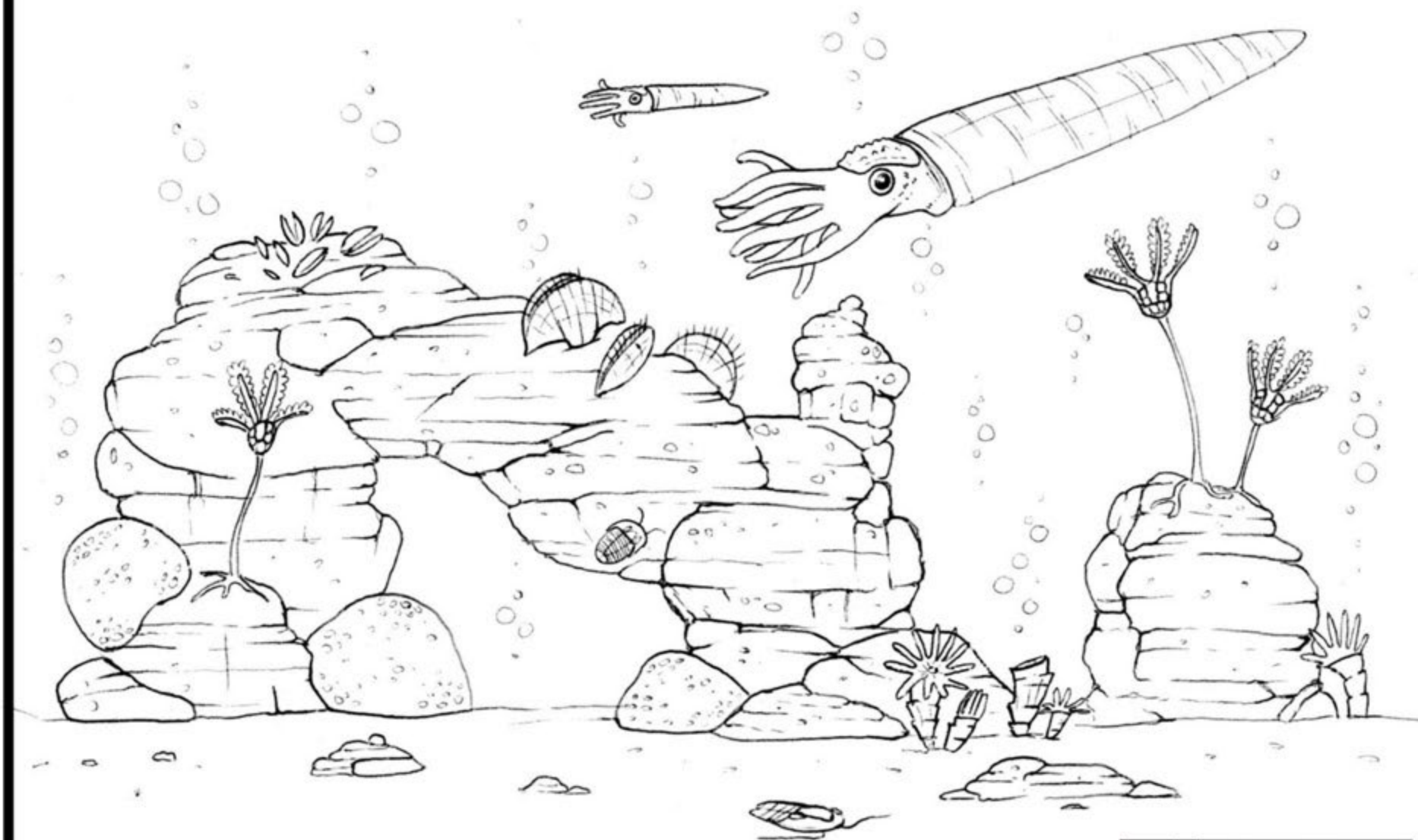
Edrioasteroid



NPS Paleontology

Ancient Ordovician Reef

Chazy Fossil Reef



CURIOUS CRINOID BITS

This sea creature might look like a flower—and that’s why some people call them “sea lilies”! With their long, wavy arms and plant-like shape, they seem a lot like underwater plants. But crinoids are actually animals! They belong to the same family as starfish, sea urchins, and sea cucumbers. Some crinoids, like this one, are rooted to the ocean floor, while others are free-swimming. Rooted crinoids have a body made of three main parts.

1 – Red: **Arms**

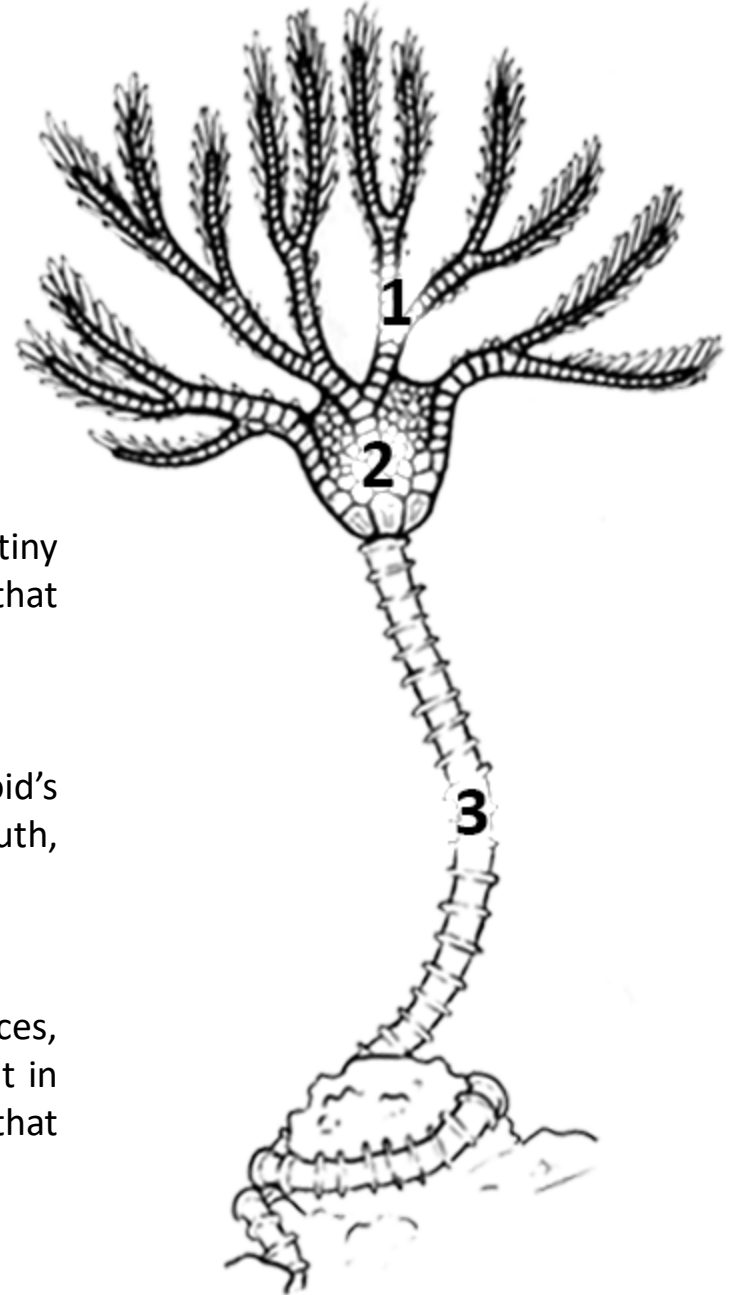
These long, feathery arms move and wave gently to catch tiny food particles floating in the water. Each arm has tiny structures that move the food particles down toward the mouth.

2 – Orange: **Calyx**

This is the main body of the crinoid, sort of like the crinoid’s control center. It holds important parts inside it like the mouth, stomach, and other organs.

3 – Yellow: **Stem**

This long, flexible stalk is made of little disc-shaped pieces, stacked up like beads on a string. It helps hold the crinoid upright in the water. At the very bottom is the **holdfast**, kind of like a root, that grips the sea floor and keeps the crinoid from drifting away.



SILURIAN PERIOD

443 – 420 MILLION YEARS AGO

The Silurian Period lasted from about 443 to 420 million years ago and followed the Ordovician mass extinction. During this time, Earth's climate stabilized, glaciers retreated, and sea levels rose, creating shallow marine environments where life flourished. Coral reefs expanded, and jawed fish first appeared. The Silurian also marks a major milestone with early arthropods colonizing land. These developments set the stage for more complex terrestrial ecosystems in the periods to come. This period is represented by fossils in 17 National Park Service (NPS) units.

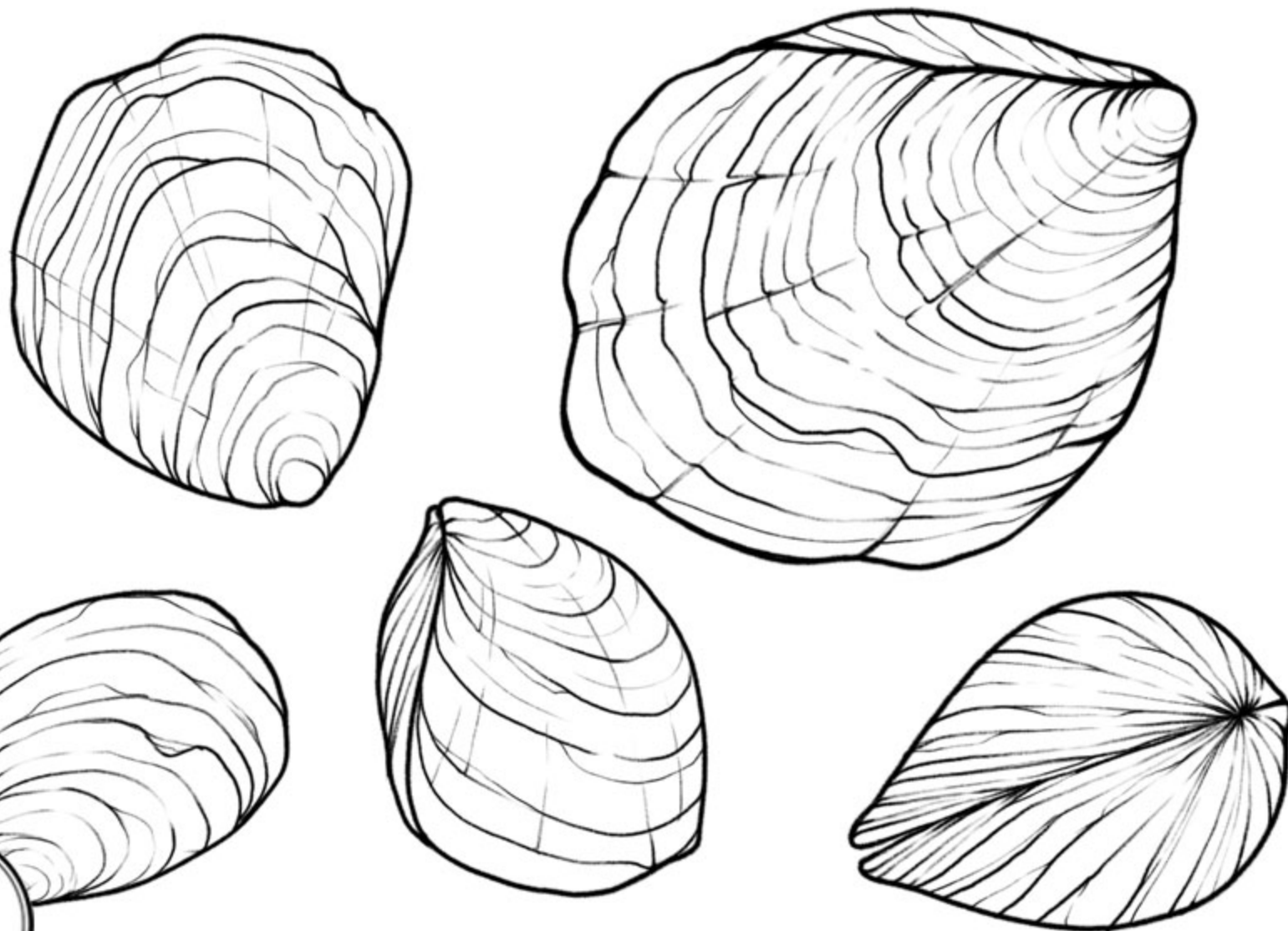


Pycinodesma giganteum was a large marine bivalve with fossils present at *Pycinodesma* Point in Glacier Bay National Park & Preserve, Alaska⁸.

