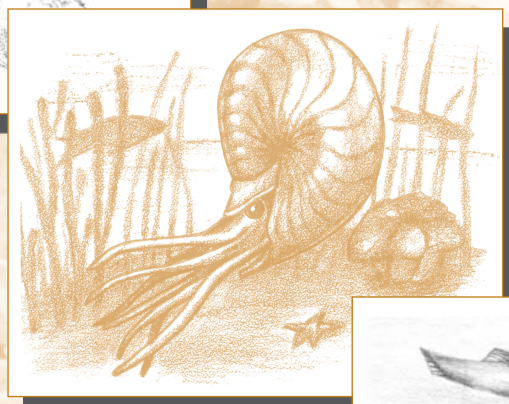
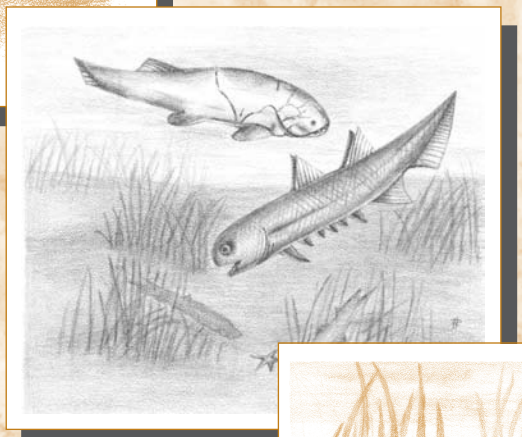
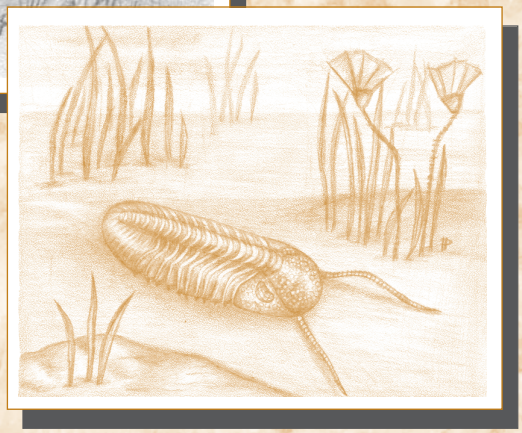
State of Illinois
Illinois Department of Natural Resources

Illinois Fossils







Illinois
Department of
Natural
Resources

Using This Activity Book – For The Educator

The *Illinois Fossils* activity book from the Illinois Department of Natural Resources' (IDNR) Division of Education is designed to supplement your curriculum in a variety of ways. The information and activities contained in this publication are targeted to **grades four through eight**. The *Illinois Fossils* resources trunk and lessons can help you teach about fossils, too. You will find these and other supplemental items through the Web page at http://www.dnr.illinois.gov/education. Contact the IDNR Division of Education at 217-524-4126 or dnr.teachkids@illinois.gov for more information.

Resources

Collinson, Charles. 2002. *Guide for beginning fossil hunters*. Illinois State Geological Survey, Champaign, Illinois. Geoscience Education Series 15. 49 pp.

Frankie, Wayne. 2004. *Guide to rocks and minerals of Illinois*. Illinois State Geological Survey, Champaign, Illinois. Geoscience Education Series 16. 71 pp.

Killey, Myrna M. 1998. *Illinois' ice age legacy*. Illinois State Geological Survey, Champaign, Illinois. Geoscience Education Series 14. 67 pp.

Acknowledgments

Much of the material in this book is adapted from the Illinois State Geological Survey's (ISGS) *Guide for Beginning Fossil Hunters*. Special thanks are given to Charles Collinson, former ISGS geologist, for the use of his fossil illustrations.

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Answers to "It's a Mystery!"

pelecypod; brachiopod; bryozoan; gastropod; crinoid; trilobite

The reasons will vary.

What Are Fossils?

Fossils are the remains or evidence of prehistoric living things. “Prehistoric” refers to the time before events were written down by humans. Living things that died and have parts or evidence remaining from historic times are not considered fossils.

Fossils are preserved in rocks. The oldest fossils in Illinois are from sandstone, limestone and shale rocks. Many of these fossils are impressions (molds) of sea creature shells or of the filling inside the shell (casts). The youngest fossils are the teeth and bones of prehistoric bison, giant beaver, mastodons, mammoths and other Ice Age species in glacial till, and snails in wind-blown silt (loess) deposits. In most fossils, the parts of the dead organisms have been replaced by different materials, although Ice Age fossils are often still the original bone material. Calcium carbonate and silica are substances that may replace the original parts. Trace fossils are footprints, burrows or holes left by animals.

The substrates in which fossils are found were not always rocks. Originally, they were mud or sand. The living thing’s body parts or tracks were left in the mud or sand. As time passed, more layers of mud and/or sand covered the original layers. These layers were compressed into rock, which included the items that were to become fossilized.

Where Can Fossils Be Found In Illinois?

Fossils can be found throughout Illinois. Even gravel in a driveway or rip rap along lake and river banks can be great sources for fossils.

The most famous fossil collecting site in Illinois is the Mazon Creek area near Braidwood. This location in northeastern Illinois is an old coal strip mine. Many fossil ferns, tree leaves and insects have been discovered there.

Other locations where fossils are found in great numbers include rock quarries and cliffs and bluffs along major rivers. Gravel pits yield fossils, as do ditches and other places where the soil is disturbed.

Fossil collecting is a passionate hobby for some people. Many great fossil finds have been made by amateur collectors. If you want to collect fossils, always get permission from the landowner **before** entering the property. Remember that most of these places are dangerous. You should wear proper safety equipment and take people with you. Also, alert other people of where you are going and when you expect to return.

When collecting fossils, take your time. You may see something that many other people have missed. Take care when excavating fossils. They can be very fragile. You do not want to rush the process and break or destroy the item.

