ARKANSAS GEOLOGY

COLORING & ACTIVITY BOOK

ARKANSAS GEOLOGICAL SURVEY

Illustrations by Camille Gernhart, Jeffrey Huddleston, and Sherrie Shepherd

STATE OF ARKANSAS

Asa Hutchinson, Governor

ARKANSAS GEOLOGICAL SURVEY

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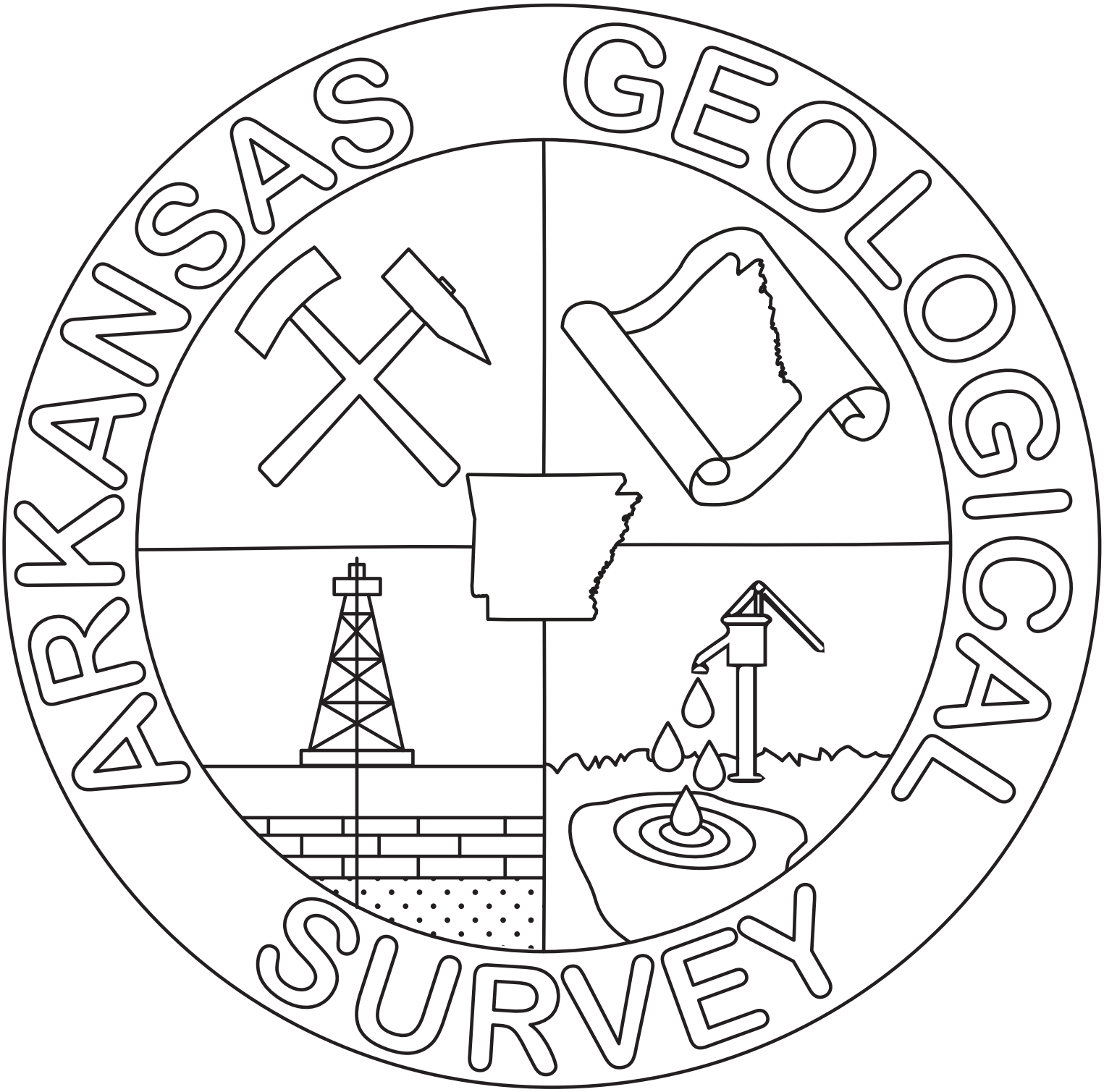
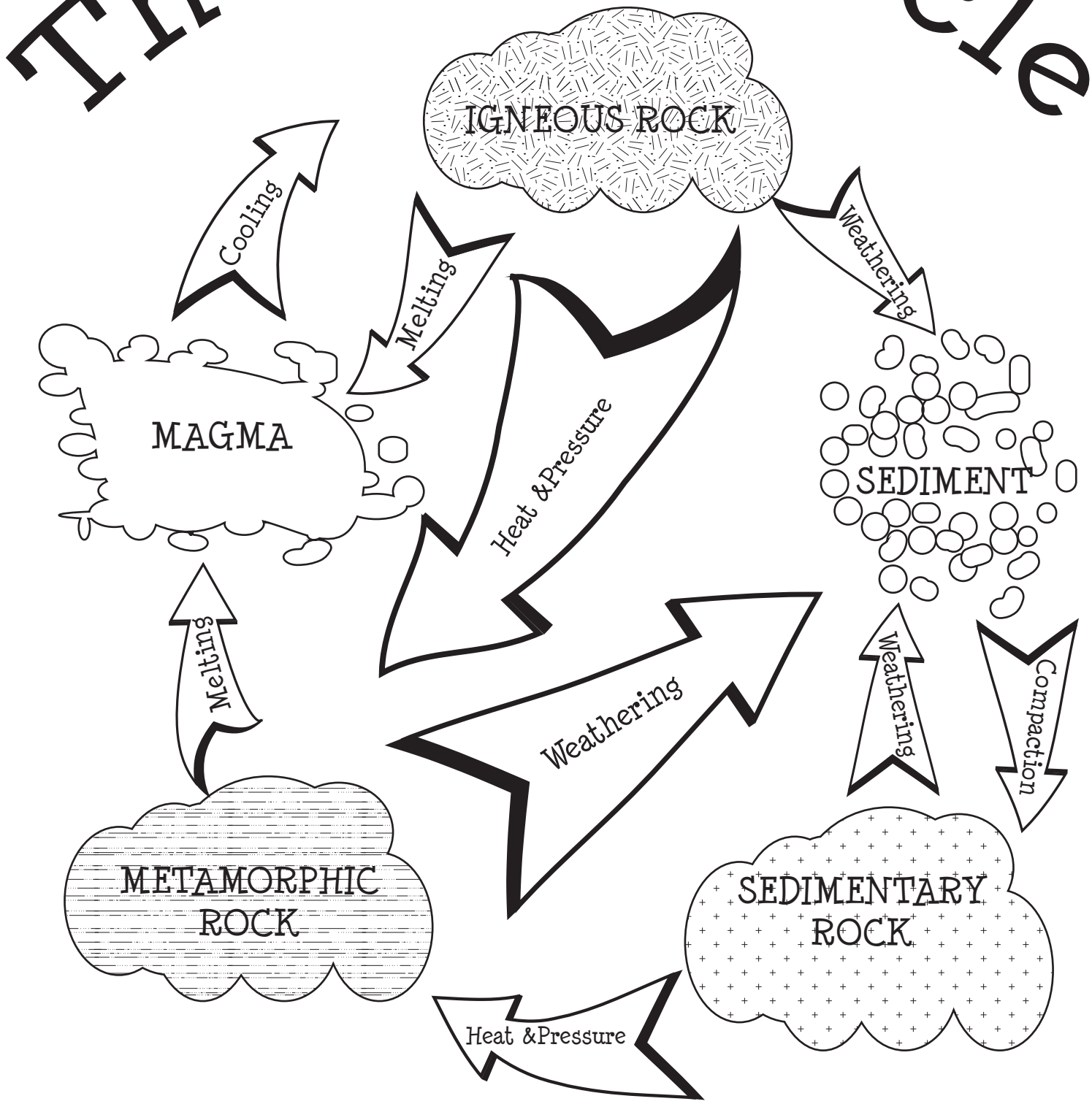


Mission

Our mission is to serve the people of Arkansas by providing geological information in order to develop and enable effective management of the State's mineral, fossil fuel, and water resources while protecting the environment.

The Rock Cycle



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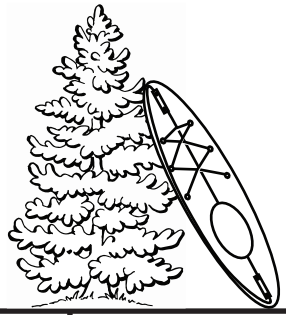
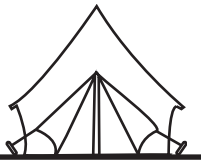
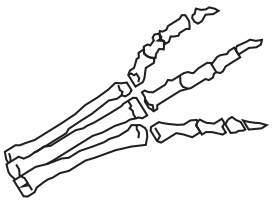
Geologic Time



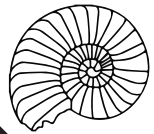


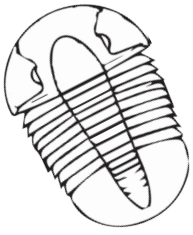
ERA	PERIOD	Million Years Ago
Cenozoic	Quaternary	2.6
	Neogene	23
	Paleogene	66
Mesozoic	Cretaceous	145
	Jurassic (Not exposed in Arkansas)	201
	Triassic (Not exposed in Arkansas)	252
Paleozoic	Permian (Not exposed in Arkansas)	299
	Pennsylvanian	323
	Mississippian	359
	Devonian	419
	Silurian	444
	Ordovician	484
	Cambrian	540

Big, Big Extinction



Gigantic Extinction





Explosion of Life

Precambrian
(Not exposed in Arkansas)

Earth Formed 4.5 billion years ago

Geologic Time Scale 2012, v. 4.0, Geological Society of America

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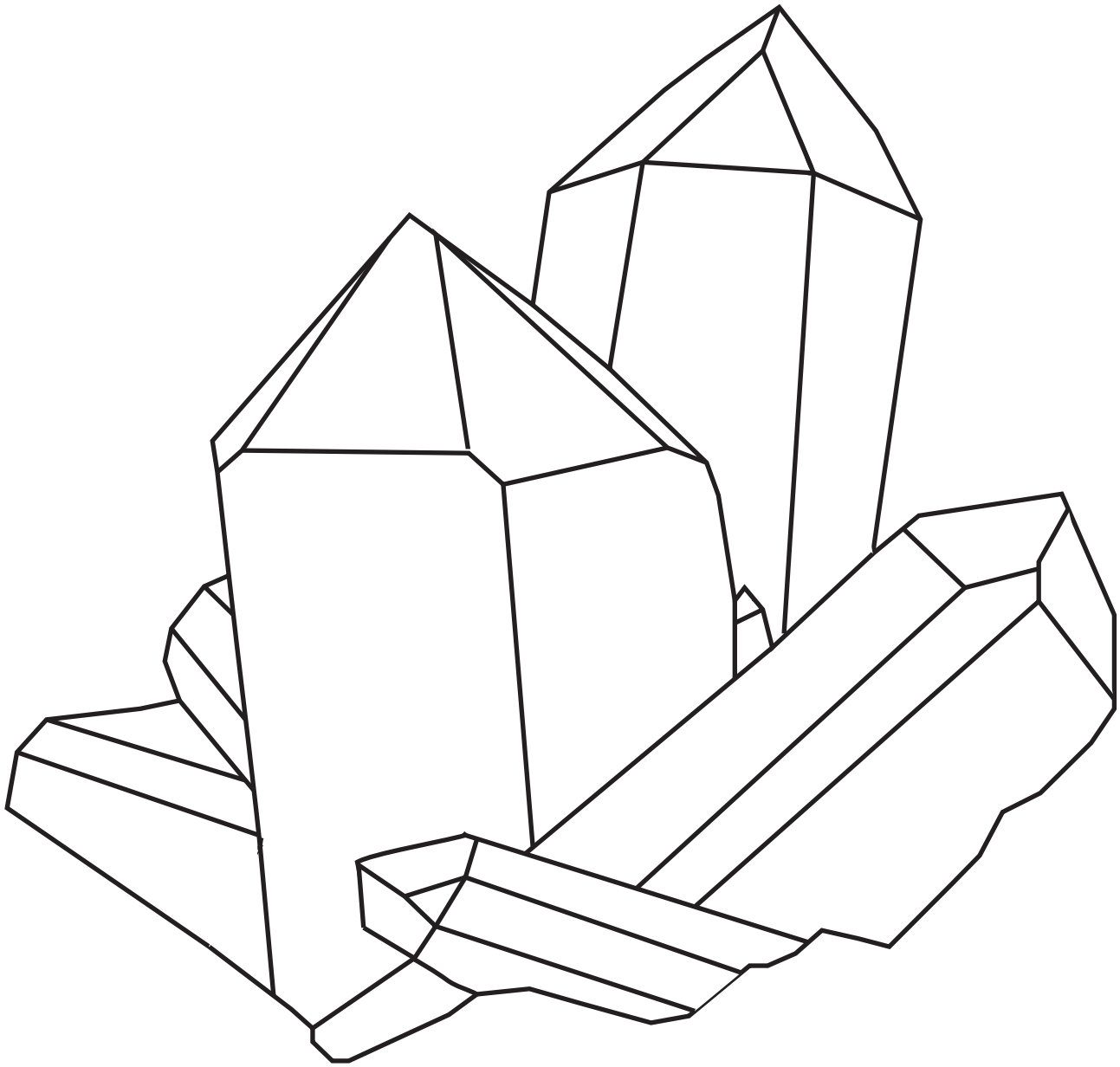
State Mineral



QUARTZ

(SiO_2)

Quartz is the most abundant mineral in the Earth's crust. Quartz is used in electronics and glass-making as well as a lot of other things!