Hughmilleria shawangunk is an extinct arthropod called a eurypterid, or “sea scorpion”. Fossils have been found at been found at Delaware Water Gap National Recreation Area, New Jersey and Pennsylvania⁹.

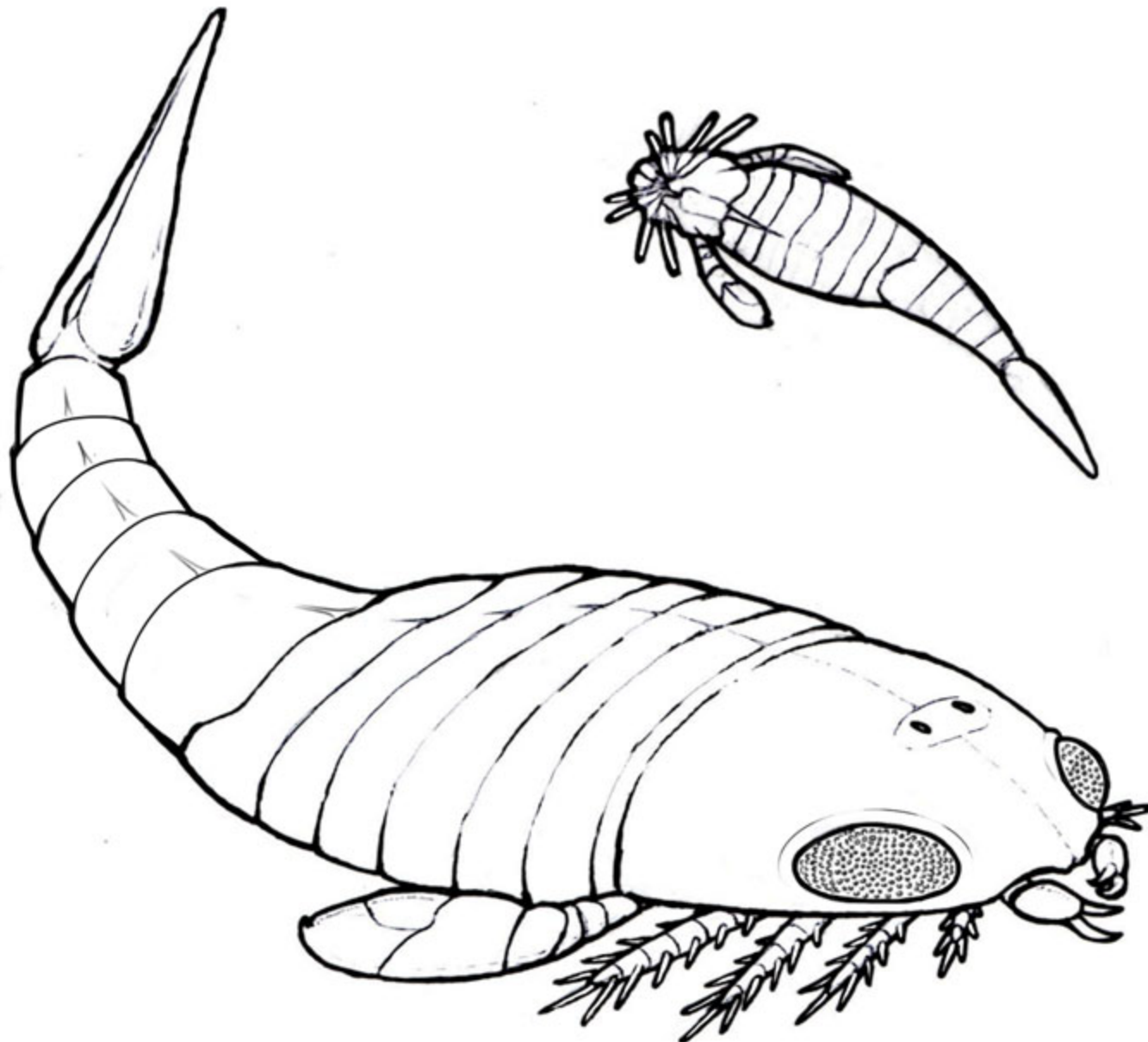
Pycinodesma giganteum

Ancient Bivalve



Hughmilleria shawangunk

Aquatic Arthropod



DEVONIAN PERIOD

420 – 359 MILLION YEARS AGO

The Devonian Period spanned from about 420 to 359 million years ago and is often called the “Age of Fishes” due to the diversity of fish, including early sharks and lobe-finned species. During this period, the first tetrapods appeared. These vertebrates began colonizing land and plant life expanded dramatically, with the formation of the first forests made up of early trees like lycophytes and ferns. A major mass extinction happened near the end of the Devonian. This period is represented by fossils in 30 National Park Service (NPS) units.



DEVONIAN PERIOD

420 – 359 MILLION YEARS AGO

Eleutherokomma reidfordi was a brachiopod that lived in shallow waters. Fossils have been found at Death Valley National Park, California and Nevada¹⁰.

Hudsonaster wardii was a sea star that lived in warm shallow water and was very similar to modern sea stars. Fossils have been found at Delaware Water Gap National Recreation Area, New Jersey and Pennsylvania⁹.

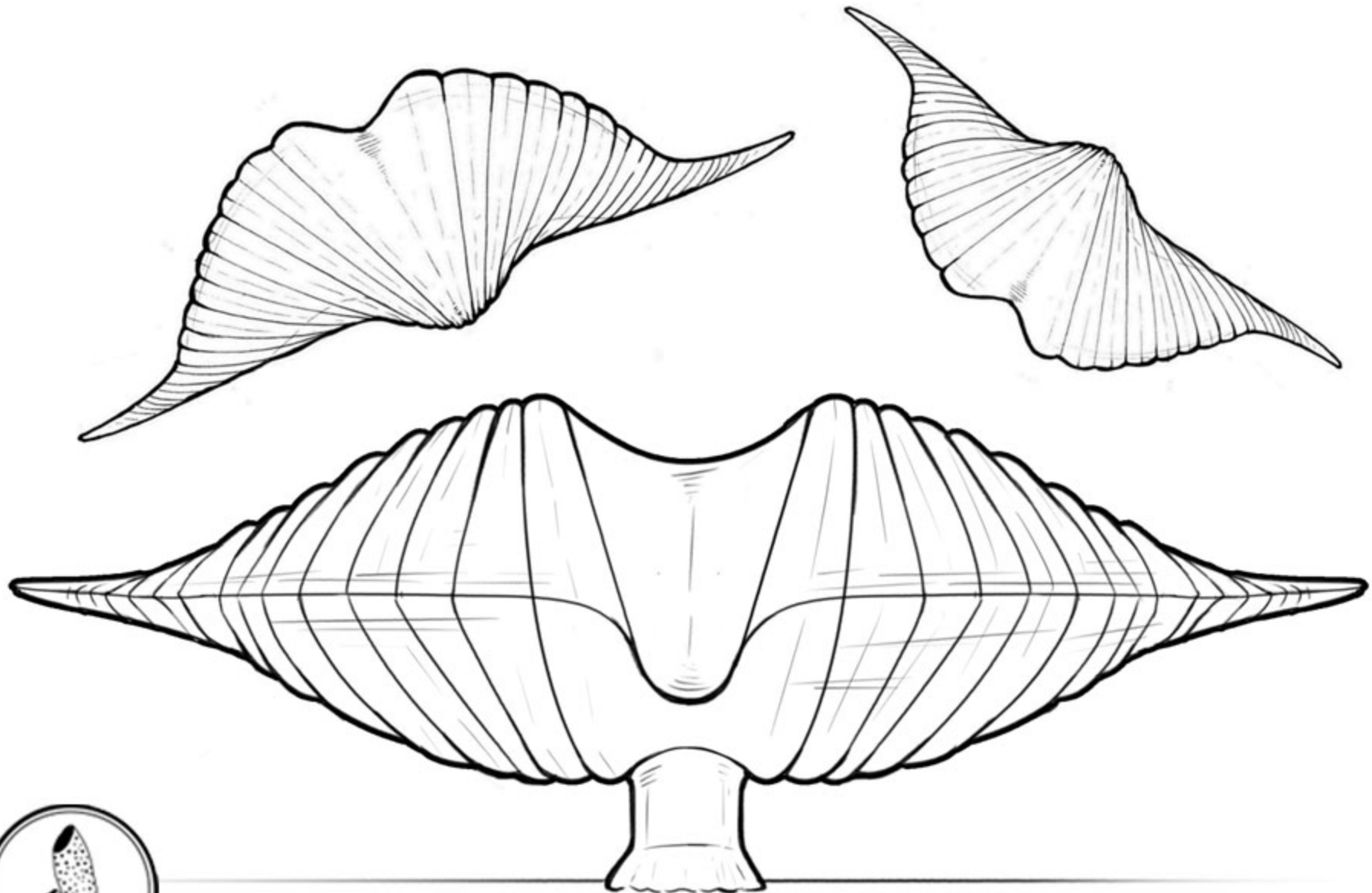
The ancient **Devonian reef** at the Falls of the Ohio is one of the largest and best-preserved Devonian reefs in the world, with many species of sponges, corals, bryozoans, brachiopods, snails, and others. It is visible on the Lewis & Clark National Historic Trail, at the Ohio Coral Reef (Falls of the Ohio) National Natural Landmark, Indiana and Kentucky^B.

Archaeopteris sp. was a very early tree with fern-like leaves. Fossils have been found at Chesapeake & Ohio Canal National Historical Park, District of Columbia, Maryland, and West Virginia⁷, and at Upper Delaware Scenic & Recreational River, New York and Pennsylvania¹⁸.

Panamintaspis snowi was a jawless fish with a bony headshield. Fossils have been found at Death Valley National Park, California and Nevada¹⁰.