Time After Time

When learning about fossils, it's necessary to know a little about geologic time. This time line shows you the major periods in geologic time. On many of the following pages, you'll be asked to use a time line to represent the periods when certain groups of organisms lived.

Geologic Time Scale

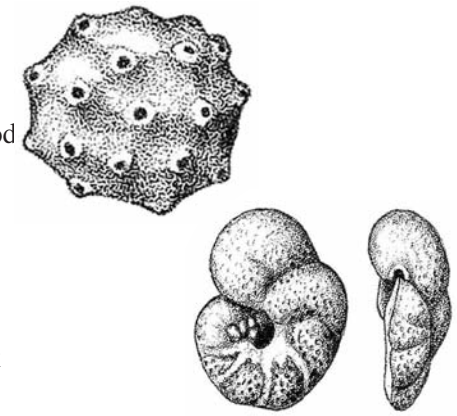
Precambrian & Phanerozoic Eons

Eon		Era	Millions of years ago
Phanerozoic		Cenozoic	66
		Mesozoic	245
		Paleozoic	570
Precambrian	Proterozoic	Late	900
		Middle	1,600
		Early	2,500
	Archean	Late	3,000
		Middle	3,400
		Early	4,600

Phanerozoic Eon
Paleozoic Mesozoic & Cenozoic Eras

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
			Miocene	23.7
			Oligocene	36.6
			Eocene	57.8
			Paleocene	66.4
	Mesozoic	Cretaceous		144
		Jurassic		208
		Triassic		245
	Paleozoic	Permian		286
		Pennsylvanian		320
		Mississippian		360
		Devonian		408
		Silurian		438
		Ordovician		505
		Cambrian		570
		Precambrian		

Foraminifera

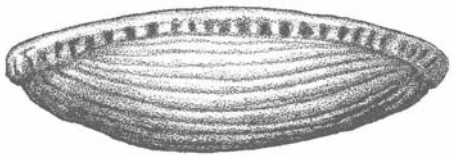


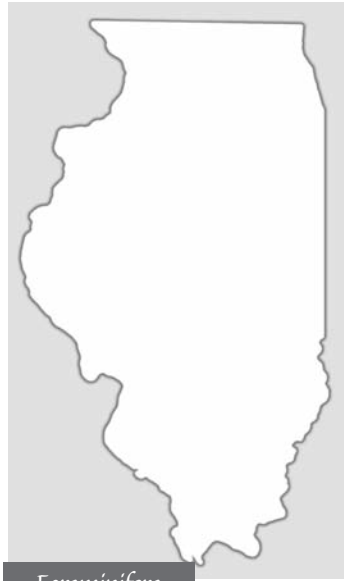
Foraminifera are very tiny, one-celled organisms that can be found as fossils and as species living today. They have a calcium carbonate shell with holes in it. The fossil foraminifera are important to geologists because where they are found, there is a good likelihood that oil will also be found. Their fossils are represented as far back as the Ordovician Period, more than 400 million years ago.

Foraminiferan fossils are common in the bluffs near Alton and in Randolph and Monroe counties. They can also be found in limestone near Anna and Jonesboro. Other types of foraminifera are found in rocks throughout Illinois. These fossils look like grains of wheat. Where they are present, they can be collected by the thousands.

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Now shade in the part of Illinois where these fossils have been found.





Foraminifera

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
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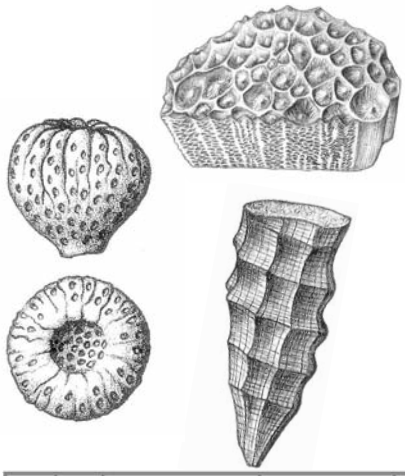
		Ordovician		505
		Cambrian		570
		Precambrian		

Sponges & Corals



Present-day sponges can be found in salt water and fresh water. Fossil sponges in Illinois are the remains of these animals that once lived on the sea floor. They had a hard external skeleton of calcium carbonate or silica. Fossil sponges are commonly found in northern Illinois. The oldest fossil sponges are from Cambrian rocks and are about 500 million years old.

Corals can be found fossilized. They also exist today. These simple animals live on the sea floor. Corals have a hard, external skeleton. Inside the skeleton, the body is divided radially into chambers. Corals today live in colonies of hundreds of individuals. Some fossil corals lived singly. The fossils of solitary corals may look like cushions, horns or tubes, each with a depression in the top. The animal lived in the depression. These are called horn or cup corals. Colonial coral fossils may be either branched or closely packed. Fossil corals can be found throughout Illinois and are common in limestone, shale and sandstone rocks. They are known from as far back as the Ordovician time period.

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
			Miocene	23.7
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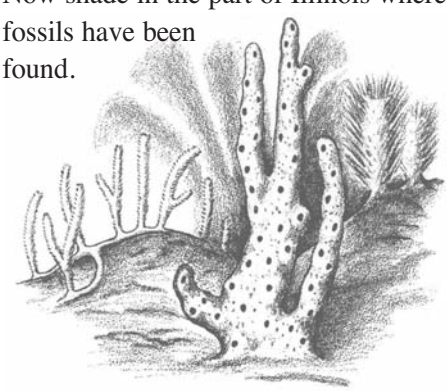
		Mississippian		360
		Devonian		408
		Silurian		438
		Ordovician		505
		Cambrian		570
		Precambrian		

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Use a different color to represent sponges and corals. Fill in the boxes with your color key. Now shade in the part of Illinois where these fossils have been found.