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State Gem

DIAMOND

(C)

Diamonds are the hardest natural substance on Earth! They make beautiful jewlery and useful tools. They can cut anything! Arkansas is home to Crater of Diamonds State Park, the only diamond mine in the world open to the public!

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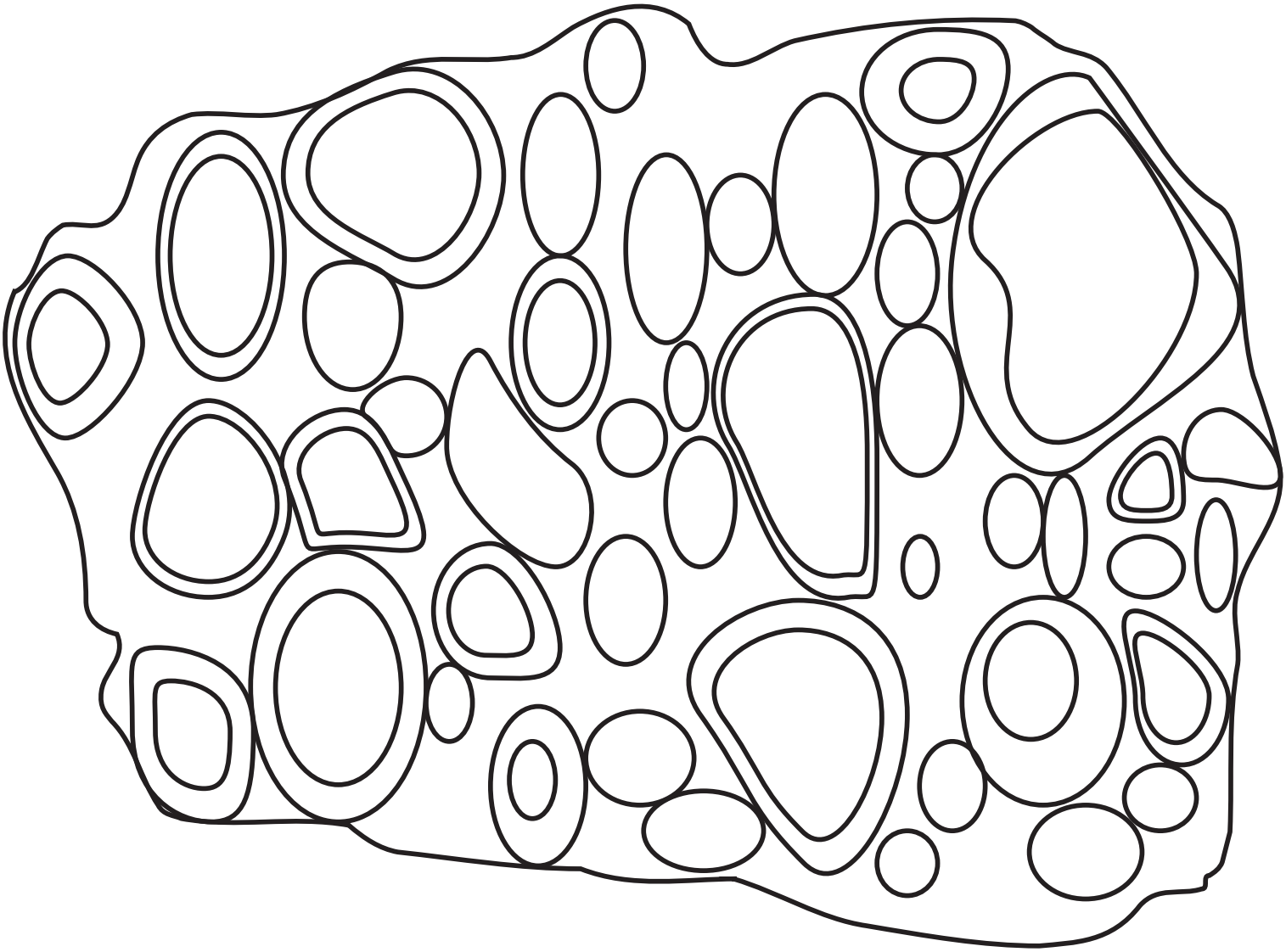
State Rock



BAUXITE

Bauxite is a unique sedimentary rock. It is a primary aluminum ore. We use aluminum to produce cans, airplanes, chip sacks, vehicle parts, and other aluminum products.

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State Dinosaur

In 2017, the Arkansas General Assembly named *Arkansaurus fridayi* the offical State Dinosaur. Foot bones from the dinosaur were discovered by Mr. Friday in 1972 near Lockesburg, Arkansas. Scientists recreated what the dinosaur may have looked like based on the foot bones of similar known dinosaurs. *Arkansaurus fridayi* lived in Arkansas during the Early Cretaceous Period, about 113 million years ago. It was about 8 feet tall and likely a swift hunter that preyed on small animals, insects, and eggs.

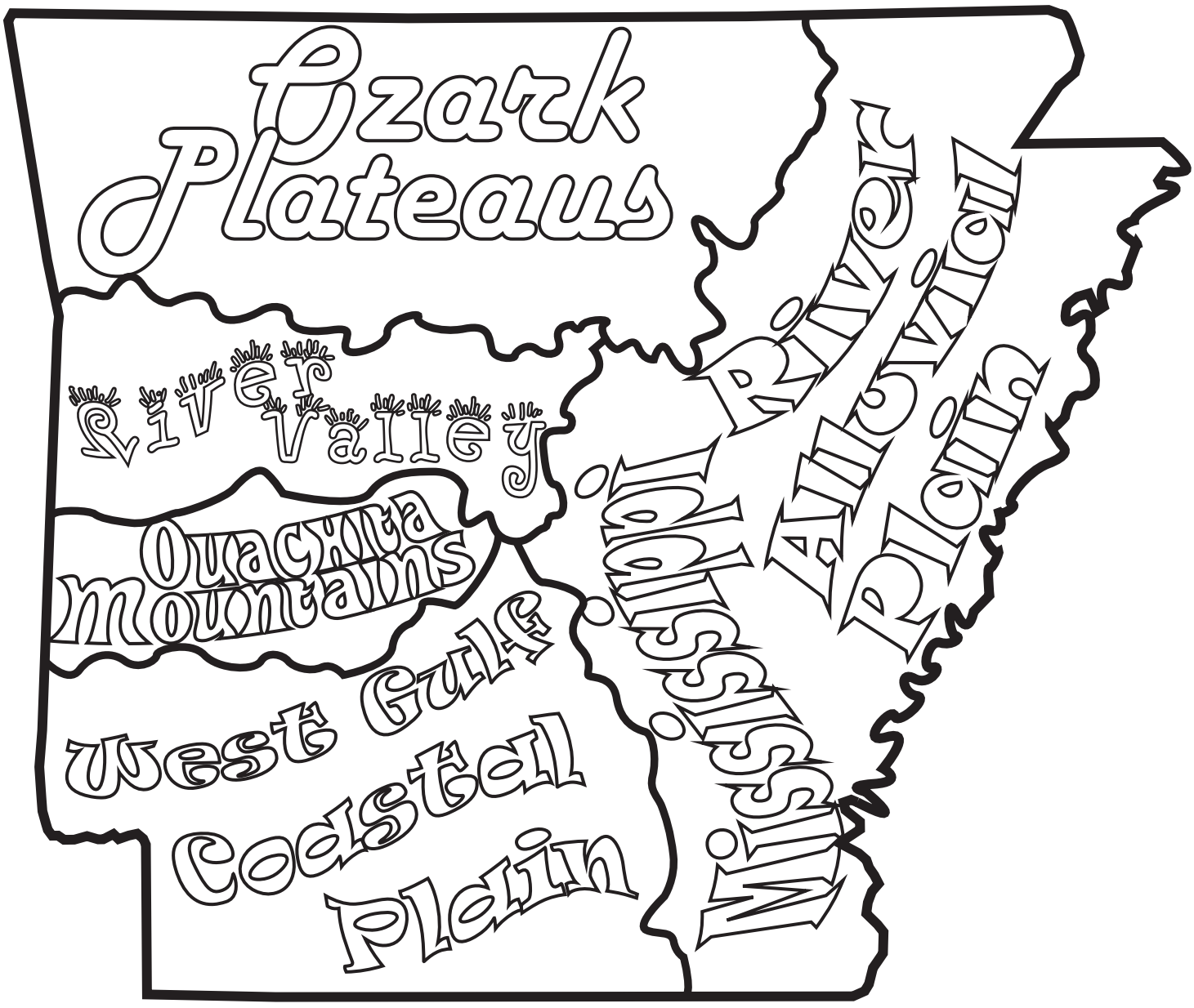
Arkansas Geology Word Search

L H E I O U A C H I T A S H J H G C M E K O A
A J O E R Z Y I U T R E S F O S S I L S L M
M S A O I P A F N T U I O M N C H Z I P O A G C G
P Q U Y T B O R U E A R T H Q U A K E S W L O A Y
O T Y D I A M V K P L F O W O G L S J T N G L K
R J D I F U J E L S T D N E F J E K E O O E E X
I K E N W X D K A O L I N O T H D J V K N P A R
T R K O O I L B A D D O K J E O C A G A K L D
E D J S K T L S H G T D K S L A C F I Y E T
T N D A R E I P I S T J E H V U D M C T C M
A K D U T L E J D D K I T E L L T J I I S
O G E R T H D N Y B M G S I E P G N N L
T H Y O D K A O Q U A R T Z L E E U T
L O R P U S B M C J R E B N E Y F Z N
O P S S H F N B E N O T S E M I L
G K Y U R O G J M F P E I T N N H
O D I A M O N D S L N U T R A C B

Search for the words below related to Arkansas geology in the above diagram. The words may read forward, backward, across, down, or diagonally.