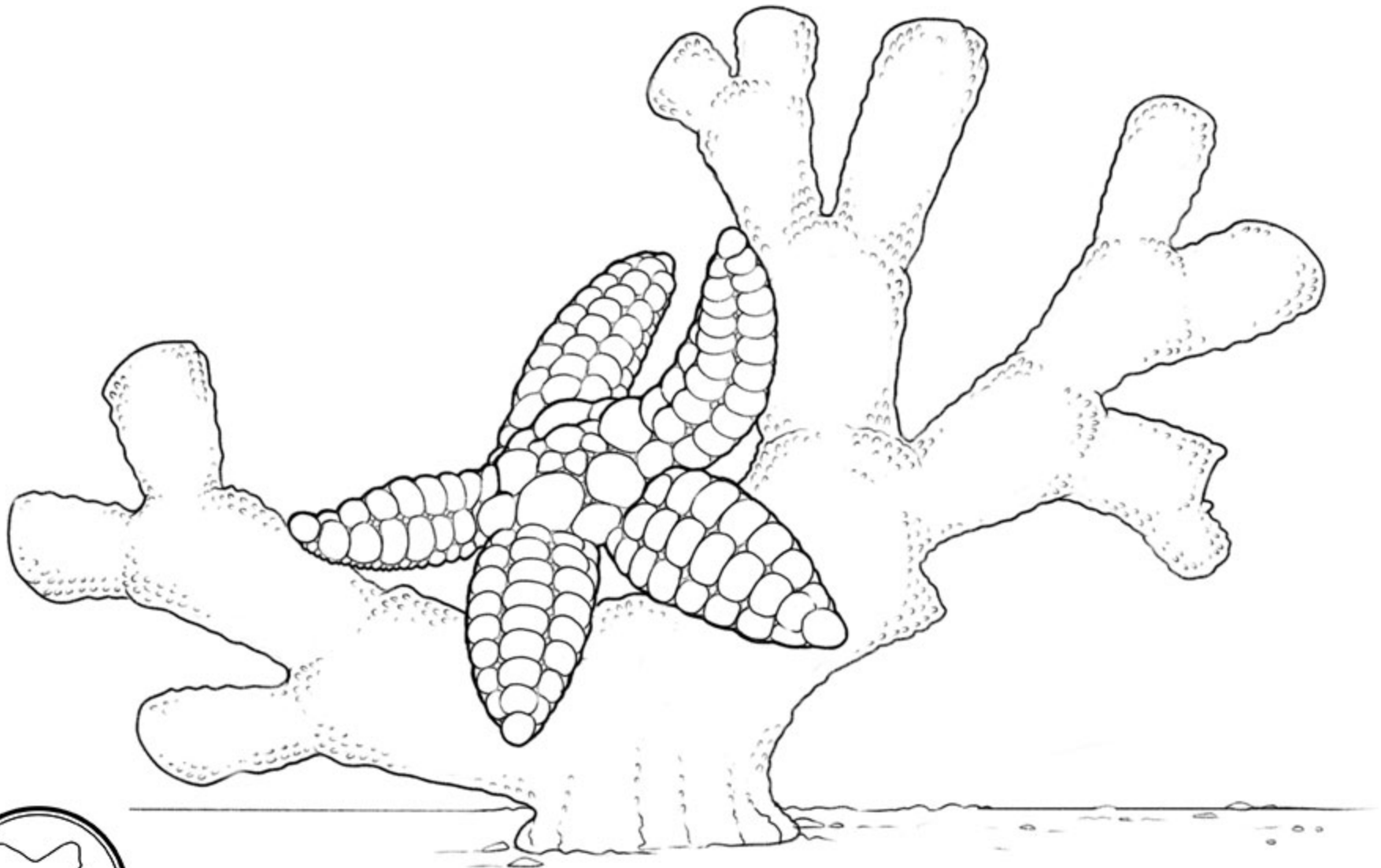
Eleutherokomma reidfordi

Brachiopod



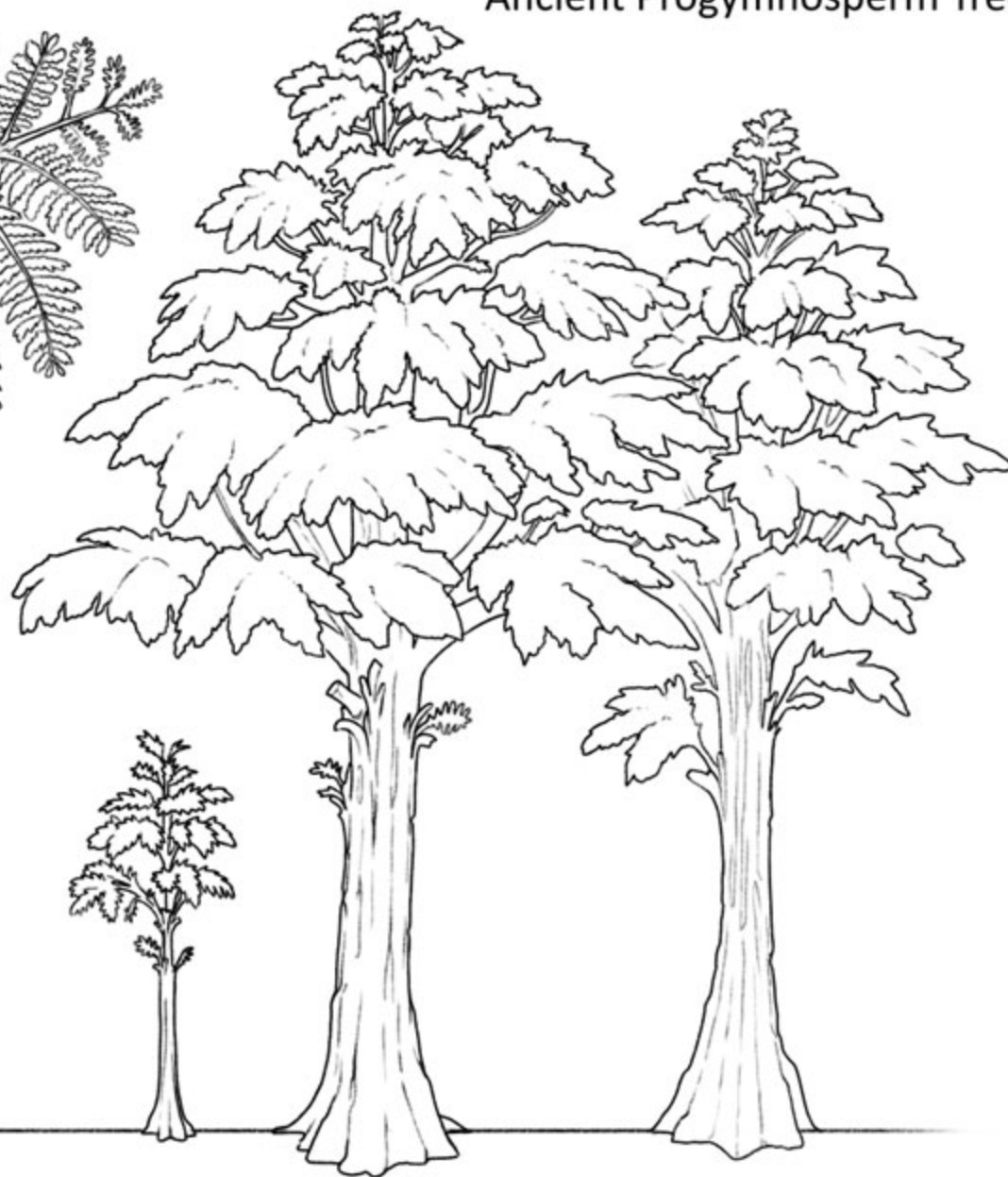
Hudsonaster wardi

Ancient Sea Star



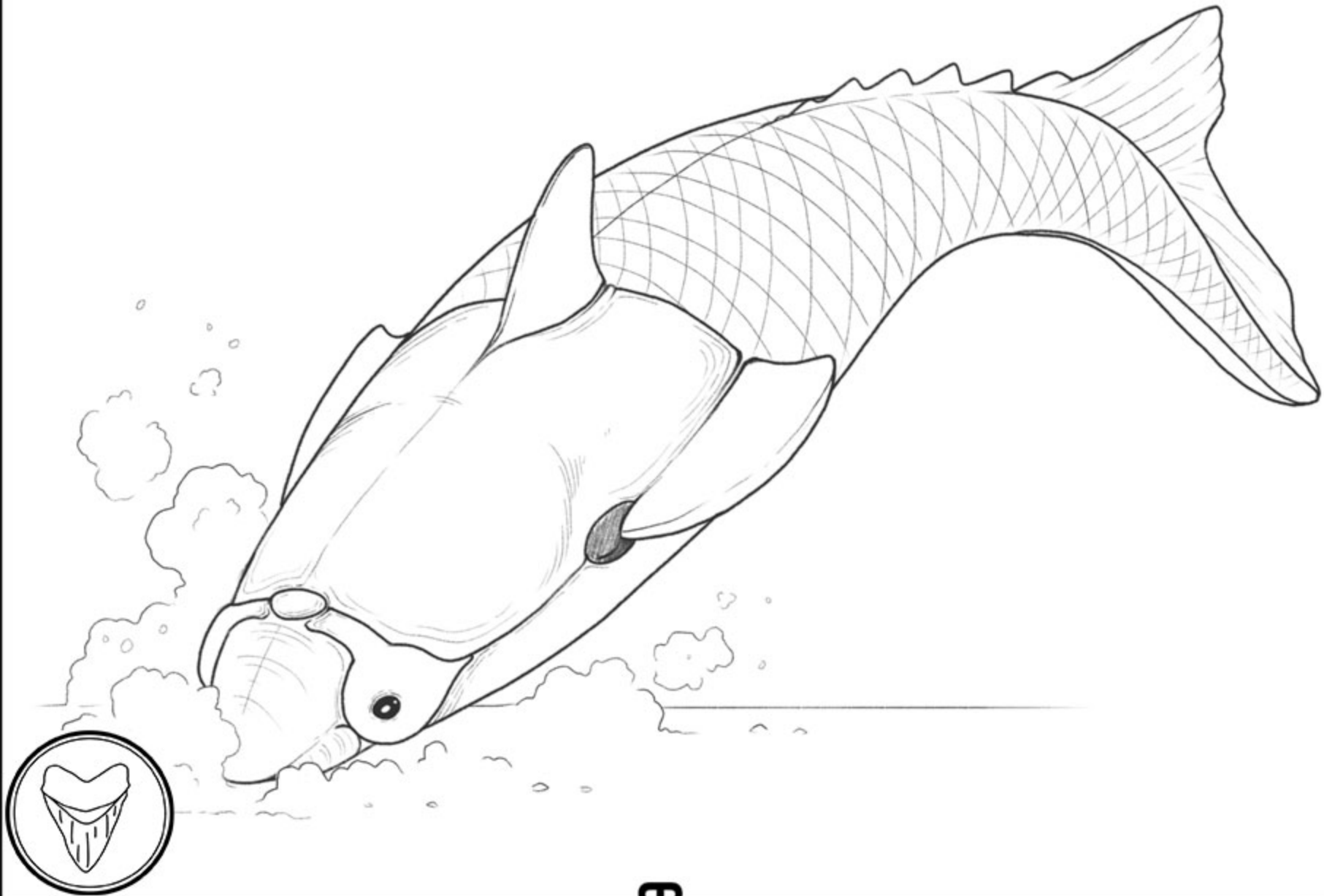
Archaeopteris sp.