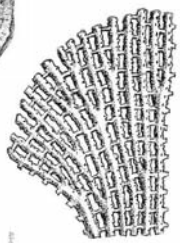
Sponges

Corals

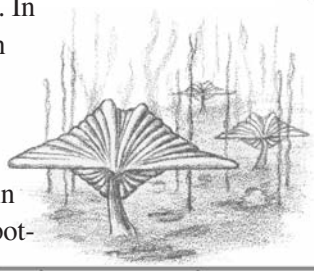
❑ Sponges

❑ Corals

Bryozoans & Brachiopods



Bryozoans live in colonies attached to the ocean floor or to objects found there. These tiny animals have hard skeletons of calcium carbonate. Each skeleton is covered with small holes, where the animals live. Bryozoan colonies grow in a variety of shapes: mound-shaped; lacy; tree-shaped; and screw-shaped centers with lacy fronds attached. Bryozoan fossils are very common throughout Illinois in shale and limestone rocks. In some places, their skeletons make up entire areas of limestone. The oldest bryozoan fossils are found in Cambrian rocks that are more than 500 million years old.



Brachiopods are also marine animals. They have an upper and a lower shell. These hard shells can be made of lime, phosphate and other hard substances. They range in size from about one-fourth inch to several inches long. Most of them attach to the bottom with a fleshy stalk that extends from the soft body inside the shell. Others either attach directly to the sea floor or situate themselves in mud or sand. Some may use spines to anchor themselves. Brachiopods are not common in oceans today, but they once were the most abundant shellfish. Brachiopod fossils are found throughout Illinois. They are preserved in especially good condition in limestone and shale rocks in bluffs along the Ohio and Mississippi rivers. The oldest fossil brachiopods are found in Cambrian rocks that are more than 500 million years old. These animals became abundant in Ordovician time and remained so through the Paleozoic Era.

Bryozoans

Brachiopods

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Use a different color to represent bryozoans and brachiopods. Fill in the boxes with your color key. Now shade in the part of Illinois where these fossils have been found.

Bryozoans ☐

Brachiopods ☐

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
			Miocene	23.7
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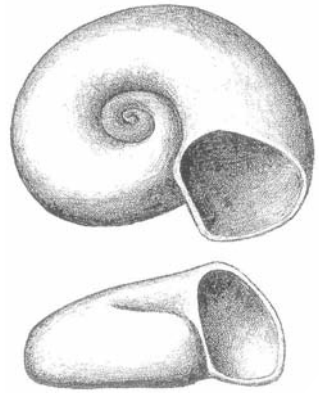
		Devonian		408
		Silurian		438
		Ordovician		505
		Cambrian		570
		Precambrian		

Marine Worm Jaws & Gastropods



Marine worms live today and are common fossils, too. The oldest marine worm jaw fossils are in Ordovician rocks, but they are most common in Silurian rocks. Most Illinois marine worm jaw fossils are found in the northeastern part of the state. These are black, shiny fossils that are best seen with a magnifying glass.

Gastropods, or stomach-footed mollusks, are commonly known as snails. These animals have a one-piece shell that may be coiled or conical. Gastropods can be found in the ocean, in fresh water and on land. Snails are abundant in the fossil record. Fossils occur throughout Illinois in several different rock strata, particularly from the Ordovician and Pennsylvanian time periods. The oldest snail fossils are from the Cambrian period, more than 490 million years ago. Ice Age snail fossils can be recovered from loess along the banks of major rivers.

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
			Miocene	23.7
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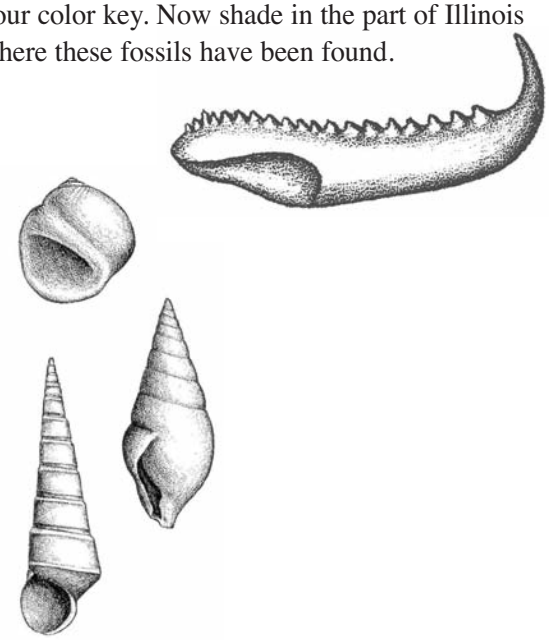
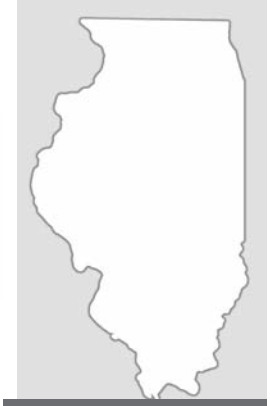
		Precambrian		

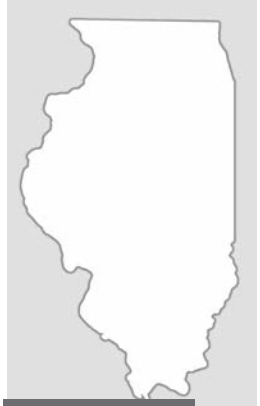
Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Use a different color to represent marine worm jaws and gastropods. Fill in the boxes with your color key. Now shade in the part of Illinois where these fossils have been found.