BAUXITE
CAVES
DIAMONDS
DINOSAUR
EARTHQUAKES
FOSSILS
GALENA
GYPSUM
KAOLIN
LAMPROITE
LEAD
LIMESTONE
NOVACULITE
OUACHITAS
OZARKS
SANDSTONE
SHALE
SYENITE
QUARTZ
ZINC

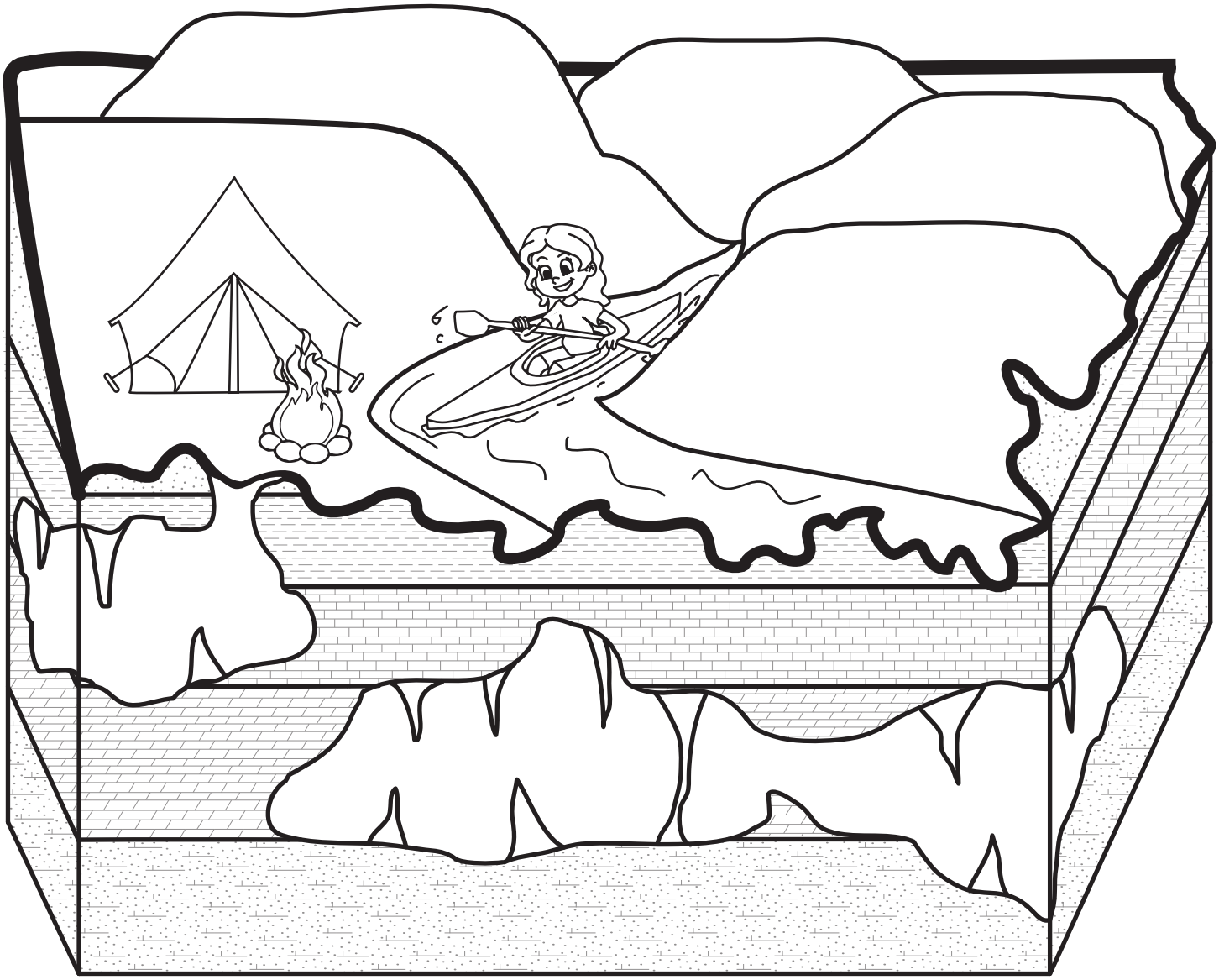
Arkansas Physiographic Provinces



Arkansas is divided into five physiographic provinces. A physiographic province is an area in which all parts are similar in geologic structure. These provinces are the Ozark Plateaus, the Arkansas River Valley, the Ouachita Mountains, the West Gulf Coastal Plain, and the Mississippi River Alluvial Plain. Each province has a unique geologic story.

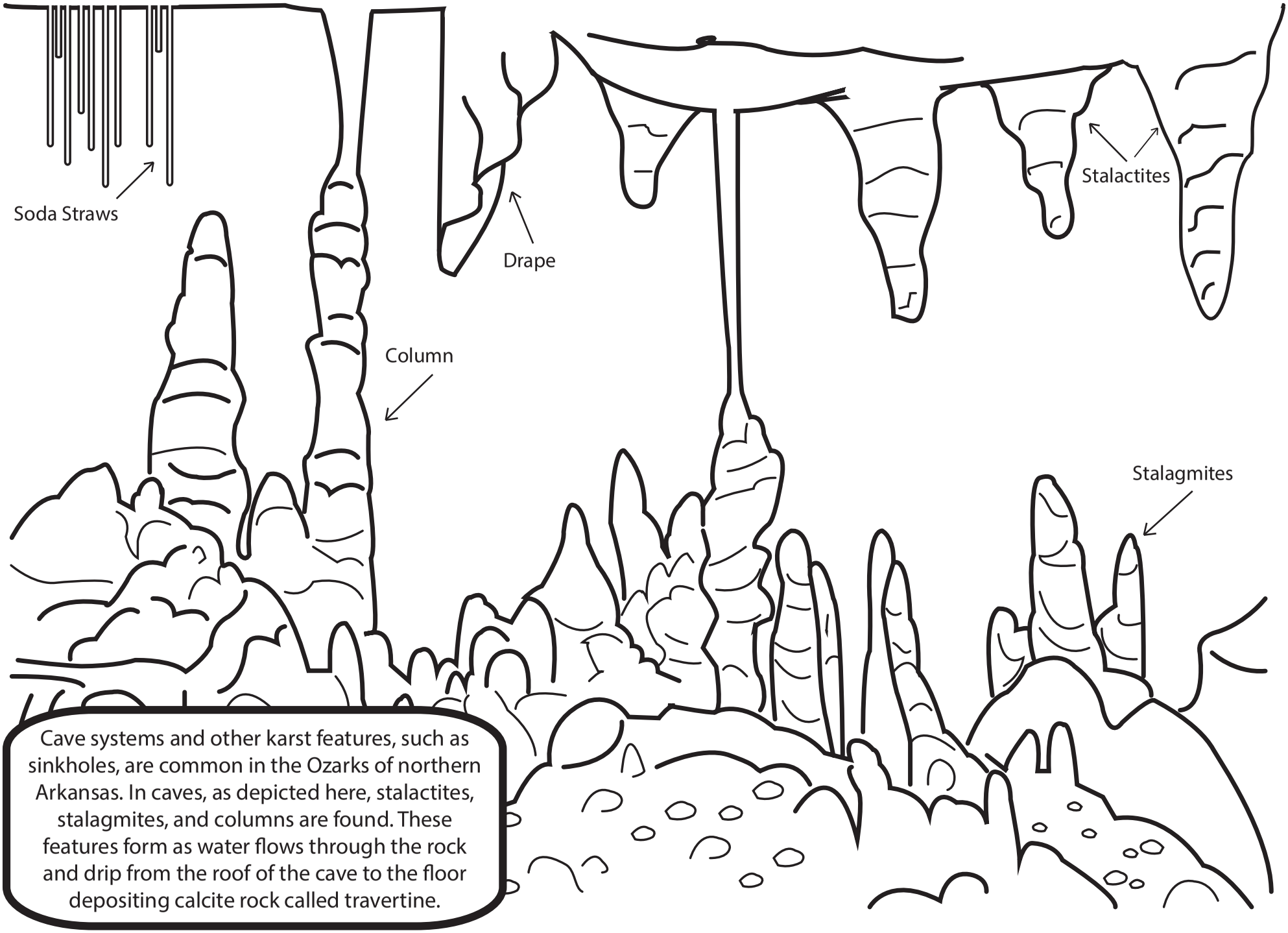
Arkansas Physiographic Provinces

Ozark Plateaus



The Ozark Plateaus Province is divided into three plateaus: Salem, Springfield, and Boston Mountain. These plateaus create a beautiful landscape with flat topped hills and deep valleys with clear flowing rivers and streams. These are not true mountains though. The rock below is mostly horizontal indicating that the relief was created from streams cutting down through the rock. The dominant rock types found are sandstone, limestone, dolostone, shale, and chert. This province has an abundance of caves, springs, rivers, and lakes making it a popular outdoor destination.

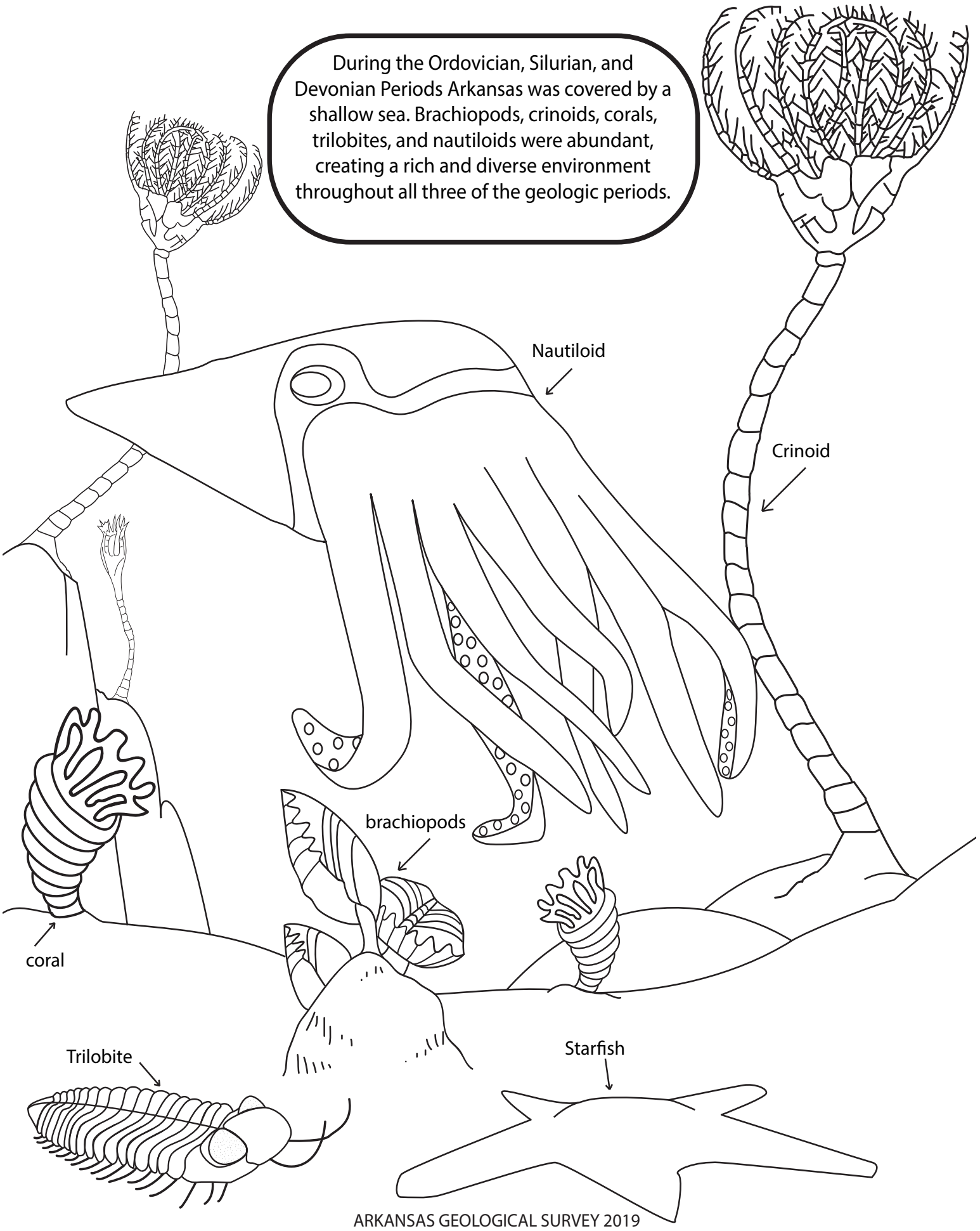
ARKANSAS GEOLOGICAL SURVEY 2019



Cave systems and other karst features, such as sinkholes, are common in the Ozarks of northern Arkansas. In caves, as depicted here, stalactites, stalagmites, and columns are found. These features form as water flows through the rock and drip from the roof of the cave to the floor depositing calcite rock called travertine.

ARKANSAS GEOLOGICAL SURVEY 2019

During the Ordovician, Silurian, and Devonian Periods Arkansas was covered by a shallow sea. Brachiopods, crinoids, corals, trilobites, and nautiloids were abundant, creating a rich and diverse environment throughout all three of the geologic periods.