Ancient Progymnosperm Tree



Panamintaspis snowi

Armored Jawless Fish



Ohio Coral Reef (Falls of the Ohio) - INDIANA & KENTUCKY

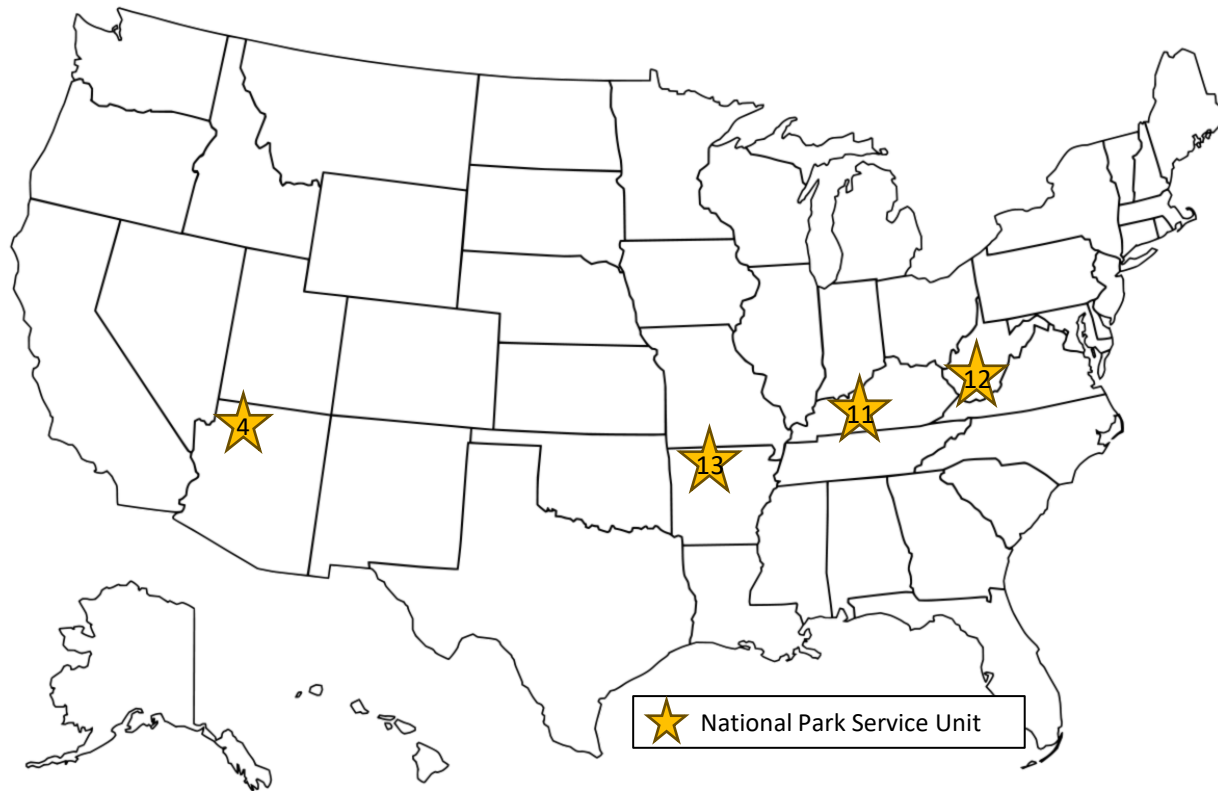
Ancient Devonian Reef



MISSISSIPPIAN PERIOD

359 – 323 MILLION YEARS AGO

The Mississippian Period lasted from about 359 to 323 million years ago and was a time of shallow seas that supported rich marine ecosystems dominated by crinoids, brachiopods, and corals. On land, dense forests of seed ferns and giant clubmosses thrived in warm, humid climates. This period is represented by fossils in 39 National Park Service (NPS) units.



MISSISSIPPIAN PERIOD

359 – 323 MILLION YEARS AGO

Helodus simplex was an early cartilaginous fish with fused jaws and specialized fins, related to the modern ratfish. It is mainly known from fossilized tooth plates. Fossils have been found at Grand Canyon National Park, Arizona⁴.

Saivodus striatus was a shark known for its long dorsal spines and narrow-crowned teeth. Fossils have been found at Mammoth Cave National Park, Kentucky¹¹.

Lepidodendron sp. was a giant prehistoric plant that looked like a scaly tree with thick, rough bark. Fossils have been found at Mammoth Cave National Park, Kentucky¹¹, and New River Gorge National River, West Virginia¹².

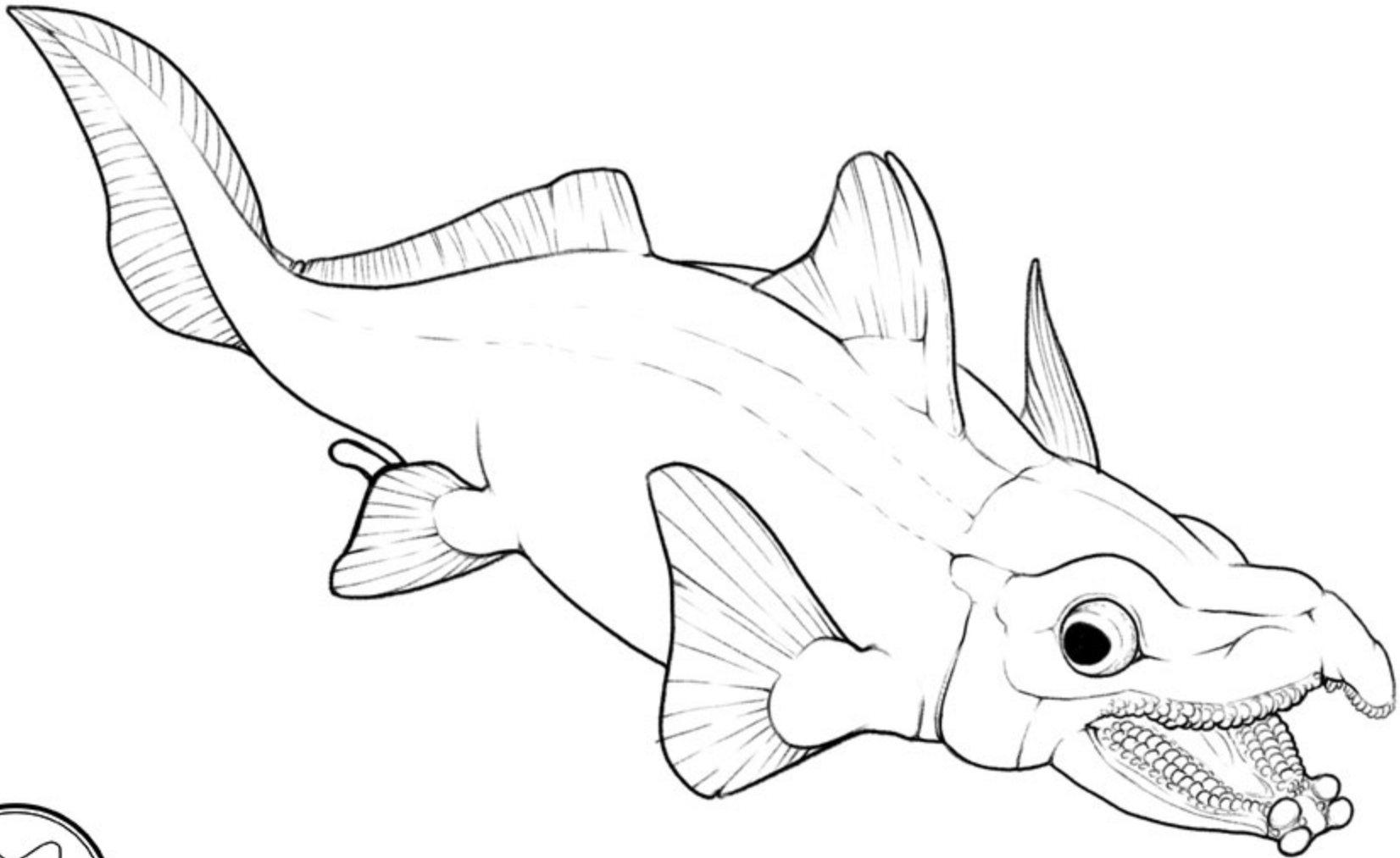
Amaradontus santuccii was a small shark recognized by its uniquely shaped teeth. Fossils have been found at Grand Canyon National Park, Arizona⁴.

Archimedes sp. was a bryozoan known for its spiral shape. Fossils have been found at Buffalo National River, Arkansas¹³, and Mammoth Cave National Park, Kentucky¹¹.

Pentremites sp. was a blastoid, a type of extinct echinoderm related to sea stars that had a body on a stalk and filtered food out of the water. Fossils have been found at Mammoth Cave National Park, Kentucky¹¹.