Marine Worm Jaws



Gastropods

- ❑ Marine Worm Jaws
- ❑ Gastropods

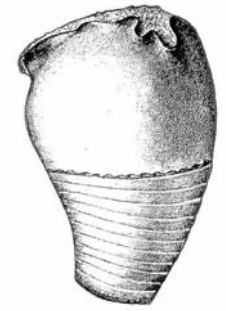
Cephalopods

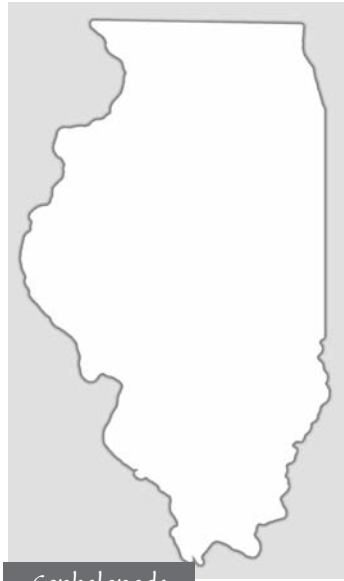
Cephalopods, or head-footed mollusks, include the squid, octopus, cuttlefish and nautilus. These are marine species which are all still in existence. The ancient "shelled" form of cephalopods is now extinct except for one type in the Pacific Ocean. Cephalopods from Ordovician, Silurian and Pennsylvanian rocks are especially common in our state.

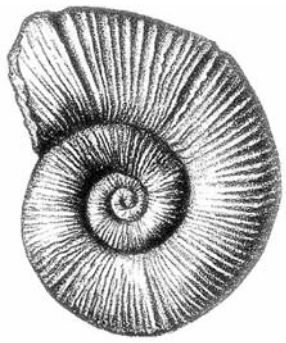
Most fossil cephalopods had a shell of calcium carbonate. Some were loosely coiled, some were tightly coiled and others were shaped like a tapered tube. Some of the tube-shaped ancient cephalopods grew to about 19 feet in length, although most species were much shorter.

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Now shade in the part of Illinois where these fossils have been found.







Cephalopods

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
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		Mississippian		360
		Devonian		408
		Silurian		438
		Ordovician		505
		Cambrian		570
		Precambrian		

Pelecypods

These aquatic species include mussels, clams, oysters and scallops. Known as bivalves, they have two shells that are mirror images of each other. Their fossil forms are present in some of the oldest marine rocks known, and they are still very numerous today. Fossil pelecypods in Illinois can be found in central Illinois Pennsylvanian rock formations and in Ordovician limestones in northern and western parts of the state. They were present through most Paleozoic time with the first ones appearing in the Cambrian Period.

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Now shade in the part of Illinois where these fossils have been found.

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
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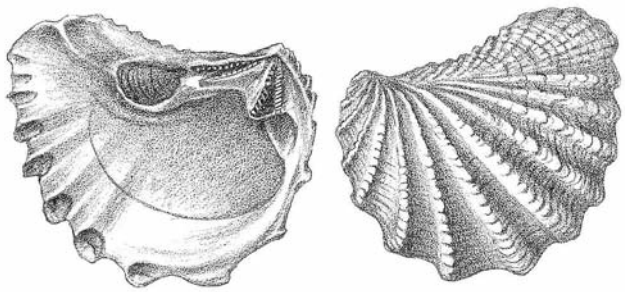
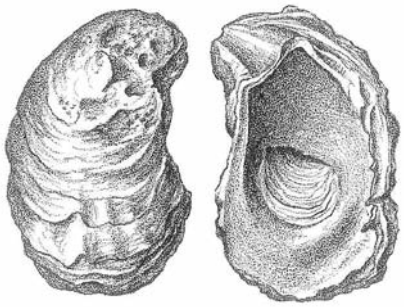
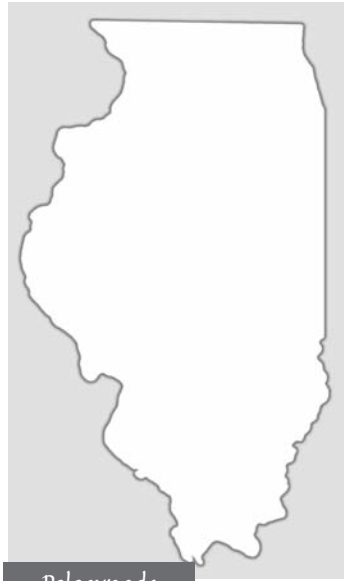


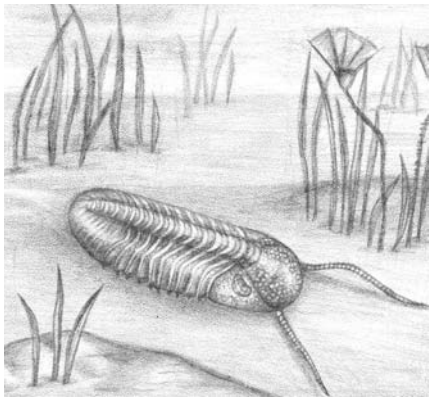




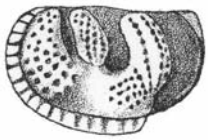
Pelecypods

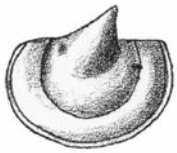
Trilobites & Ostracods

Trilobites became extinct about 250 million years ago in the Permian time period. Their heads and tails are often preserved well as fossils, although entire specimens are rare. Two grooves divided this animal's back into three lobes, hence the name "trilobite." These marine species had a head with two eyes and a mouth, a jointed body and a tail. The body was covered with tough plates. The covering was shed as the animal grew, so that one individual could have provided material for several fossils. Illinois trilobite fossils can be found in the northeastern and western parts of the state. These animals were abundant in the Cambrian, Ordovician, Silurian and Devonian times and were among the most important animals then on earth. Trilobites or their parts are found in Mississippian and Pennsylvanian rocks, too, although less commonly.



Ostracods are tiny aquatic crustaceans that are found in fossil form and are still living today, too. Each individual has two shells. Inside the shell, the animal has two antennae and other appendages used in swimming. Fossils from as early as the Ordovician Period have been found.

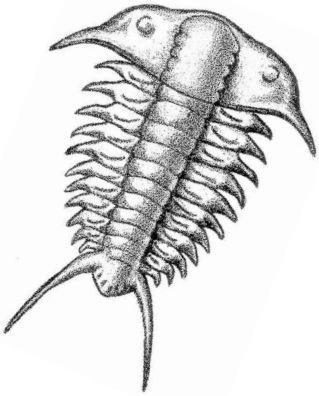




Trilobites

Activity:
Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Use a different color to represent trilobites and ostracods. Fill in the boxes with your color key. Now shade in the part of Illinois where these fossils have been found.