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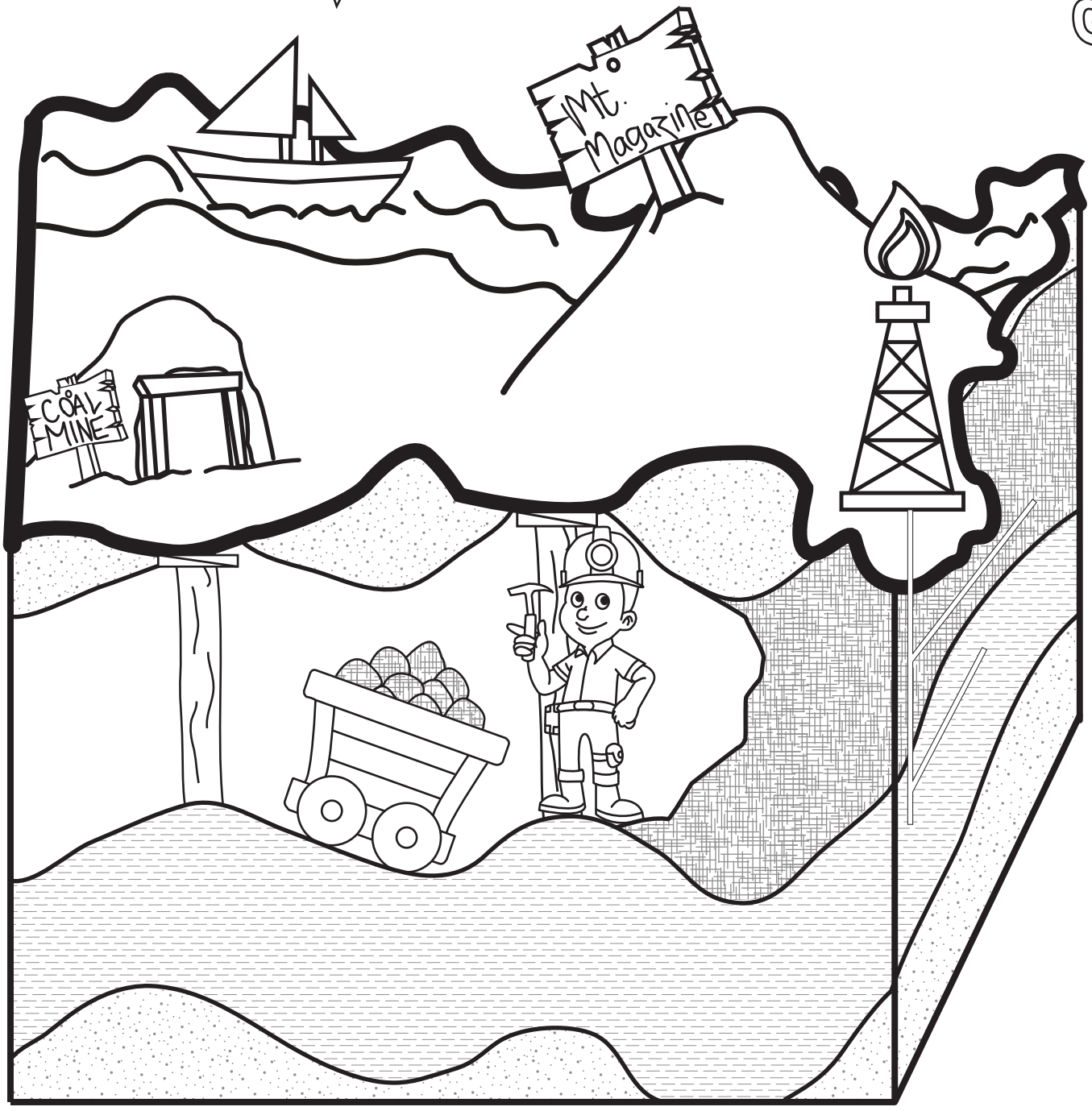
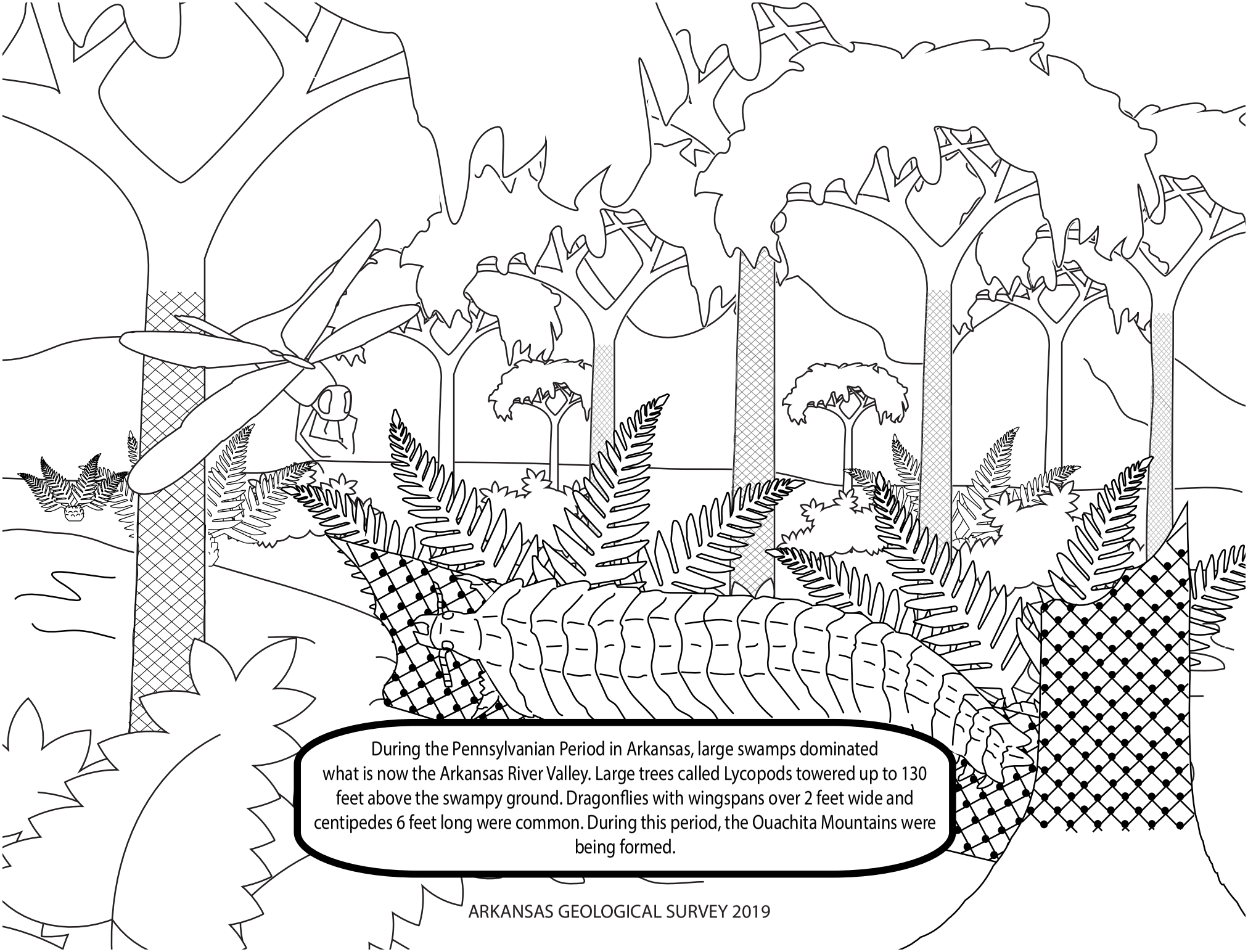
Arkansas Physiographic Provinces

The River Valley



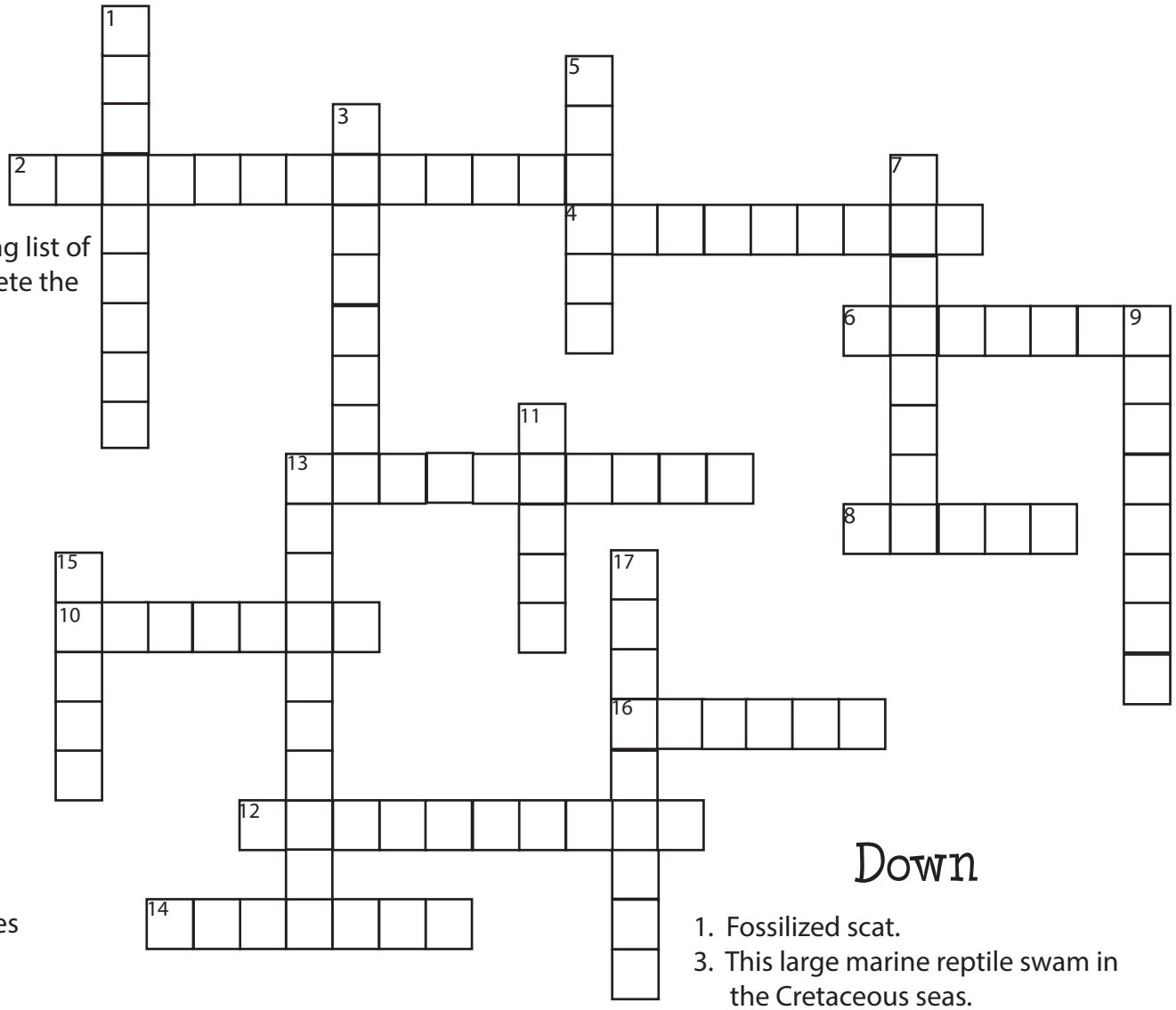
The River Valley Province is home to the Arkansas River and the state's highest peak, Mount Magazine. The province is characterized by gently folded rock formations and broad anticlines and synclines. The most common rock types found here are sandstone, siltstone, and shale. Fossil fuels are an important industry in this province. Coal has been mined and natural gas has been produced here off and on over the past 150 years.