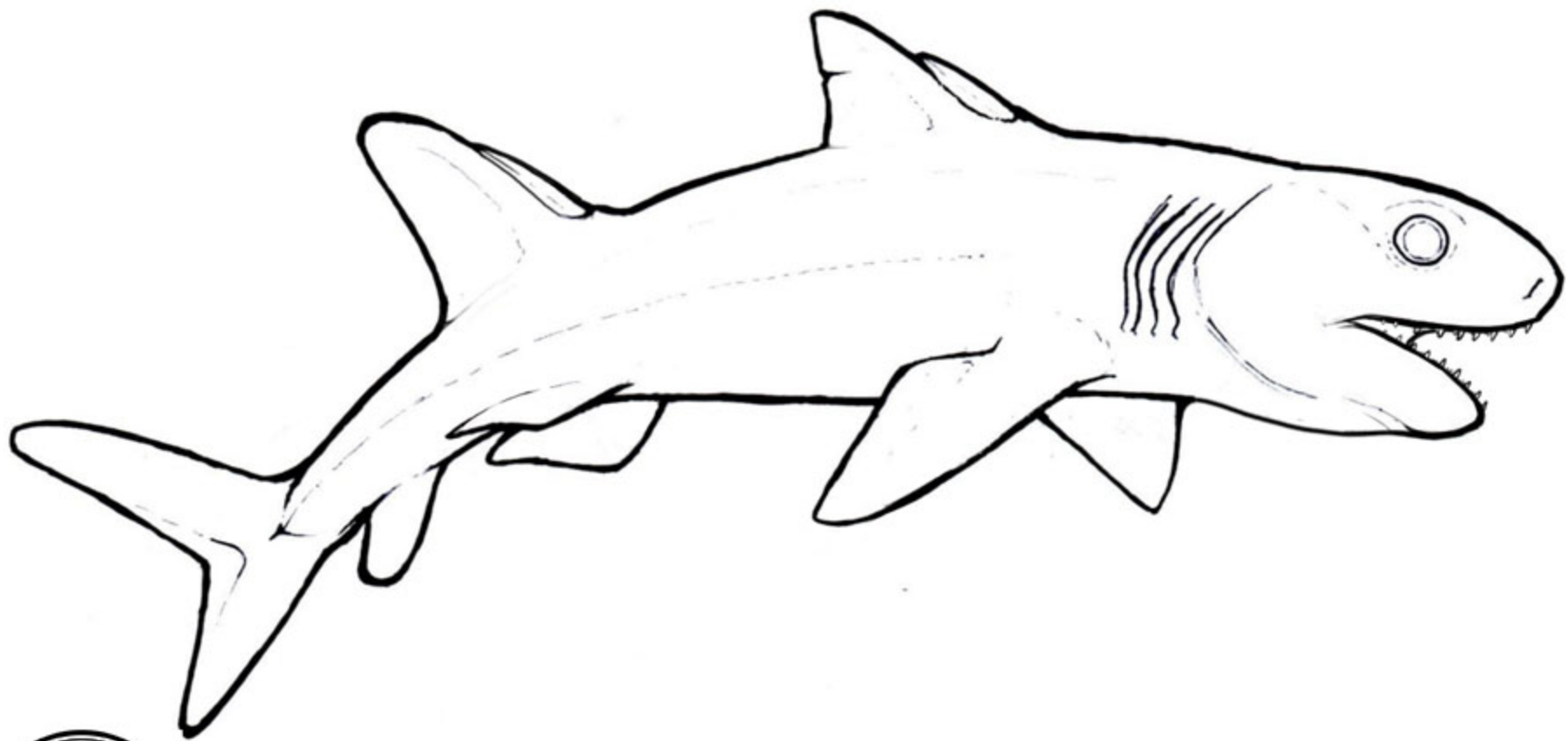
Helodus simplex

Ancient Ratfish



Saivodus striatus

Ancient Shark



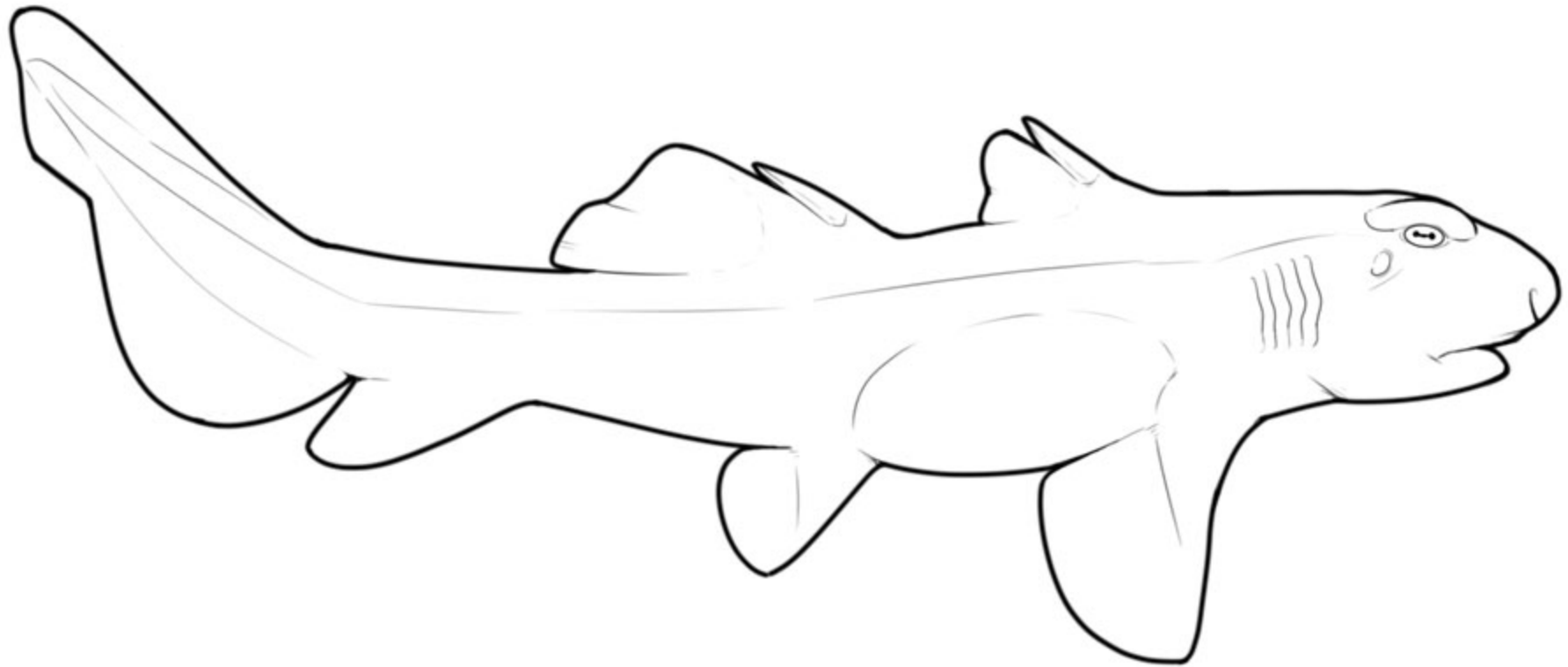
Lepidodendron sp.

Scale Tree



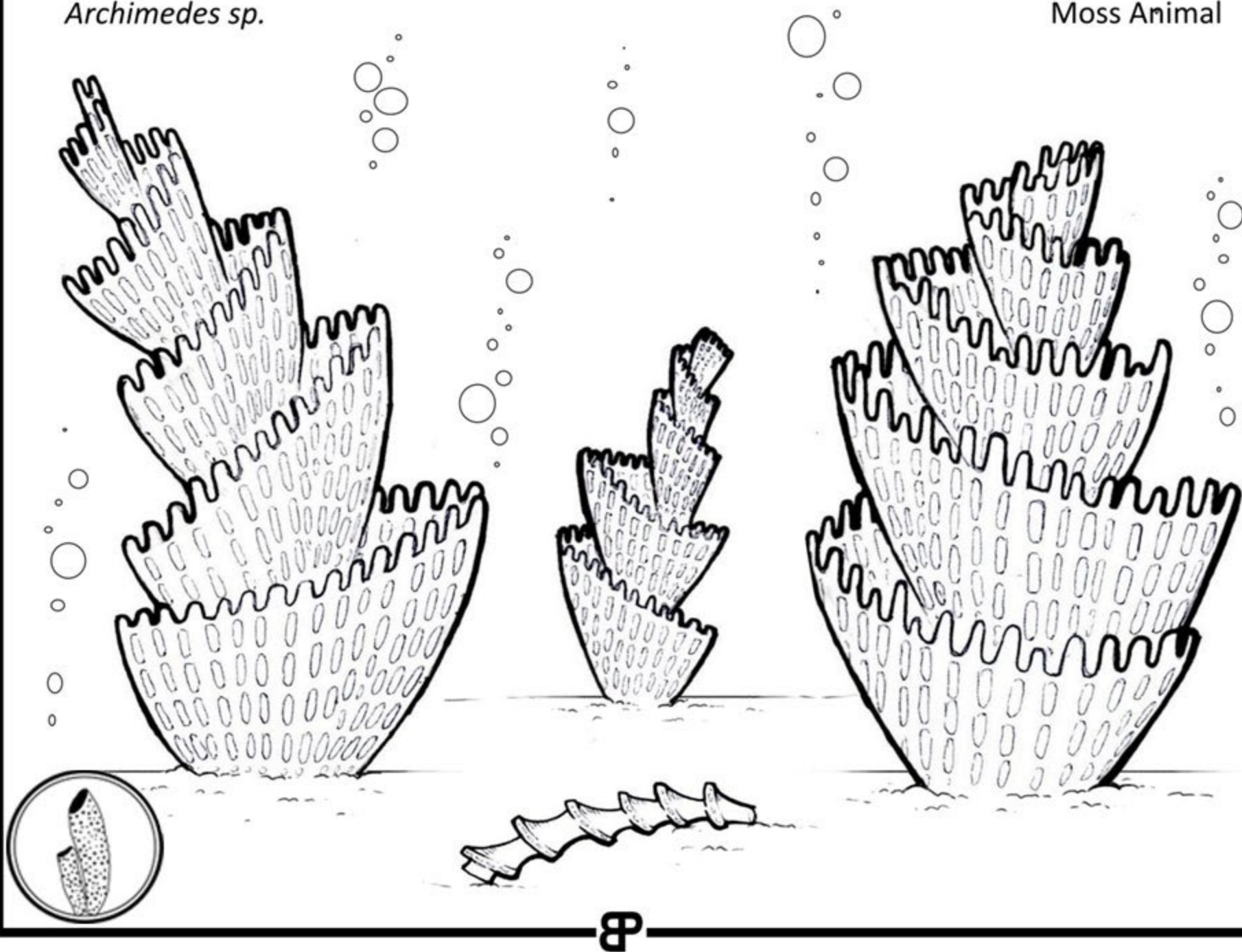
Amaradontus santuccii

Ancient Shark



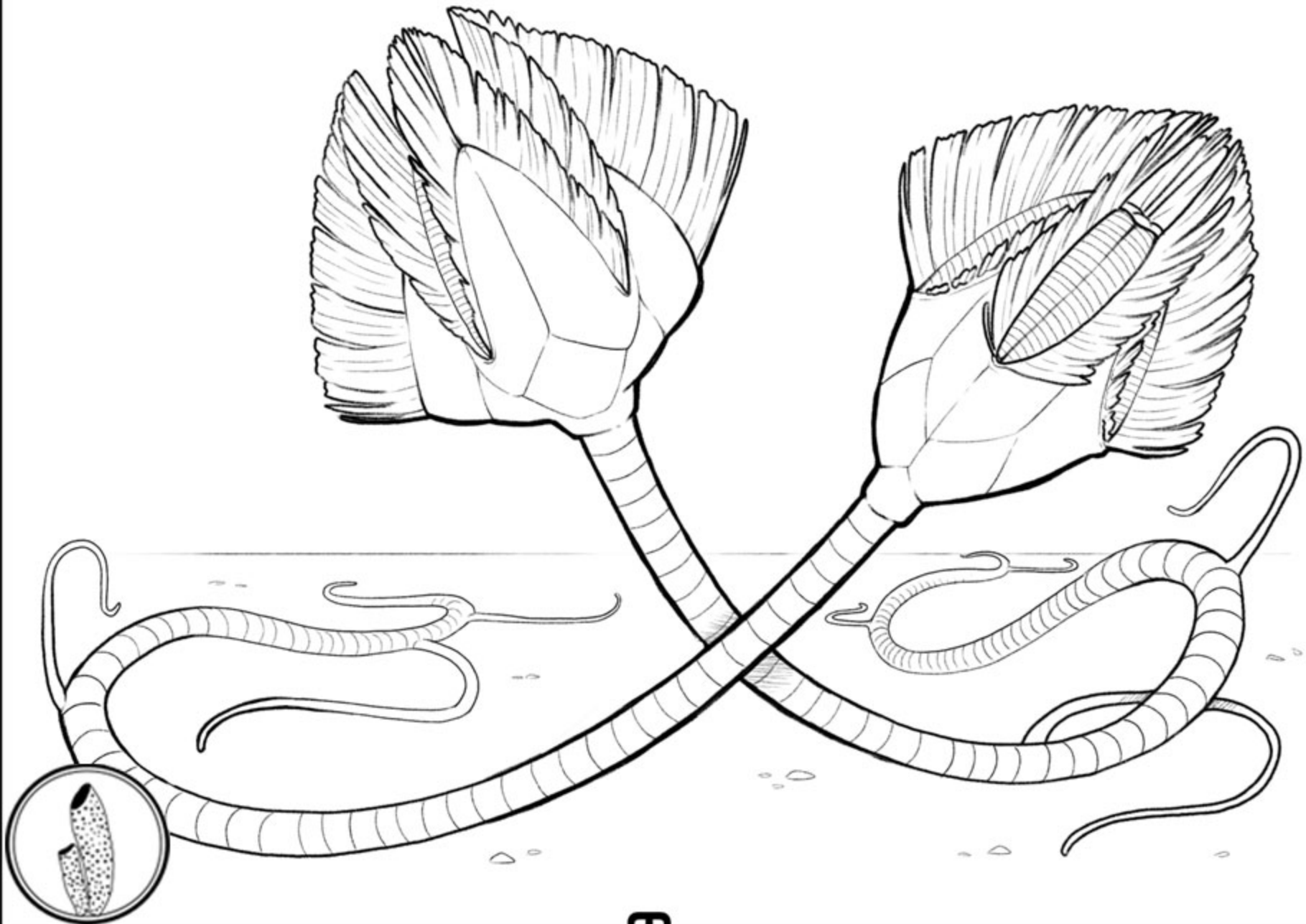
Archimedes sp.

Moss Animal



Pentremites sp.

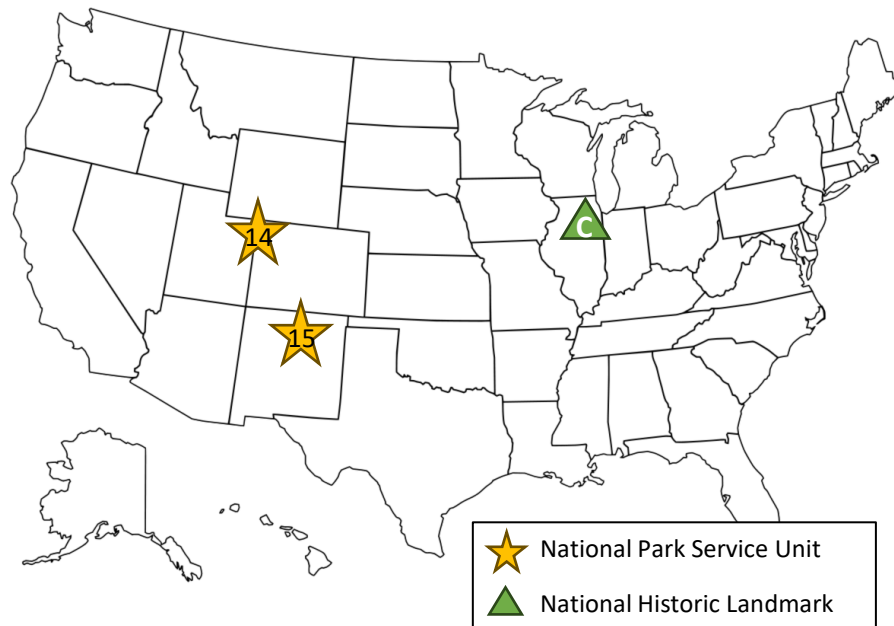
Blastoid Animal



PENNSYLVANIAN PERIOD

323 – 299 MILLION YEARS AGO

The Pennsylvanian Period spanned from about 323 to 299 million years ago and is known for its swampy forests that led to the formation of large coal deposits in North America. Dense vegetation, including tree-sized ferns and lycophytes, dominated the landscape. This period also saw diversification of insects and the rise of the first reptiles. This period is represented by fossils in 40 National Park Service (NPS) units.