Ostracods



Trilobites ☐

Ostracods ☐

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
			Miocene	23.7
			Oligocene	36.6
			Eocene	57.8
			Paleocene	66.4
	Mesozoic	Cretaceous		144
		Jurassic		208
		Triassic		245
	Paleozoic	Permian		286
		Pennsylvanian		320
		Mississippian		360
		Devonian		408
		Silurian		438
		Ordovician		505
		Cambrian		570
		Precambrian		

Echinoderms

Echinoderms live on the ocean floor and have an external calcite skeleton. A special characteristic of some of them is the use of tube feet for locomotion and to open the shells of mollusks that they prey upon. The best known echinoderm fossils are the cystoids, blastoids and crinoids. Other echinoderms that may be present in Illinois rocks, but only rarely, are the starfish, sea urchin, brittle star, paracrinoids and edrioasteroids. Starfish and sea urchins arose during the Ordovician time, about 490 million years ago and are still represented by living species. Brittle stars appeared in the Ordovician and continued into the Mississippian. Paracrinoids are only found in Middle Ordovician rocks. Edrioasteroids appeared in the Cambrian and continued into the Mississippian.

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
			Miocene	23.7
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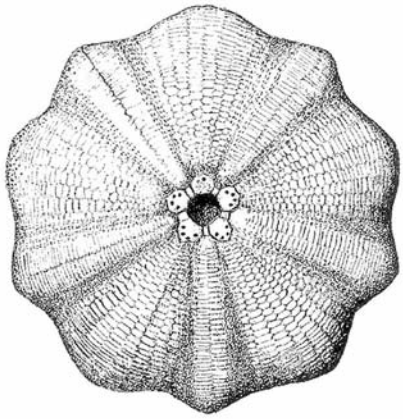
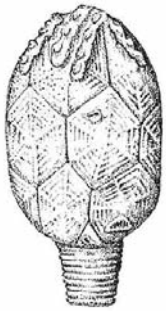
		Mississippian		360
		Devonian		408
		Silurian		438
		Ordovician		505
		Cambrian		570
		Precambrian		

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Now shade in the part of Illinois where these fossils have been found.

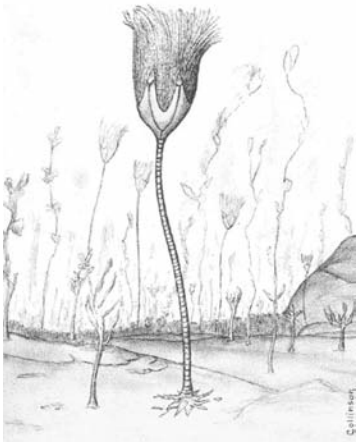


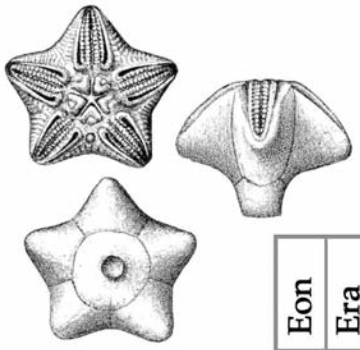


Echinoderms

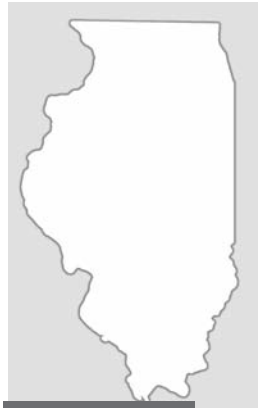
Echinoderms: Cystoids & Blastoids

The cystoids lived from the Ordovician Period, 490 million years ago, until the late Devonian Period, about 370 million years ago. They were primitive echinoderms. Their body plates were irregular in arrangement, and their "arms" were irregular and rarely preserved. In Illinois, these fossils are most often found in Ordovician and Silurian rocks from quarries in the Chicago area and from the Mississippi River bluffs of northwestern Illinois, particularly in the Rock Island area.

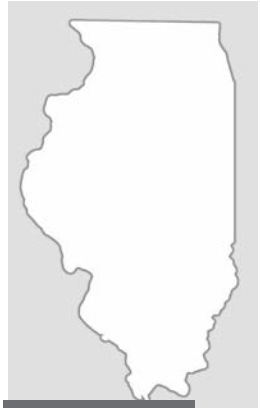




Blastoids are also known as "sea buds." These echinoderms had a mouth of the top of the body surrounded by small round holes that conducted food into and wastes out of the body. Brachioles, long hairlike structures, swept food toward the mouth. Brachioles are rarely preserved as fossils since they had such a delicate structure. The oldest blastoids are found in Silurian rocks and lived about 425 million years ago. These animals became extinct about 260 million years ago in the Permian Period. Blastoid fossils look like hickory nuts. They are commonly found in river cliffs and stream banks of western and southwestern Illinois and in areas near the Ohio River.



Cystoids



Blastoids

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today.

Use a different color to represent cystoids and blastoids. Fill in the boxes with your color key. Now shade in the part of Illinois where these fossils have been found.