ARKANSAS GEOLOGICAL SURVEY 2019



ARKANSAS GEOLOGICAL SURVEY 2019

Arkansas Fossil Crossword Puzzle



Use the following list of fossils to complete the puzzle:

amber
ammonoid
coprolite
coral
crinoid
dinosaur
dung
fossils
gastropods
graptolite
mammoth
mosasaur
nautiloid
oyster
shark
starfish
stromatolites
trilobite
traces
worm trails

Across

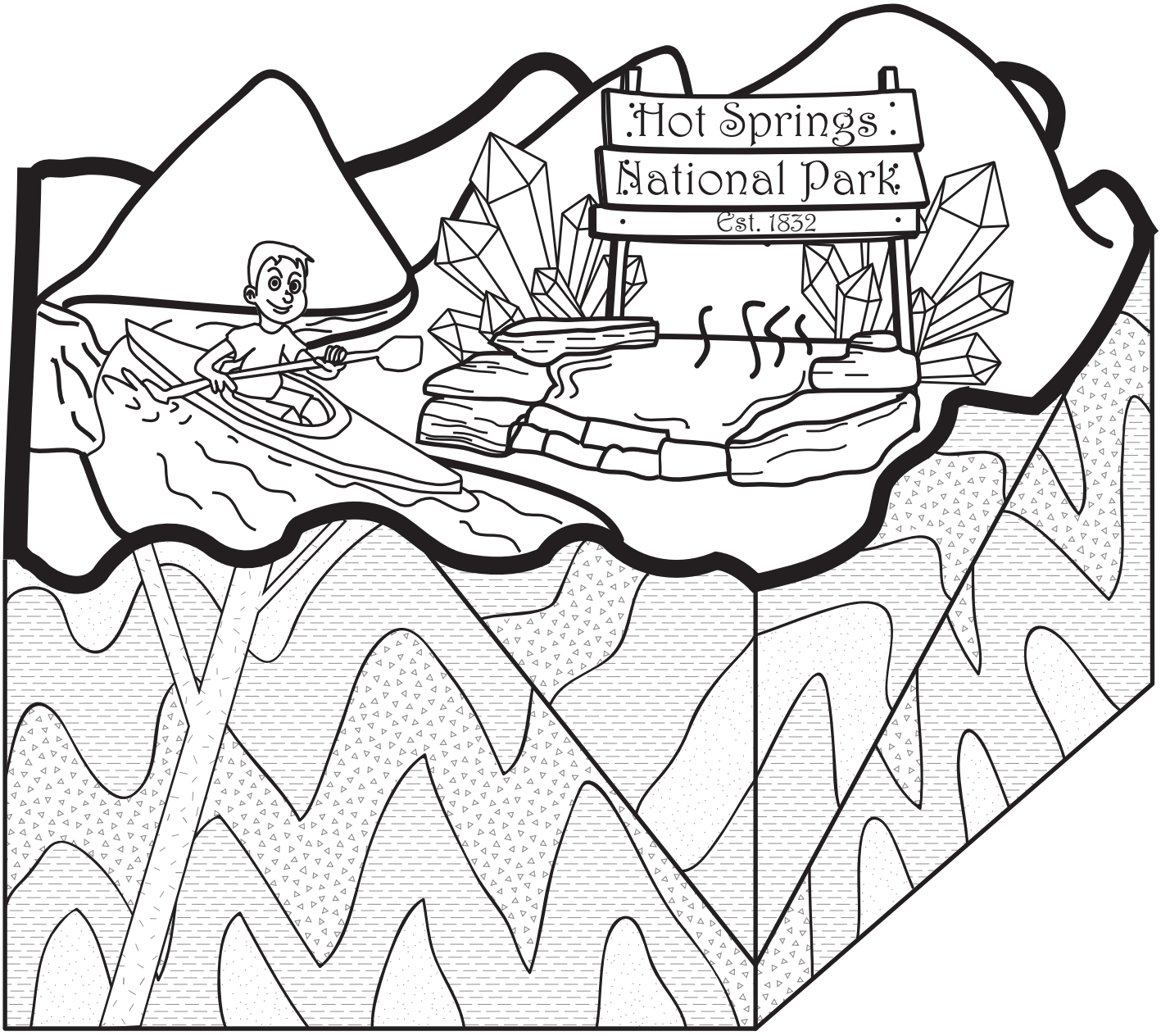
2. These fossils formed from blue-green algae or cyanobacteria.
4. This animal has a 3 lobed exoskeleton and is the oldest fossil in Arkansas.
6. This fossil has been called a "sea lily" even though it is not a plant.
8. Teeth from this large swimming predator can be discovered.
10. Teeth from this ice-age mammal have been discovered.
12. These trace fossils are abundant in the rocks.
13. This fossil resembles pencil marks and is found in shales in the Ouachita Mountains.
14. The remains of once living organisms.
16. Tracks and trails are these types of fossils.

Down

1. Fossilized scat.
3. This large marine reptile swam in the Cretaceous seas.
5. This bivalve was attached to the seafloor and may have contained a pearl.
7. This animal created a star-shaped trace fossil.
9. Terrible lizard.
11. These marine creatures can create reefs.
13. Arkansas contains fossils and modern snails from this group.
15. Fossilized tree sap.
17. An eight foot long fossil of this cephalod was found in Fayetteville.

Arkansas Physiographic Provinces

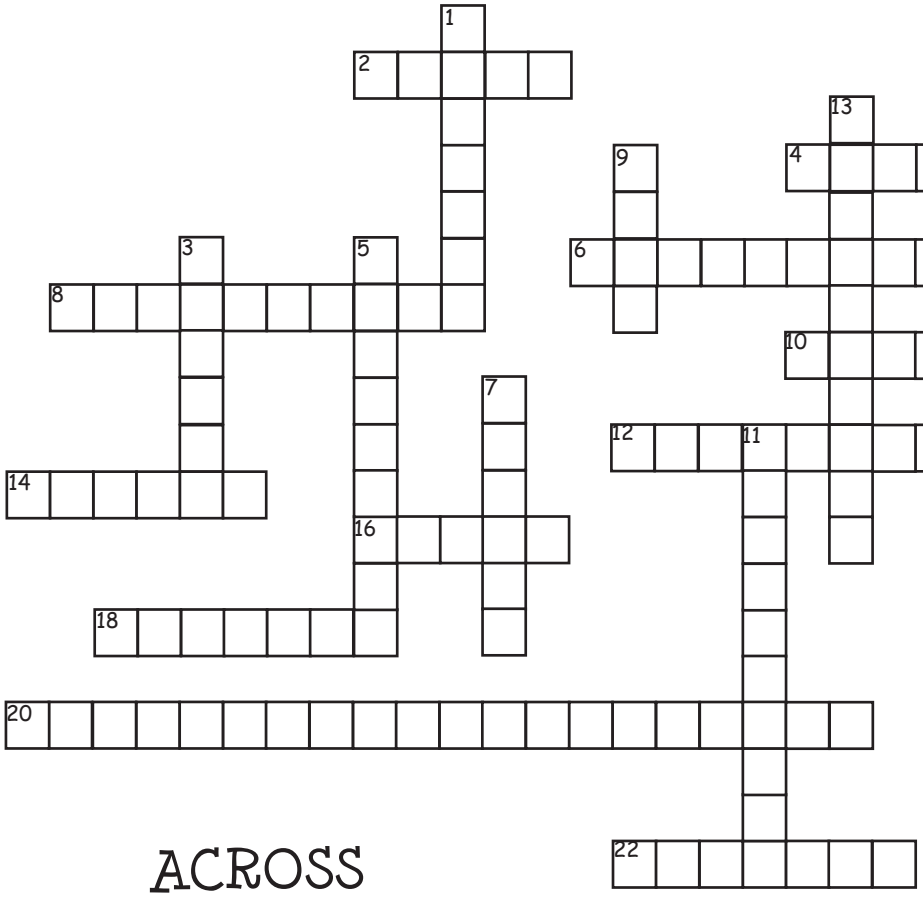
Ouachita Mountains



The Ouachita Mountain Province is the smallest, but boasts some of our state's greatest claims to fame! It is home to Hot Springs National Park, one of the first national parks. This province also has some of the most beautiful hiking trails and pristine rivers in the state. Mining is also common in the Ouachita Mountains. Among these mined resources are numerous quartz mines open to the public where anyone can mine their own quartz crystals! The province is characterized by tightly folded and faulted rock formations in steep anticlines and synclines with igneous intrusions. The dominant rock types found here are sandstone, shale, novaculite, and chert.

ARKANSAS GEOLOGICAL SURVEY 2019

Arkansas Geology Crossword Puzzle



Use the following list of words to complete the puzzle:

Bauxite	Diamonds
Chalk	Galena
Quartz	Coal
Kaolin	Loess
Quachita	Limestone
Syenite	Cretaceous
Novaculite	Ozark
Dinosaurs	Fossils
Ordovician	Sandstone
Crowley's Ridge	Cretaceous
Mississippi Embayment	

ACROSS

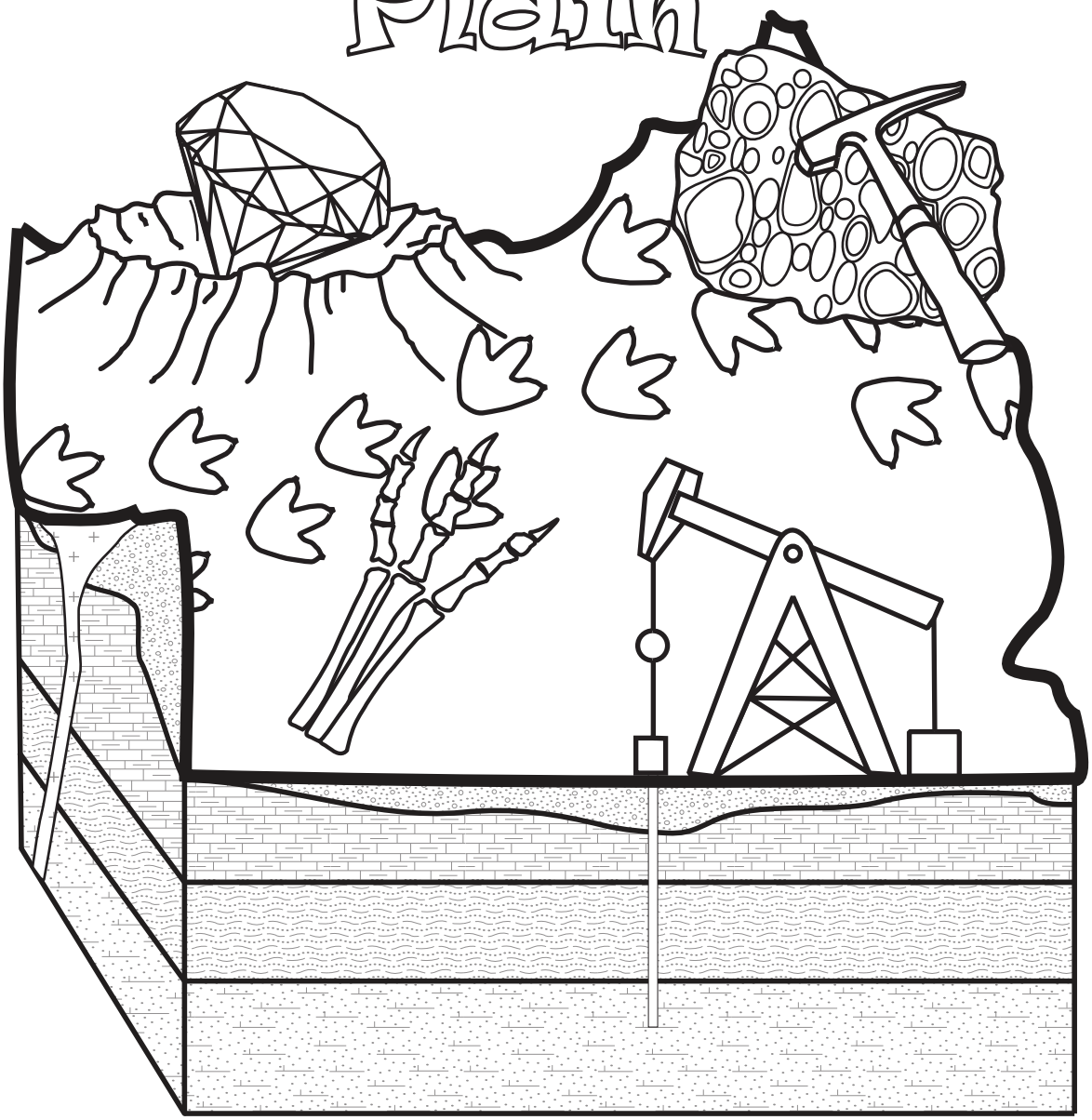
2. A soft variety of limestone that can be used to make cement.
4. Famous ridge in the Mississippi Embayment of eastern Arkansas.
6. Abundant sedimentary rock in Arkansas made up of 85-90% quartz.
8. A siliceous sedimentary rock from the Ouachitas used as a whetstone.
10. Gemstones found near Murfreesboro.
12. Mountain range in the west-central part of Arkansas.
14. The principal ore of lead.
16. Hilly region in the northern part of our state.
18. An igneous rock, similar to granite, used to make shingles.
20. Region in eastern Arkansas that contains Crowley's Ridge.
22. The remains of once living organisms.

DOWN

1. The principal ore of aluminum.
3. A clay used to make ceramics and cosmetics.
5. An often fossiliferous rock used as crushed stone.
7. Mineral from the Ouachita Mountains used in electronics and to make glass.
9. Once mined extensively in the Arkansas River Valley as a source of heat.
11. The age of rocks in southwestern Arkansas where dinosaur fossils have been found.
13. The oldest age of rocks in the Ozark Plateaus.
15. The material that caps the southern portion of Crowley's Ridge.
17. "Terrible lizard" found near Lockesburg, AR.