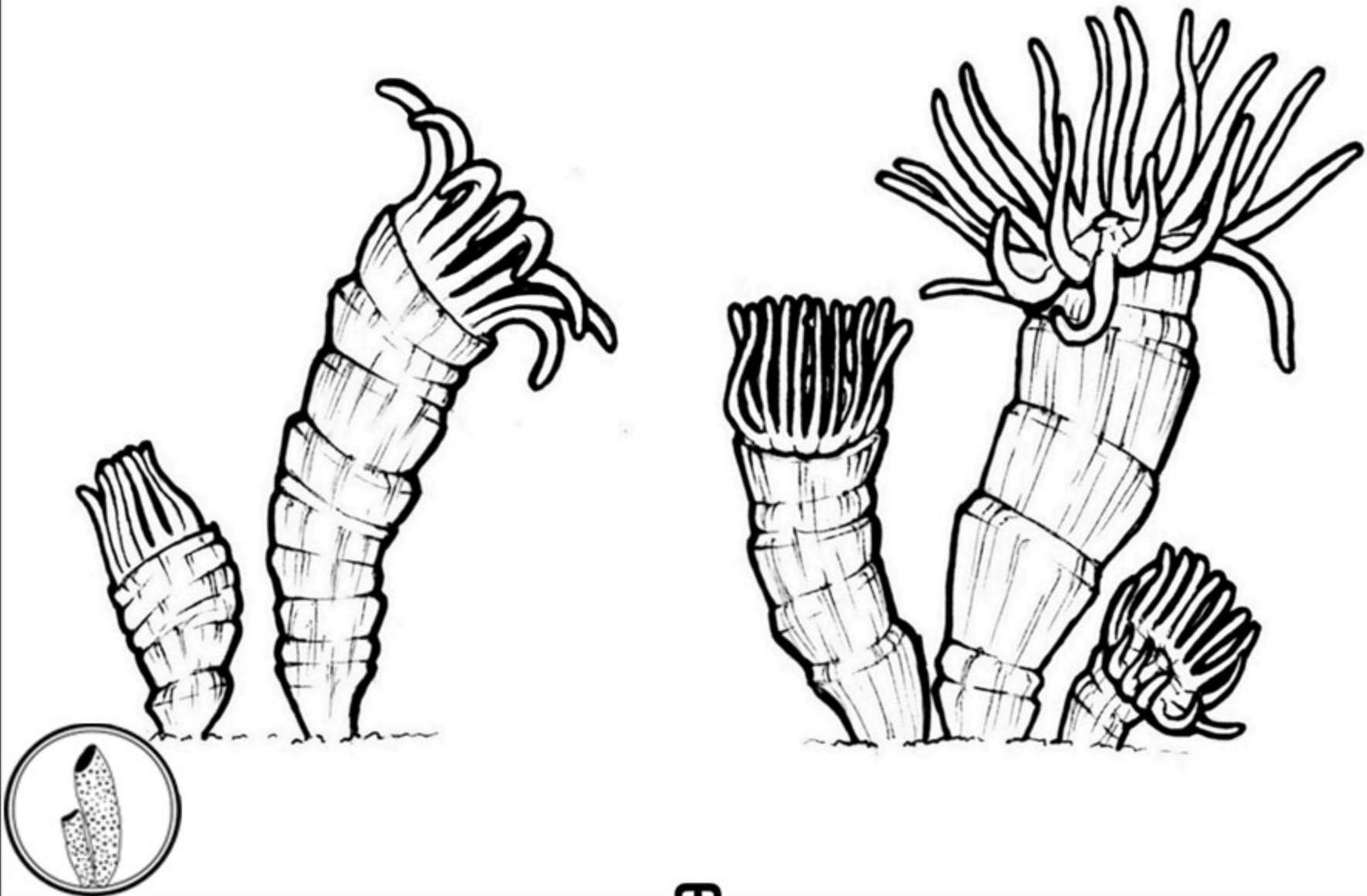
Barytichisma zaphrentiforme was a horn coral. Fossils of this coral have been found at what is now Dinosaur National Monument, Colorado and Utah¹⁴. These corals were the first kind of fossils described here, long before it's fame for dinosaur discoveries.

Tullimonstrum gregarium also known as the Tully Monster, was an extinct marine animal that lived in shallow waters. Despite years of study, its exact classification is not known. Fossils are found at Mazon Creek National Historic Landmark, Illinois^C.

Walchia was an ancient tree with needle-like leaves that grew in swampy forests, the preferred habitat for ***Eryops***, a sturdy amphibian, and ***Sphenacodon***, a reptile-like animal related to mammals. Fossils of all three are present at Pecos National Historic Park, New Mexico¹⁵.

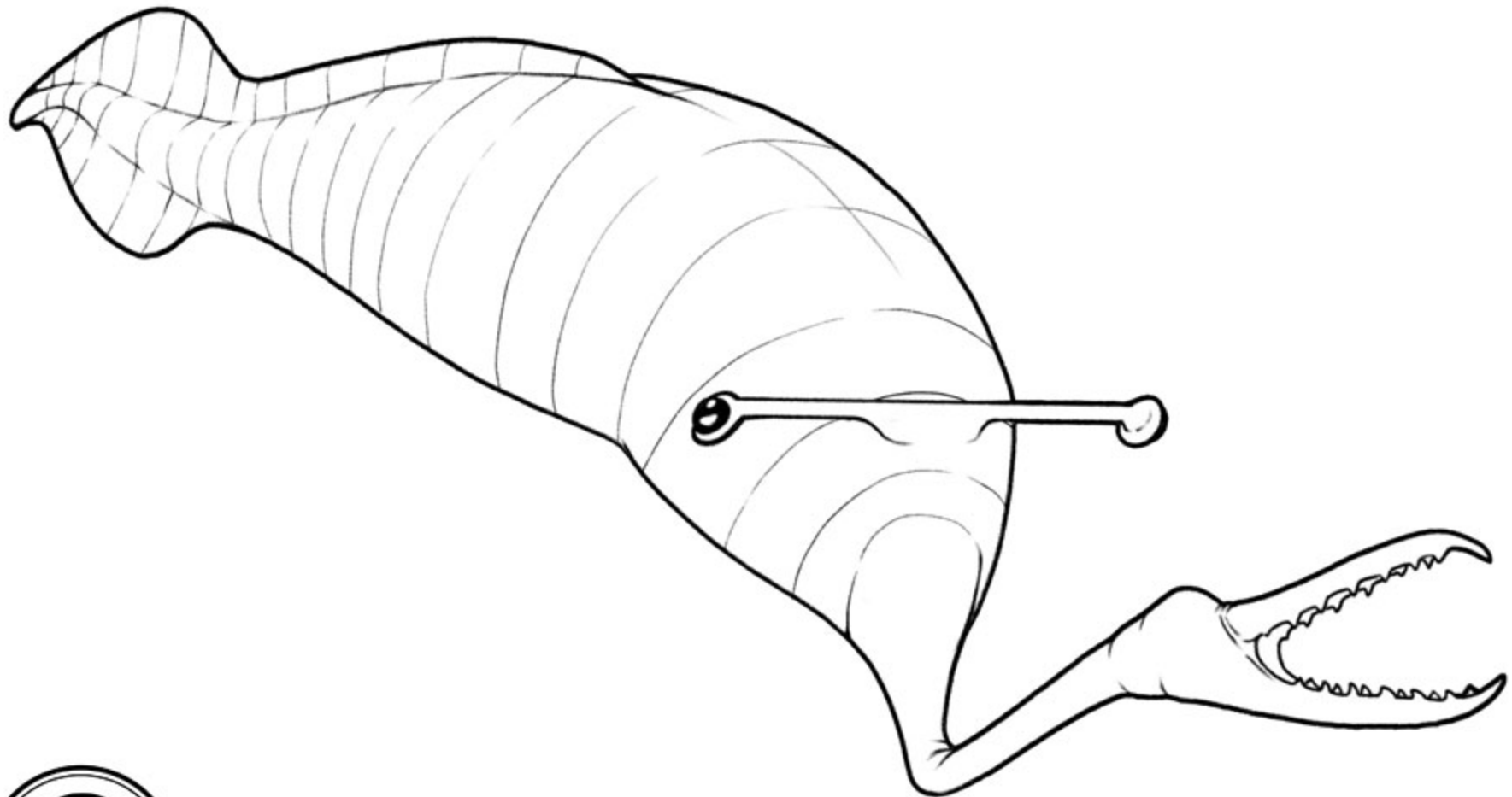
Barytichisma zaphrentiforme

Horn Coral



Tullimonstrum gregarium

Tully Monster

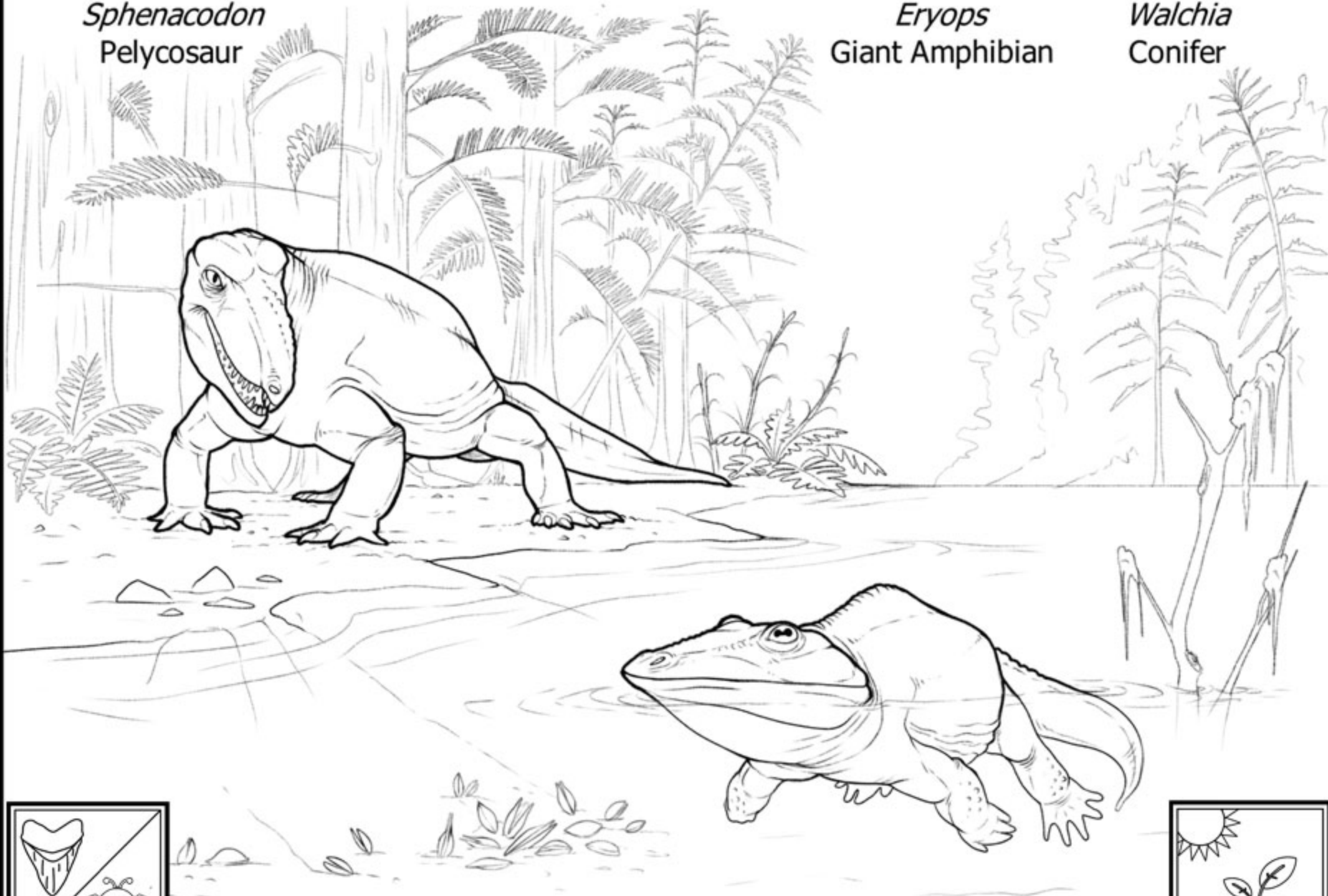


NPS Paleontology

Sphenacodon
Pelycosaur

Eryops
Giant Amphibian

Walchia
Conifer



PERMIAN PERIOD

299 – 252 MILLION YEARS AGO

The Permian Period lasted from about 299 to 252 million years ago and marked the final chapter of the Paleozoic Era. During this time, Earth's continents joined to form the supercontinent Pangaea. Reptiles diversified and early mammal-like reptiles, or synapsids, became dominant on land. The period ended with the largest mass extinction in Earth's history, wiping out around 90% of marine species and 70% of terrestrial species, paving the way for the Mesozoic Era. This period is represented by fossils in 36 National Park Service (NPS) units.