Cystoids ❑

Blastoids ❑

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
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			Oligocene	36.6
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		Jurassic		208
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		Mississippian		360
		Devonian		408
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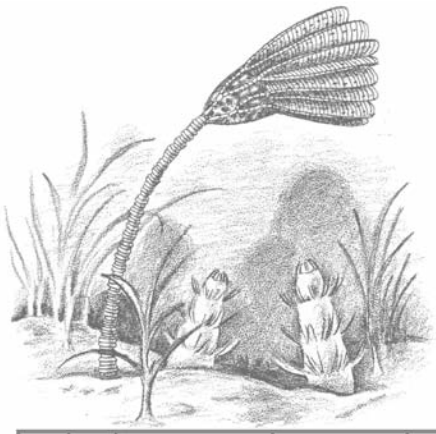
		Ordovician		505
		Cambrian		570
		Precambrian		

Echinoderms: Crinoids



Crinoids are known as "sea lilies," but they are animals, not plants. The body is usually on the end of a long stem composed of discs. The stem is held to the sea floor by a stony anchor or rootlike arms. At the top of the body, arms surround the mouth and sweep food into it. The body is made of calcium carbonate plates. When a sea lily dies, the plates and discs tend to fall apart and sink to the ocean floor. Fossil crinoid stems and stem discs are commonly found in Illinois. Have you heard of "Indian beads?" People use this term frequently to refer to the fossil crinoid stem discs. Many of the limestone beds in Illinois are made mainly of crinoid plates and discs. The oldest crinoids are found in Ordovician rocks. Crinoids still live today in deep parts of the ocean.

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
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		Silurian		438
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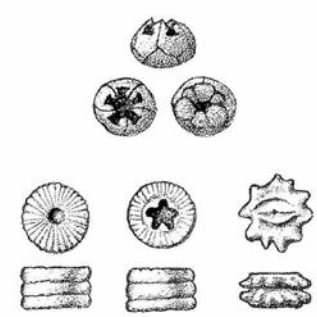
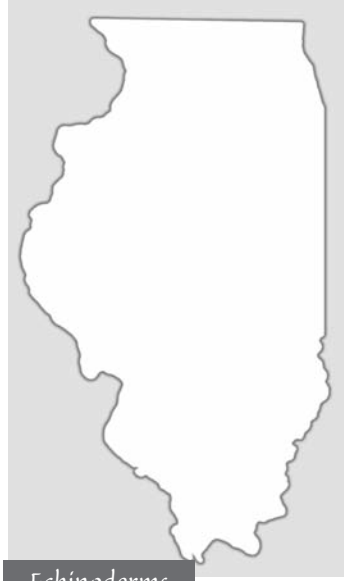
Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Now shade in the part of Illinois where these fossils have been found.

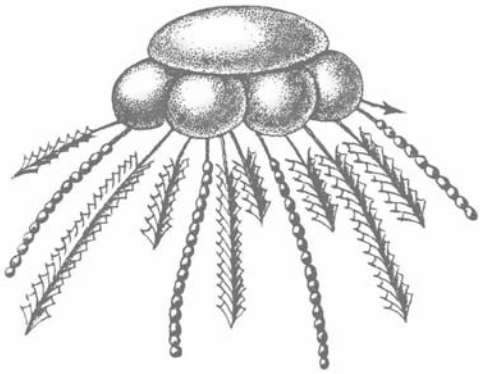




Echinoderms

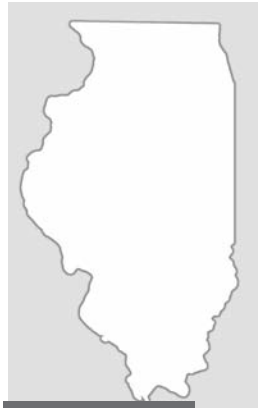
Graptolites & Conodonts

Graptolites were simple marine animals that appeared in the Cambrian Period and became extinct in the Mississippian Period. They lived in tiny, hard, cup-like structures arranged along slender stems. In some forms, the stem was attached to a round float. In others, two, three or four stems were attached together. Most graptolites floated free in the ocean. Their fossils are found in shales and limestones. In Illinois, they are frequently found in the Ordovician rocks of the northern part of the state.



Conodonts are small calcium phosphate fossils that are barely visible without magnification. They occur in Cambrian through Pennsylvanian rocks in Illinois although in other places they exist through the Triassic. Found worldwide, conodont fossils are valuable because they help geologists correlate the age of rock formations from region to region and continent to continent. Many conodont fossils look like a jaw with spines. The conodont animal is not well understood. It contained numerous conodonts, providing the opportunity for numerous fossil pieces per individual. This organism may have been an active swimmer.

Graptolites



Conodonts

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Use a different color to represent graptolites and conodonts. Fill in the boxes with your color key. Now shade in the part of Illinois where these fossils have been found.

Graptolites ❑

Conodonts ❑

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
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		Precambrian		

Insects

Insect fossils are rarely found, although more than 100 kinds of fossil insects have been described from the Coal Age (Pennsylvanian) rocks of Illinois. Most of them have come from the Mazon Creek-Braidwood area of Will and Grundy counties. Here, they are preserved in ironstone nodules. Although fossil dragonflies, damselflies and cockroaches have been found, most fossil insects are from species that no longer exist. These insects would have lived in swamps at the edge of seashores. Some of them were huge.

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Now shade in the part of Illinois where these fossils have been found.

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
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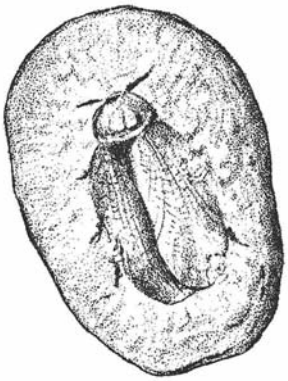
		Ordovician		505
		Cambrian		570
		Precambrian		

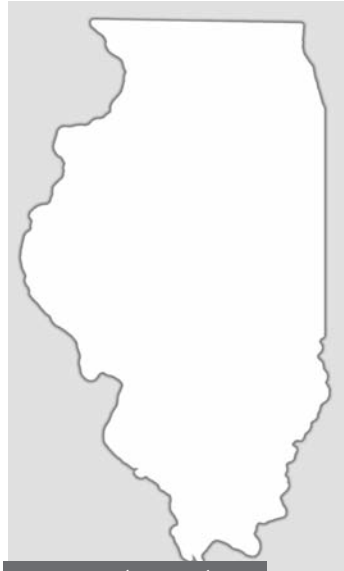


Horseshoe Crabs

The Mazon Creek-Braidwood area of Will and Grundy counties is well-known for the fossils that have been found there. The horseshoe crab is just one of many species represented by fossils from this area. These fossils show a creature very similar to horseshoe crabs of today. The ancient horseshoe crabs would have lived in the shallow oceans just off the shore from the Coal Age forests. All of the Illinois specimens have been found in Pennsylvanian rocks.