Arkansas Physiographic Provinces

West Gulf Coastal Plain



The West Gulf Coastal Plain Province contains Crater of Diamonds State Park and holds evidence that dinosaurs once walked across Arkansas's Cretaceous shoreline. Foot bones from our State Dinosaur, *Arkansaurus fridayi* were discovered here, as well as footprints from other dinosaurs. Many marine fossils can be found here as well, including shark teeth! Our State Rock, bauxite, was mined in this province along with crude oil and natural gas. The West Gulf Coastal Plain is characterized by fairly flat-lying rock formations and sediment deposited in terraces. The dominant rock types found here are marl, clay, chalk, sandstone, and limestone. The most common sediments are sand, gravel, and clay.

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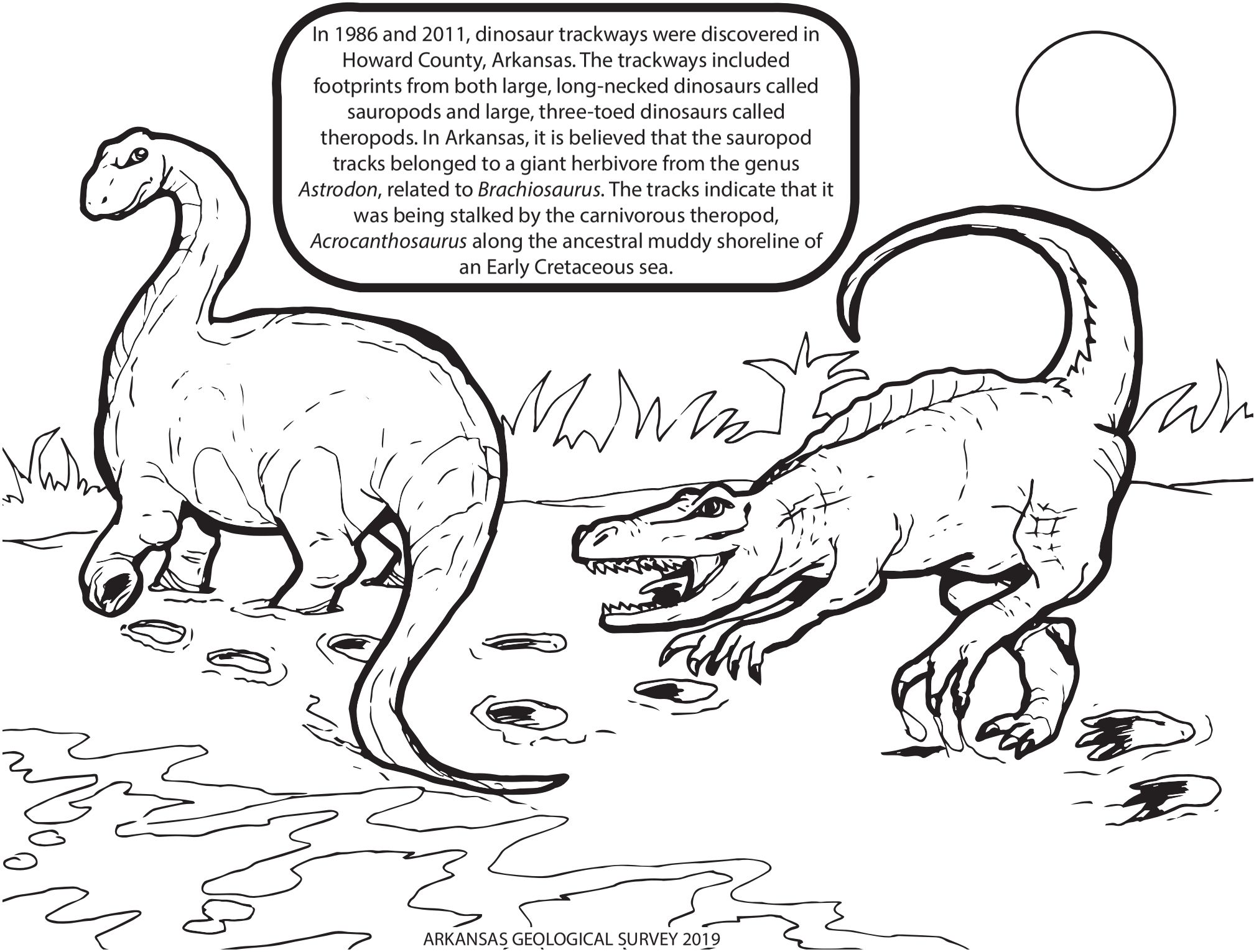
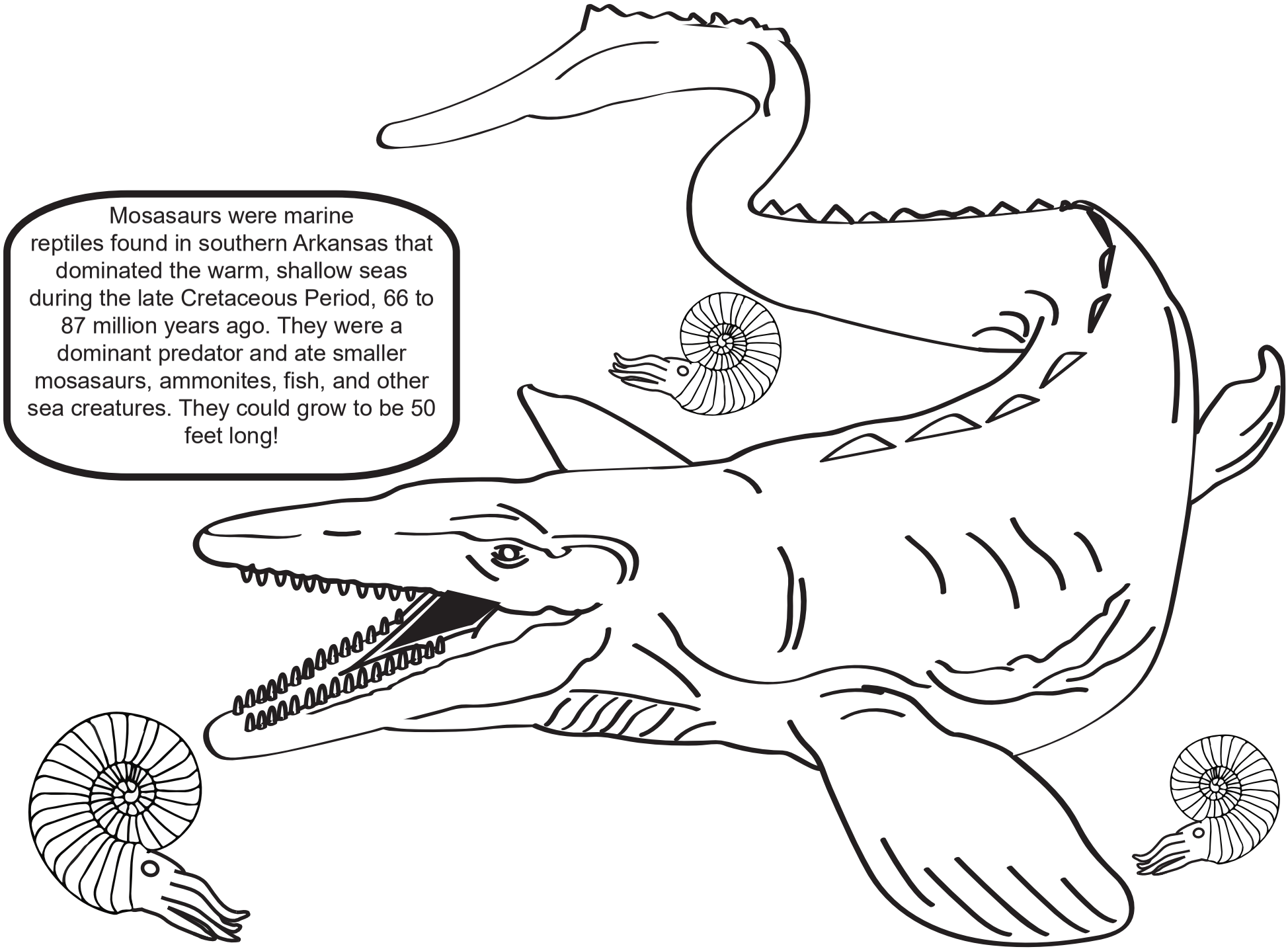


ARKANSAS GEOLOGICAL SURVEY 2019

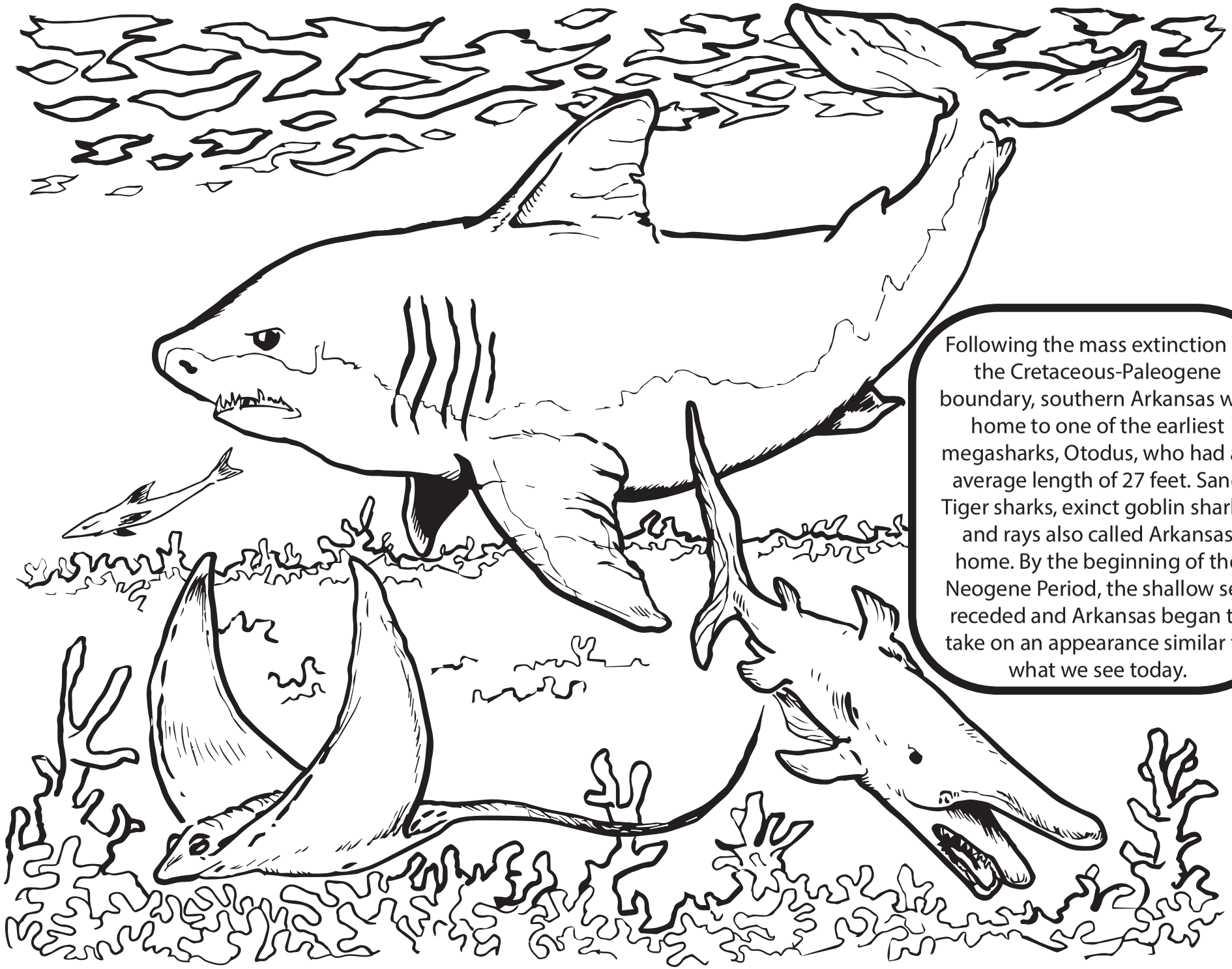
Arkansas Fossil Word Search

Search for the words below related to Arkansas geology in the above diagram. The words may read forward, backward, across, down, or diagonally.