The Permian reef at Guadalupe Mountains National Park, Texas¹⁶ contains fossils of bryozoans (*Rhombopora* & *Acanthocladia*), brachiopods (*Marginifera*), bivalves (*Girtypecten*), gastropods (*Bucanopsis*), echinoids (*Archaeocidaris*), and sharks (*Helicoprion*).



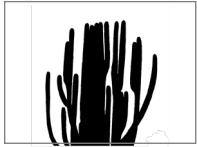
Tupus whitei was an early dragonfly that had a wingspan around 12 inches. Fossils have been found at Grand Canyon National Park, Arizona⁴.

Supaia merriami was a fern-like plant that lived in both dry and muddy environments. Fossils have been found at Grand Canyon National Park, Arizona⁴.

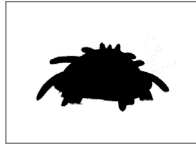
Cooperoceras texanum was a marine cephalopod with a tightly coiled, spiny shell shaped like a ram's horn. Fossils have been found at Guadalupe Mountains National Park, Texas¹⁶.

***Varanops* (?)** was a protomammal about the size of an iguana. Fossils have been found at Salinas Pueblo Missions National Monument, New Mexico¹⁷.

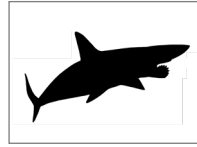
FIND THESE REEF RASCALS!