Activity:

Color the section of the time line that represents when these organisms lived. Remember, if there are still representatives living today, you should color the time line from the oldest fossils through today. Now shade in the part of Illinois where these fossils have been found.



Horseshoe Crab

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
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	Mesozoic	Cretaceous		144
		Jurassic		208
		Triassic		245
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		Mississippian		360
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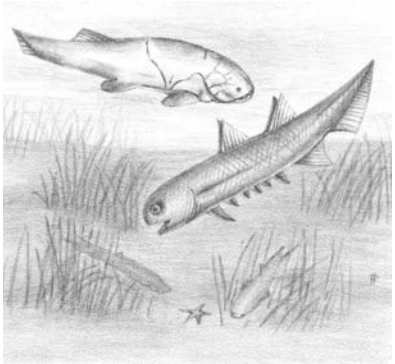
Vertebrate Fossils



Vertebrate species include fishes, amphibians, reptiles, birds and mammals. In many western states, vertebrate fossils, like skeletons of dinosaurs, camels and saber-toothed tigers, are found in Mesozoic and Cenozoic rocks. In Illinois, most of the Mesozoic and Cenozoic rocks (except Quaternary rocks) have eroded and are not present. Therefore, vertebrate fossils in Illinois are mainly from the Paleozoic and Quaternary rocks. The Paleozoic fossils represent the following vertebrates: fishes – teeth, scales and bony plates; some lizards; and amphibians. Mammoths and mastodons were Quaternary vertebrates that are now extinct. Other vertebrates of this time period, such as horses, deer and humans, are still represented today.

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
		Tertiary	Pliocene	5.3
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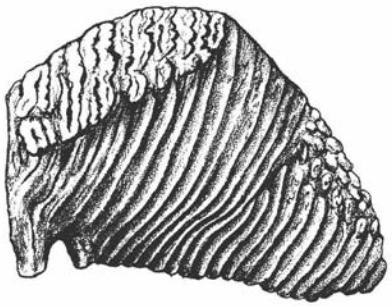

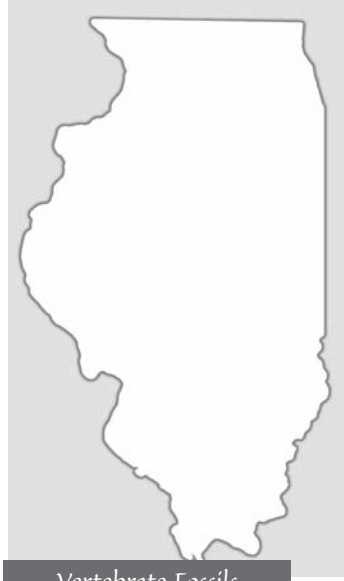

Vertebrate Fossils

Plant Fossils

Probably the most famous fossils from Illinois are plant parts recovered at the Mazon Creek-Braidwood area of Will and Grundy counties. The fossils are contained in ironstone nodules, most of which were incorporated in the coal of this area. The fossils are remains of fast-growing ferns and trees. The most common plants were ferns with a total height of about 50 feet. Also found were the now extinct seed ferns and giant scouring rushes, relatives of today's horsetail plants. Scale trees grew to heights of more than 100 feet. The leaves on this tree were tightly packed on the trunk and limbs. When leaves fell off, they left rows of scars that help us to identify these plants. Plant fossils can be found in the Cambrian time period.

Activity:

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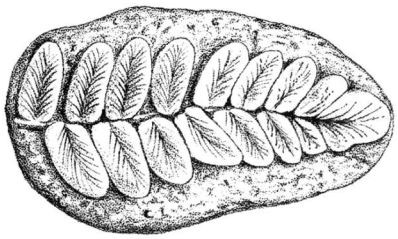

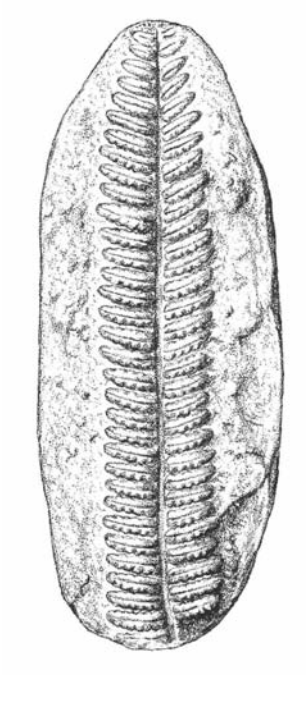

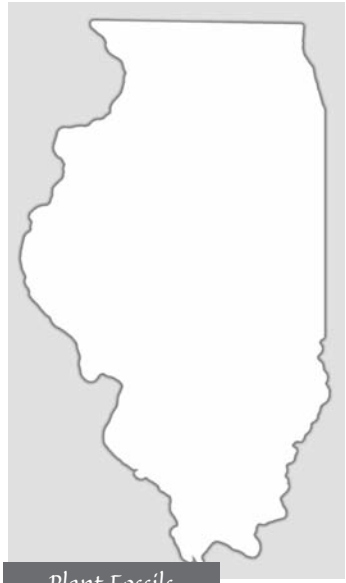

Plant Fossils

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
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Our State Fossil – Tully Monster

Tully's common monster (*Tullimonstrum gregarium*), also known as the Tully monster, was selected as Illinois' state fossil in 1989. The first Tully monster fossil was discovered in 1958 by Francis Tully. Fossils of the Tully monster have only been found in Illinois.