MASTODON
CORAL
TRILOBITE
MAMMOTH
BIVALVE
NAUTILOID
AMMONOID
ECHINOID
LEAF IMPRINT
OYSTER
DINOSAUR
FOSSILS
AMBER
TRACES
GASTROPOD
CRINOID



ARKANSAS GEOLOGICAL SURVEY 2019



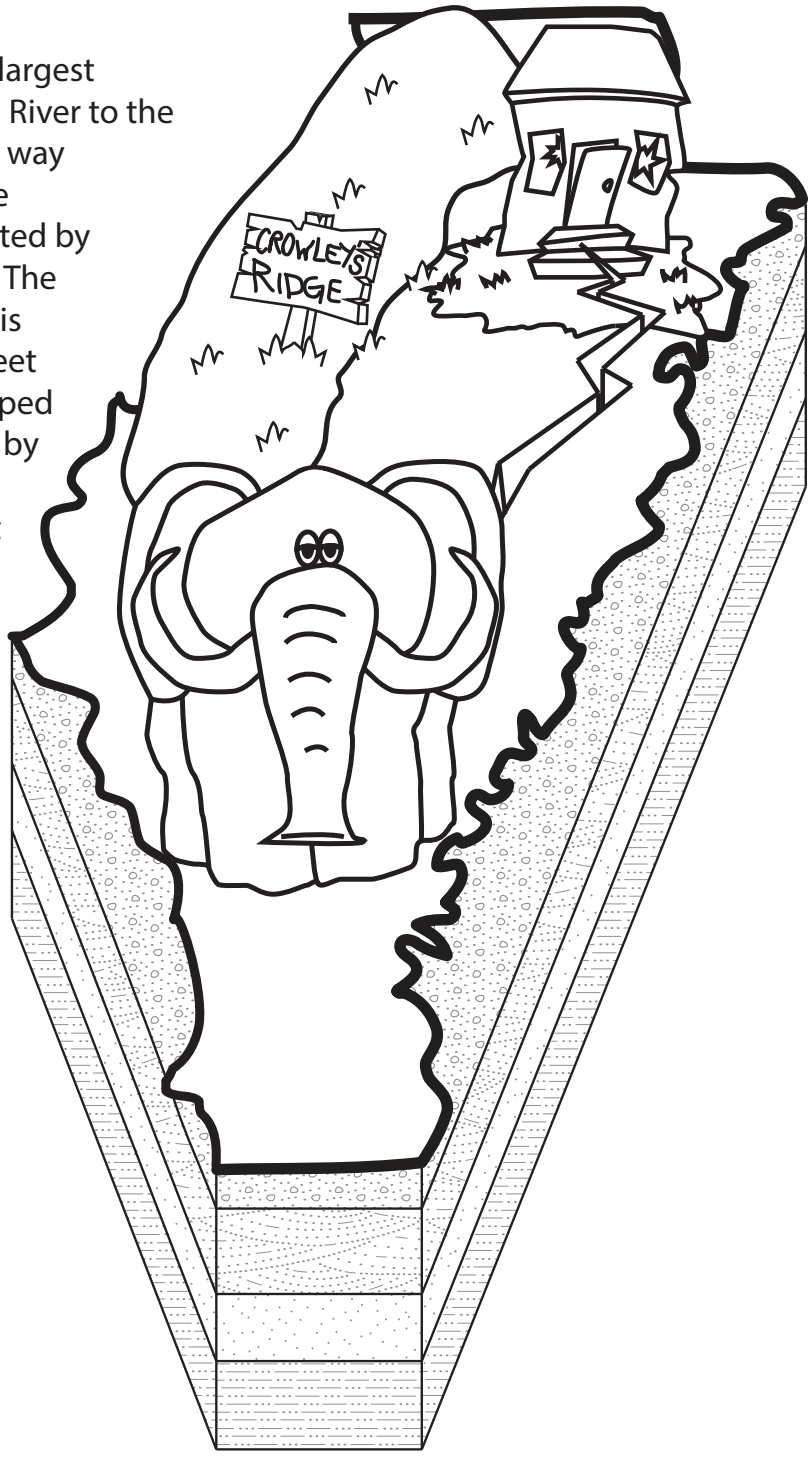
Following the mass extinction at the Cretaceous-Paleogene boundary, southern Arkansas was home to one of the earliest megasharks, Otodus, who had an average length of 27 feet. Sand Tiger sharks, exinct goblin sharks, and rays also called Arkansas home. By the beginning of the Neogene Period, the shallow sea receded and Arkansas began to take on an appearance similar to what we see today.

ARKANSAS GEOLOGICAL SURVEY 2019

Arkansas Physiographic Provinces

Mississippi River Alluvial Plain

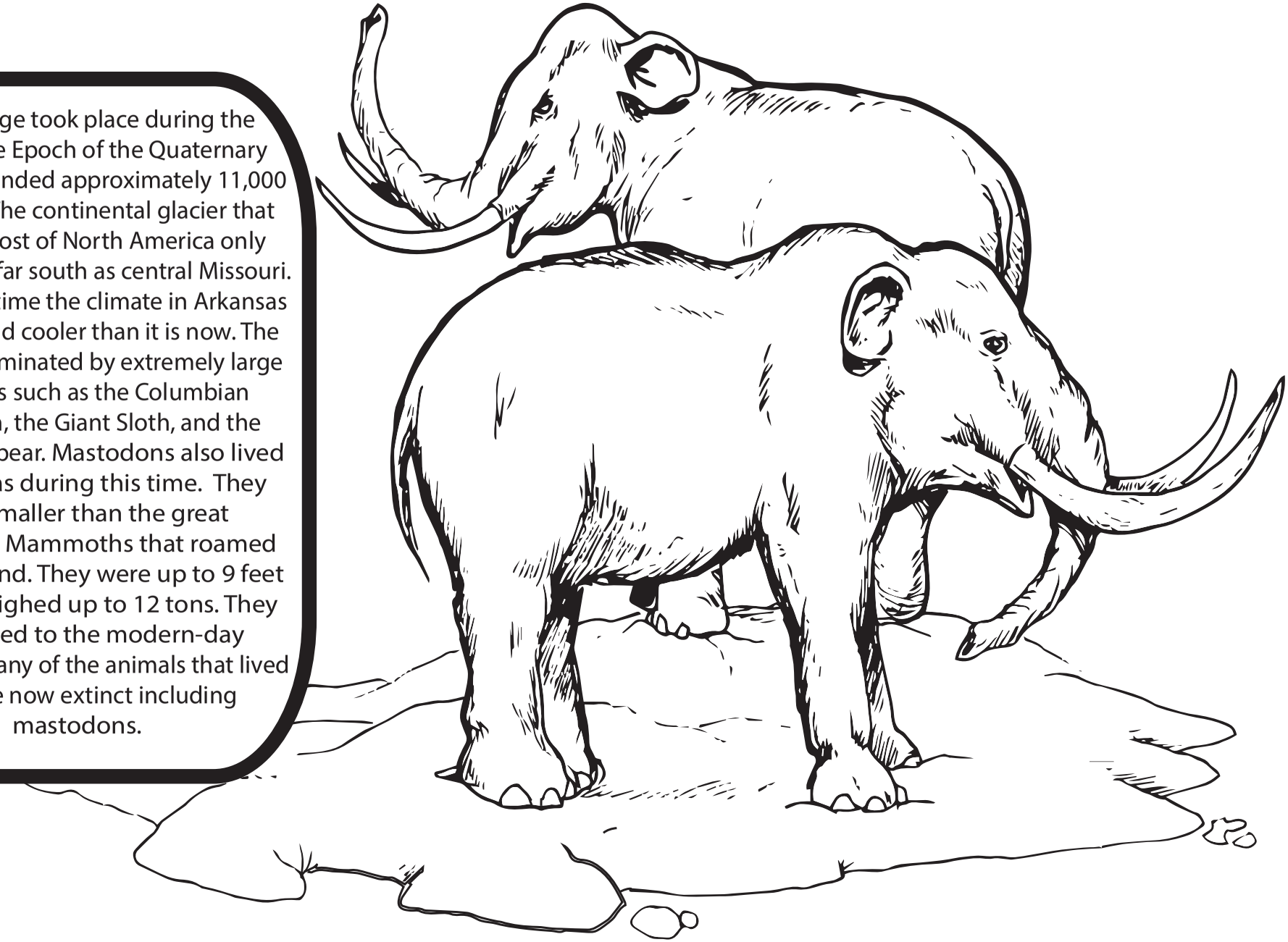
The Mississippi River Alluvial Plain is the largest province and is bound by the Mississippi River to the east. Other rivers and streams wind their way through this province on their way to the Mississippi River. The province is dominated by flat-lying sediment of sand, silt, and clay. The most prominent feature of this province is Crowley's Ridge, which stands 250-550 feet above the alluvial plain. The Ridge is capped by loess, wind-blown silt or dust created by the glaciers to the north during the last ice age. Many different species of extinct animals, such as the Columbian Mammoth and the Giant Sloth from the last ice age are found in this province.



The Mississippi River Alluvial Plain province also contains the New Madrid Seismic Zone which runs from eastern Arkansas into Missouri, Tennessee, Kentucky, and Illinois. This fault zone is the most seismically active area in the United States east of the Rocky Mountains. It produces more than 200 small earthquakes per year!

ARKANSAS GEOLOGICAL SURVEY 2019

The Ice Age took place during the Pleistocene Epoch of the Quaternary Period that ended approximately 11,000 years ago. The continental glacier that covered most of North America only extended as far south as central Missouri. During that time the climate in Arkansas was drier and cooler than it is now. The land was dominated by extremely large mammals such as the Columbian Mammoth, the Giant Sloth, and the short-faced bear. Mastodons also lived in Arkansas during this time. They were smaller than the great Columbian Mammoths that roamed the same land. They were up to 9 feet tall and weighed up to 12 tons. They are related to the modern-day elephant. Many of the animals that lived then are now extinct including mastodons.