Rhombopora



Marginifera



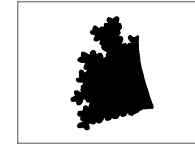
Helicoprion



Archaeocidaris



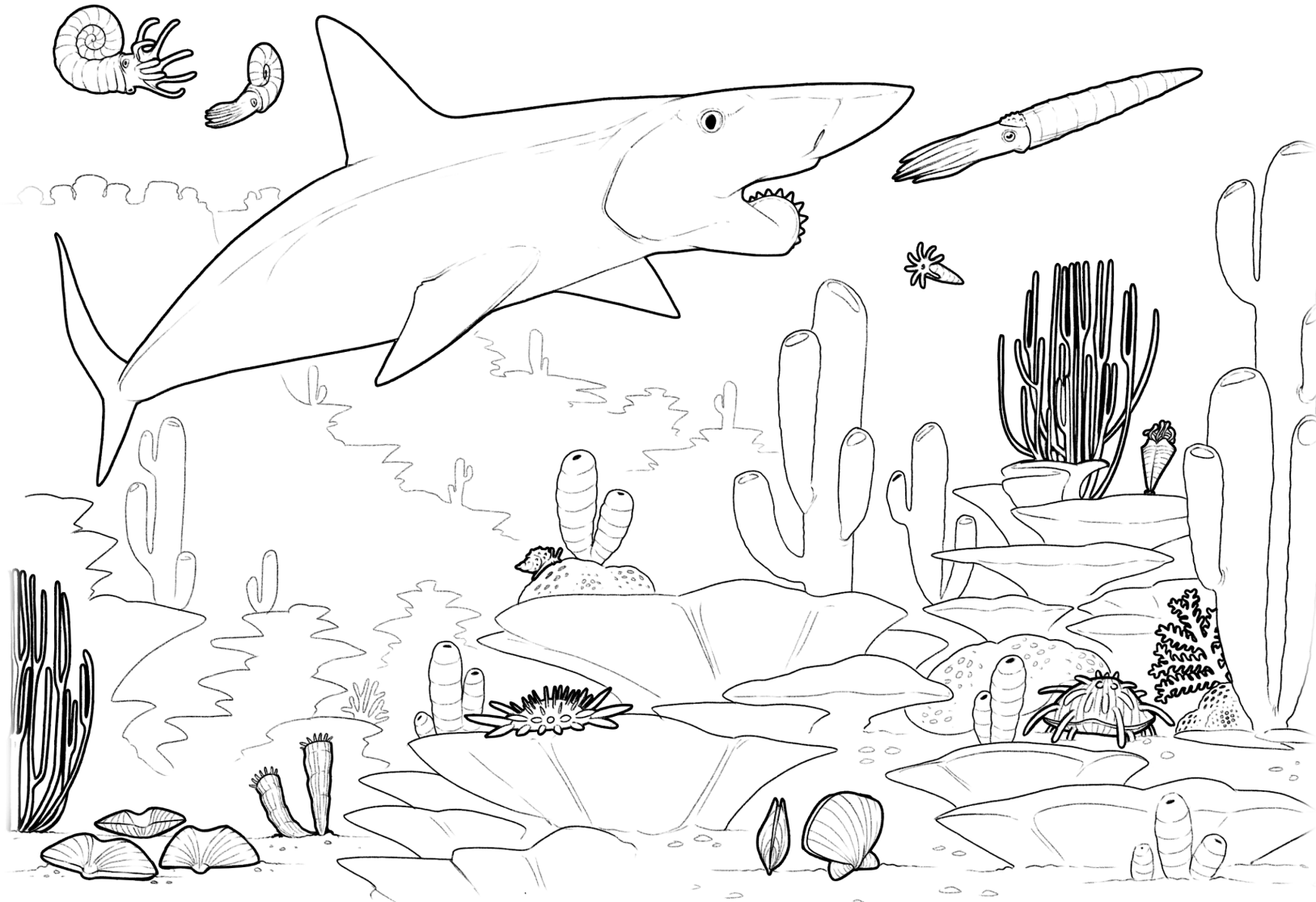
Bucanopsis



Acanthocladia

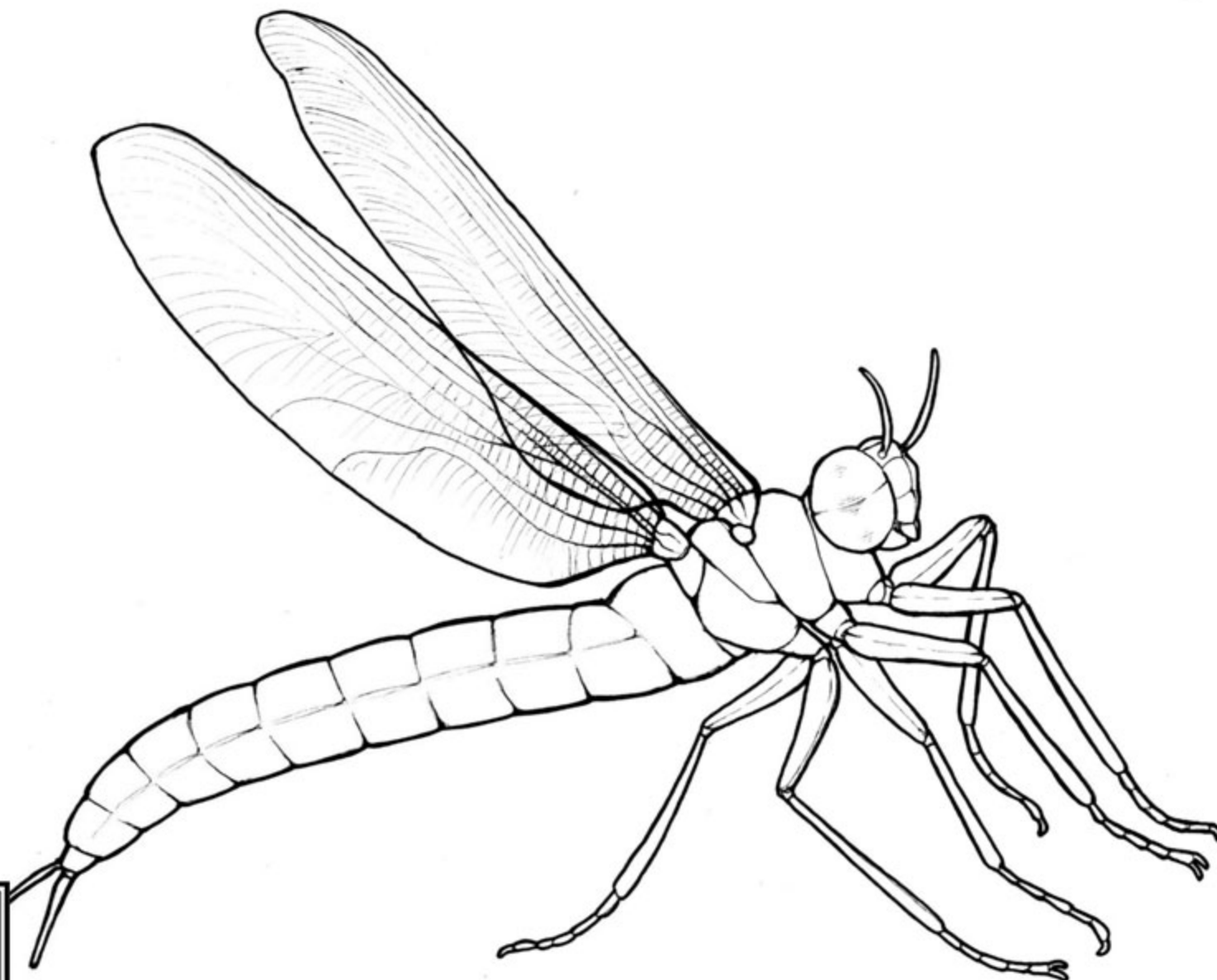


Girtypecten



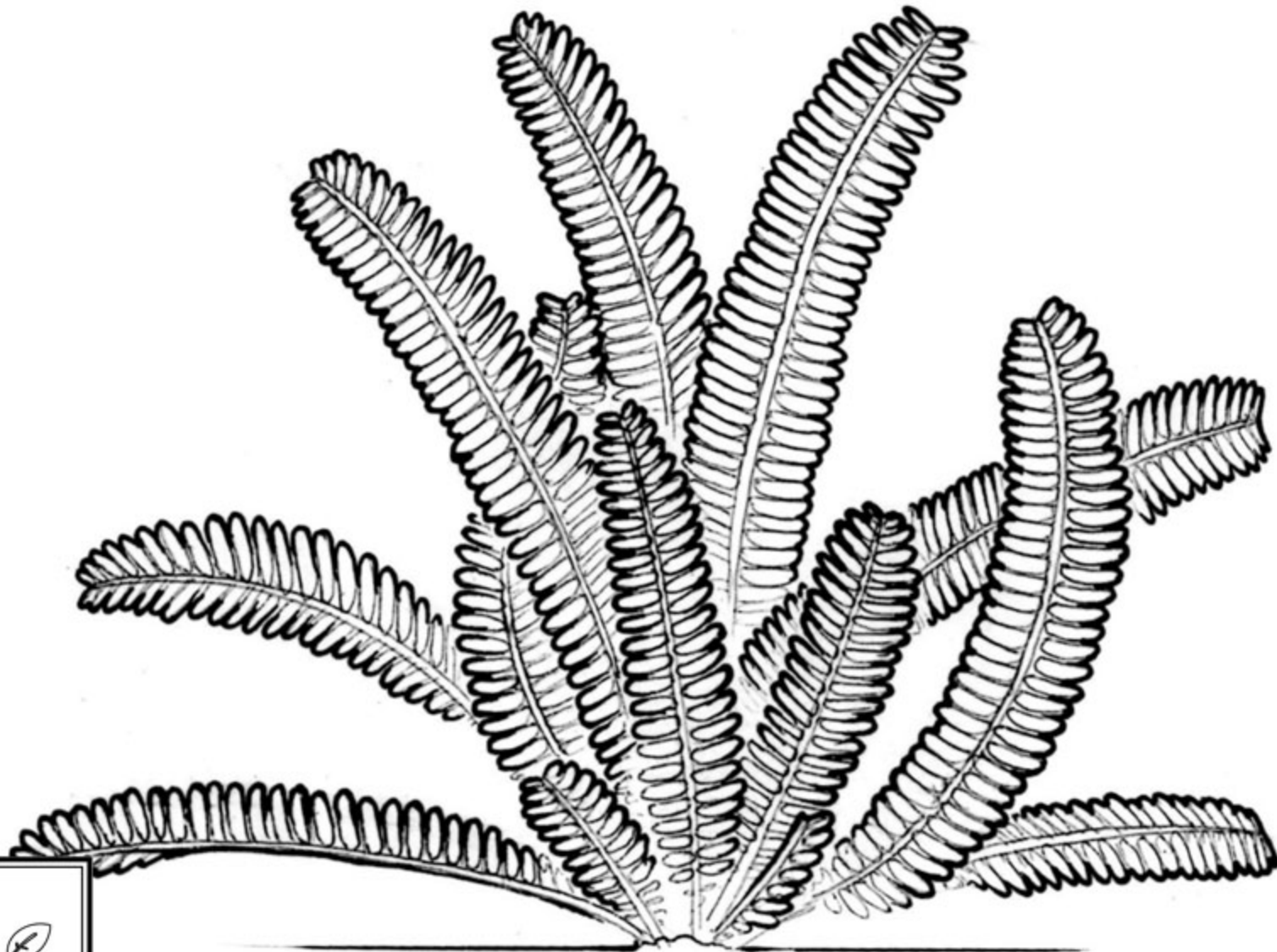
Tupus whitei

Dragonfly



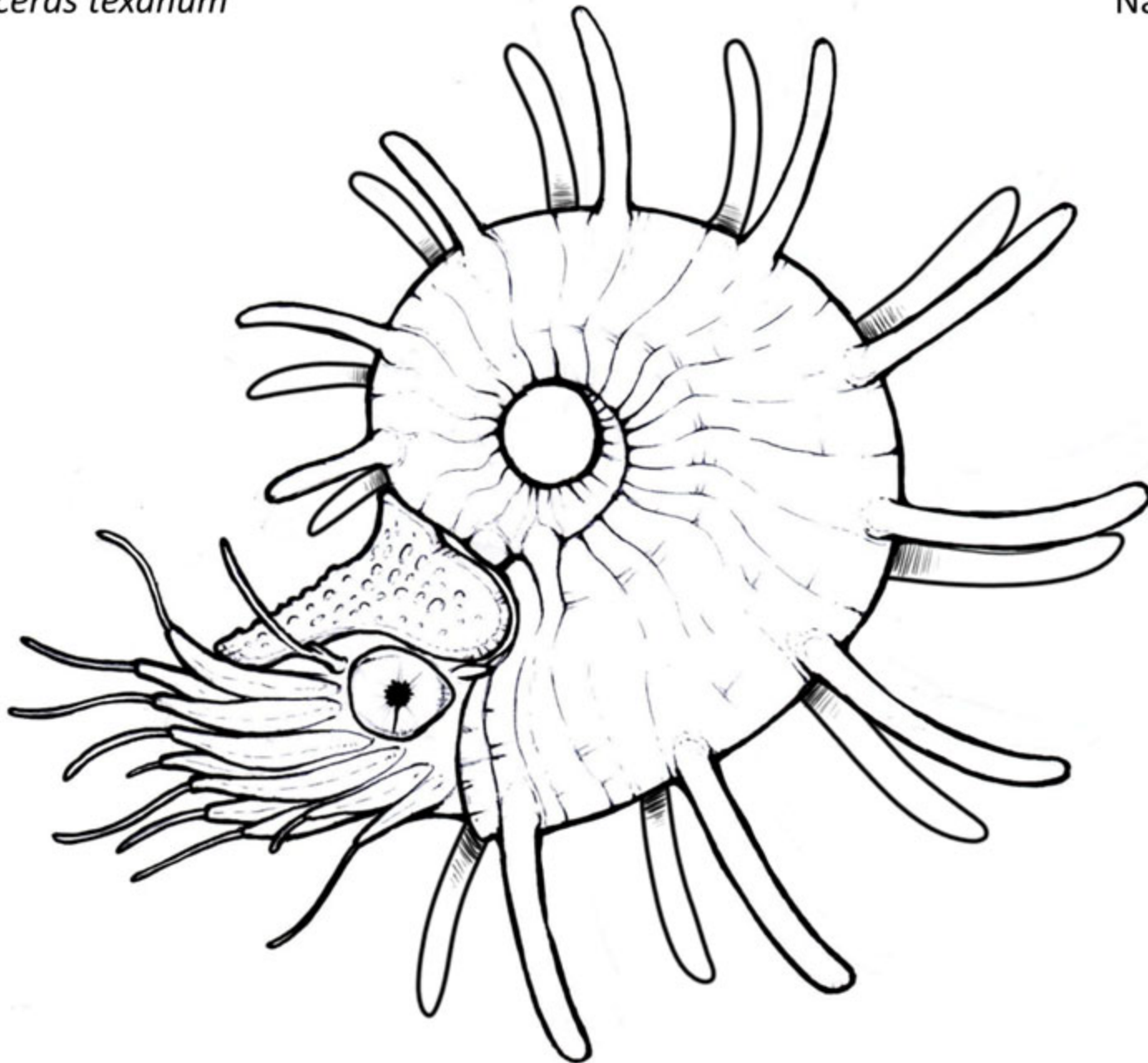
Supaia merriami

Fern-like Plant



Cooperoceras texanum

Nautiloid



Varanops (?)

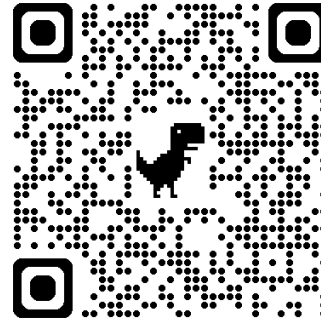
Late Pelycosaur





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This Paleozoic Life in the National Parks Coloring Book is a collaborative project between the National Park Service (NPS) Paleontology Program, the American Geosciences Institute (AGI), and the Paleontological Society (PS). The NPS, AGI, and PS share a vision and are committed to inspiring children, of all ages, to embrace science and stewardship through their interests in dinosaurs and other prehistoric life.

Content, Design, and Layout: Vincent L. Santucci, Justin Tweet, and Alysha Zazubec.

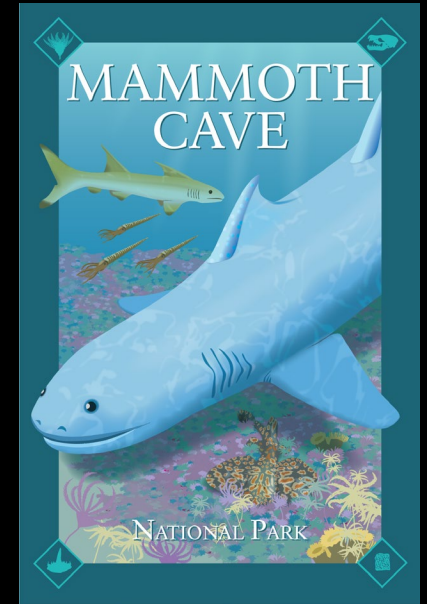
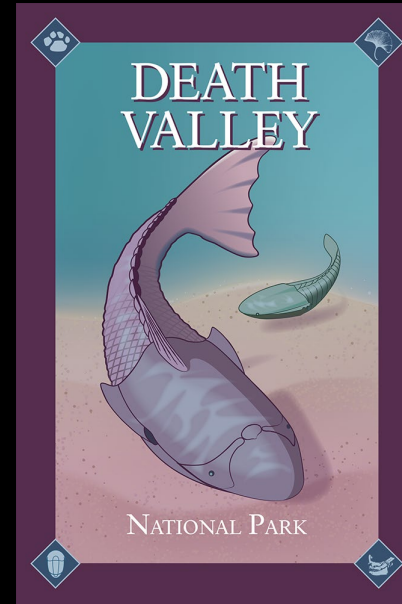
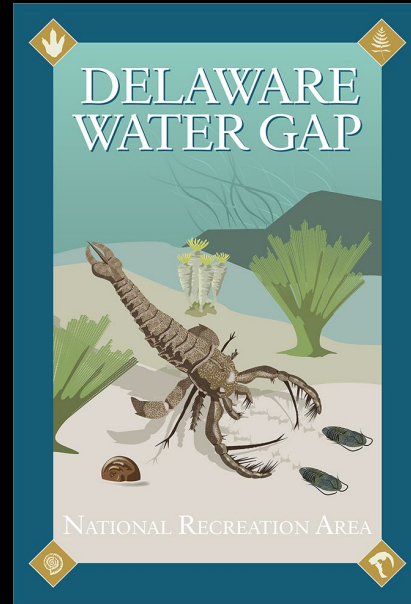
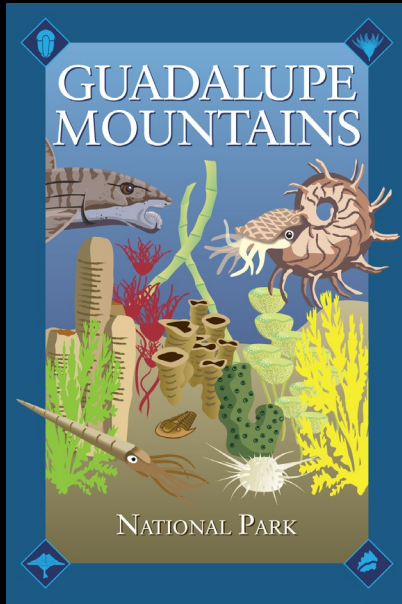
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Technical Review: J.P. Hodnett, Justin Tweet, and Christy Visaggi.

Website Development: Jim Wood

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PALEOZOIC LIFE IN THE NATIONAL PARKS COLORING BOOK



Also featuring the following NPS units:

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Yellowstone National Park, WY, ID, & MT.
Mojave National Preserve, CA.
Grand Canyon National Park, AZ.
Chickasaw National Recreation Area, OK.
Mississippi National River and Recreation Area, MN.
Chesapeake & Ohio Canal National Historical Park, DC, MD, & WV.
Chazy Fossil Reef National Natural Landmark, NY, & VT.

Glacier Bay National Park & Preserve, AK.
Falls of the Ohio National Wildlife Conservation Area, KY.
New River Gorge National River, WV.
Buffalo National River, AR.
Dinosaur National Monument, CO & UT.
Mazon Creek Fossil Beds National Historical Landmark, IL.
Pecos Pueblo, NM.
Salinas Pueblo Missions, NM.
Upper Delaware Scenic River & Recreational River, NY & PA.