The Tully monster was a soft-bodied animal. Its fossils are found in ironstone concretions, which are red-brown, rounded stones commonly found in rock removed from coal mines. This strange creature only existed during the Pennsylvanian period, about 300 million years ago. It swam in the tropical ocean that covered Illinois at that time. Its sleek, tapered body and large tail fins imply that it was an active swimmer, perhaps a carnivore. Its segmented body was flexible and round or oval in shape. The body was about one foot in length.

The Tully monster had two eyelike projections on stalks. At the front of the body was an "arm" that ended in a mouthlike structure with eight to 14 sharp projections. The "arm" and projections may have been used for catching prey and bringing it to the mouth.

This animal is a mystery. Although it was an invertebrate, scientists don't really know exactly what kind of animal it was. It may be related to snails, slugs and other kinds of mollusks.

Eon	Era	Period	Epoch	Millions of years ago
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01
			Pleistocene	1.6
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Activity:

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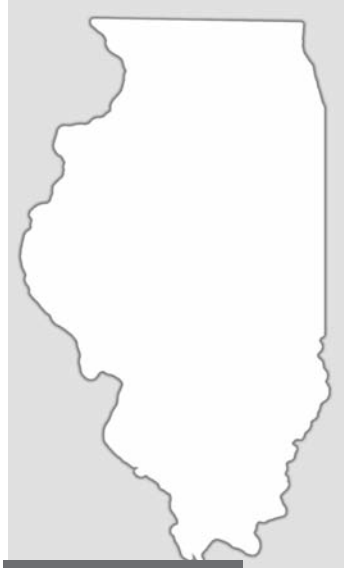


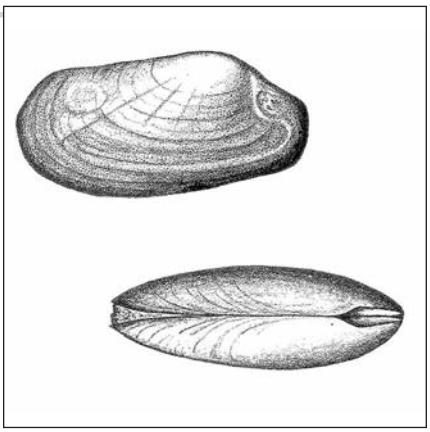
Tully Monster

It's a Mystery!

You are a paleontologist who has collected the following fossils on some recent field studies. Using the information contained in the previous pages, identify each of the fossils. Write two sentences for each one explaining why you placed the organism in this category.

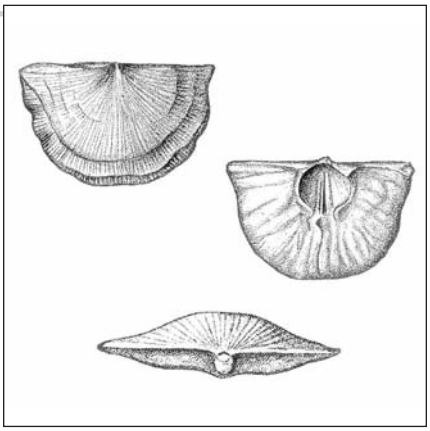
Name _____

Reasons for selecting this category? _____



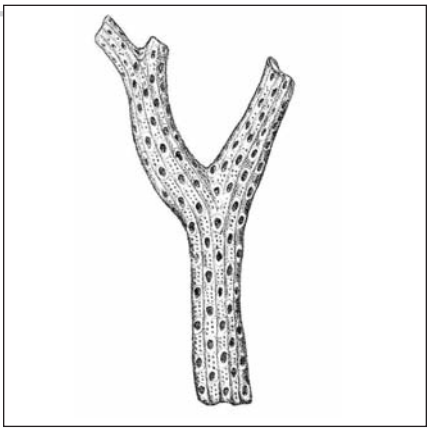
Name _____

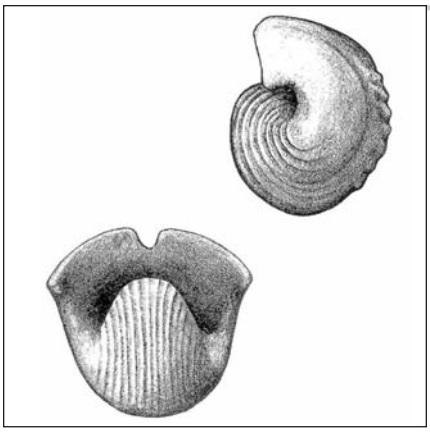
Reasons for selecting this category? _____



Name _____

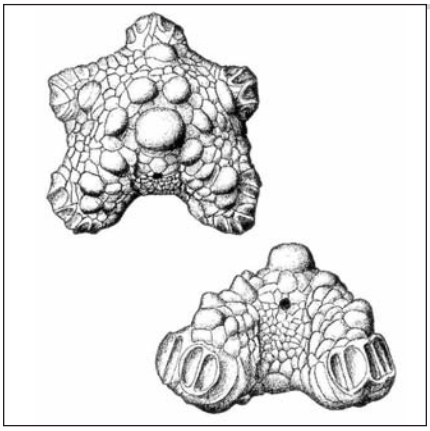
Reasons for selecting this category? _____





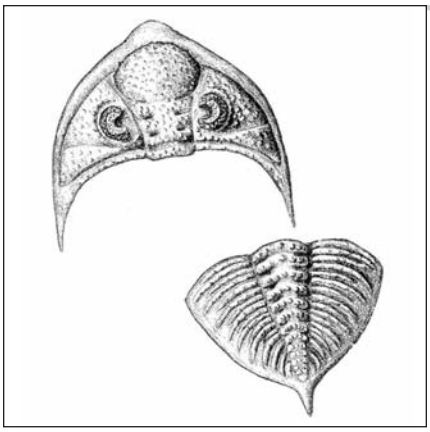
Name _____

Reasons for selecting this category? _____



Name _____

Reasons for selecting this category? _____



Name _____

Reasons for selecting this category? _____

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