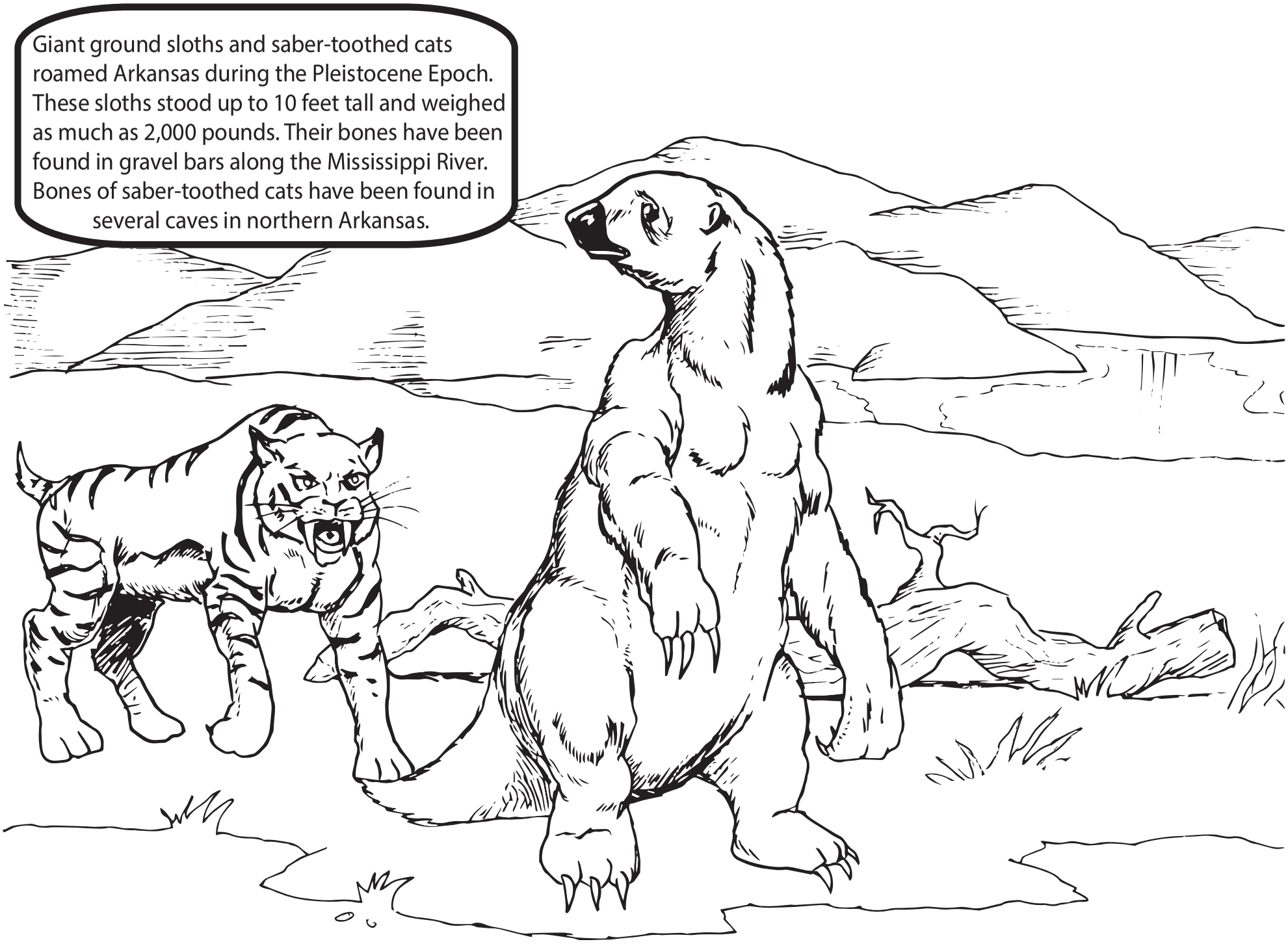
ARKANSAS GEOLOGICAL SURVEY 2019

Arkansas Earthquakes Word Search

D D N K F Z L T D T Y V W D U Y S Q I N
P X R L B S C B T S I G O L O M S I E S
D C L A E U T J I X L R I K S N L P S T
I O A N Z G X I C L I Y D H O Z G X F U
R E G A M A D E I C G Q N T U S P W A E
D Q J I P N H S H R Q A O U X A U F B K
A Z Z C B R J T E C P Z I N W J M M U A
M A Z N W X E N X O I K T T I B S B V U
W H Y Z D R E B B U E Z C Q F E N M L Q
E G R M S O N W A W U P A G K O R A F H
N W H C N U K Z T S M P F K V B U Z J T
O O A V D M C X D Y H H E T D B B E D R
X L N O O S Q O Q K O Z U M L O D O S A
E Y Q N U M G C F Z G P Q B R U I N Y E
H H P A R G O M S I E S I Z T S A N O W
H F I S S U R E T C L Y L I F X R F V B
A B W W L W Z E U P Y W N I C L Z Y I A
B N H G X B B Z C U G G F S R V L W F F
E K S H A K I N G D A K S J S T P W P I
V R K V C V H P B M R Q G M B I V E Q N

Search for the words below related to earthquakes in Arkansas in the above diagram. The words may read forward, backward, across, down, or diagonally.

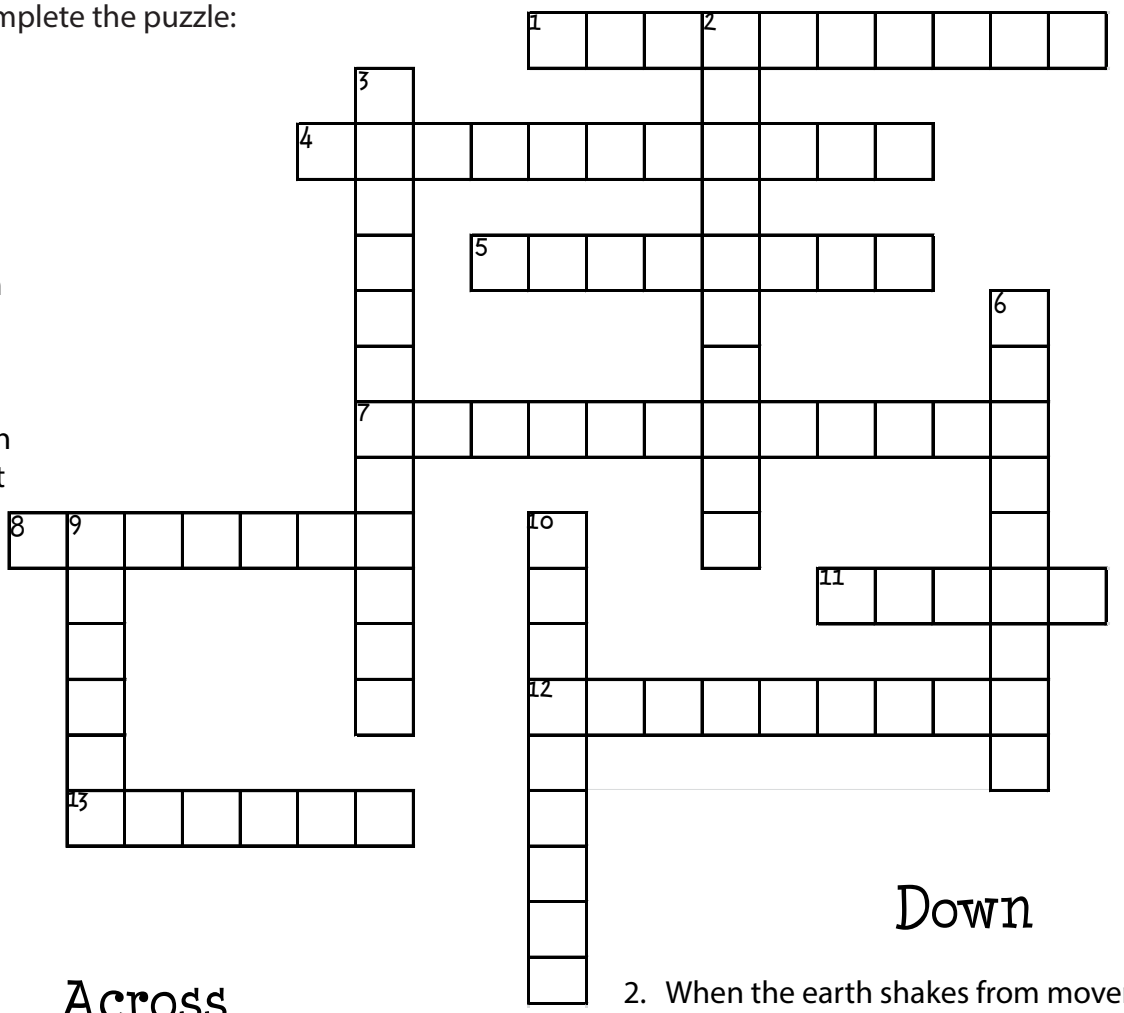
FAULT
DAMAGE
HAZARD
SHAKING
EARTHQUAKE
FISSURE
SEISMOLOGIST
FOCUS
LIQUEFACTION
NEW MADRID
ENERGY
MAGNITUDE
RICHTER SCALE
SEISMOGRAPH



Geologic Hazards Crossword

Use the following list of words to complete the puzzle:

AFtershock
Damage
Earthquake
Fault
Hazard
Landslide
Liquefaction
Magnitude
New Madrid
Shaking
Seismograph
Seismologist
Sinkhole

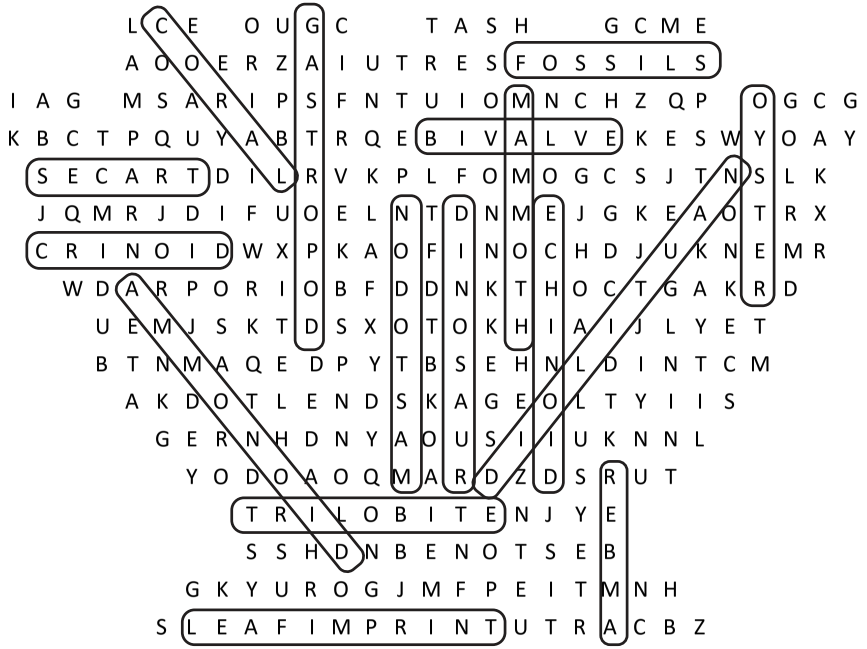


Across

1. What are the "small ground shakes" that occur after an earthquake?
4. An instrument used to measure the intensity of an earthquake.
5. A hole created when the surface of the ground collapses revealing an underground void.
7. When sandy sediment is shaken and turned into a liquid-like substance.
8. Another word for the trembling or vibrating of the ground.
11. A break in rock where movement has occurred.
12. The fault zone located in Eastern Arkansas.
13. Harm caused to something as to lower its value, usefulness, or function.

Down

2. When the earth shakes from movement along a fault.
3. A scientist that studies earthquakes.
7. The sliding down of a mass of earth or rock from a mountain or cliff.
9. A geologic condition capable of causing damage.
10. A measure of size or strength of seismic waves generated by an earthquake.


L C E O U G C T A S H G C M E
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K B C T P Q U Y A B T R Q E B I V A L V E K E S W Y O A Y
S E C A R T D I L R V K P L F O M O G C S J T N S L K
J Q M R J D I F U O E L N T D N M E J G K E A O T R X
C R I N O I D W X P K A O F I N O C H D J U K N E M R
W D A R P O R I O B F D D N K T H O C T G A K R D
U E M J S K T D S X O T O K H I A I J L Y E T
B T N M A Q E D P Y T B S E H N L D I N T C M
A K D O T L E N D S K A G E O L T Y I I S
G E R N H D N Y A O U S I I U K N N L
Y O D O A O Q M A R D Z D S R U T
T R I L O B I T E N J Y E
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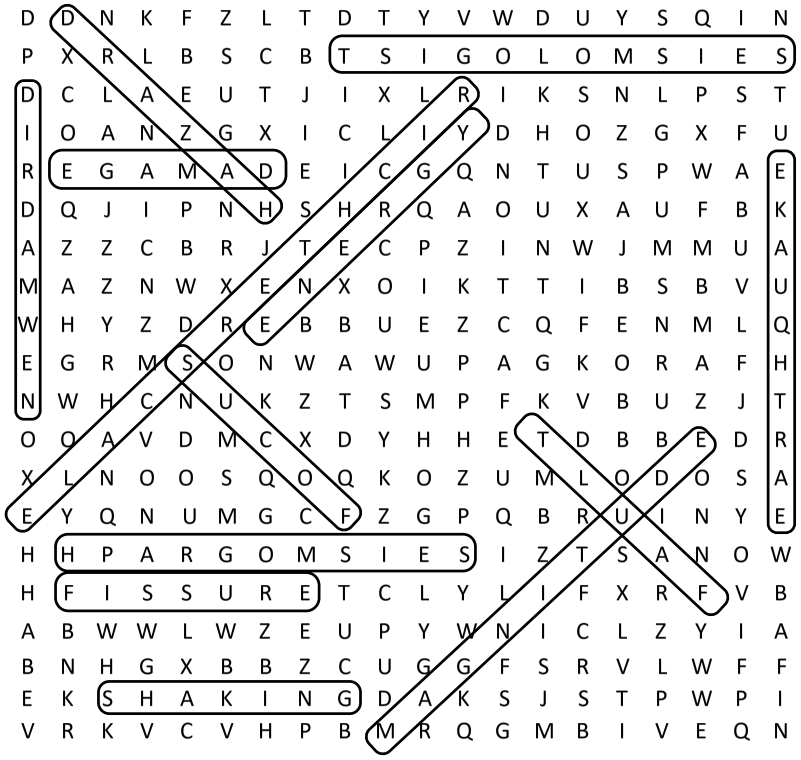
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I O A N Z G X I C L I Y D H O Z G X F U
R E G A M A D E I C G Q N T U S P W A E
D Q J I P N H S H R Q A O U X A U F B K
A Z Z C B R J T E C P Z I N W J M M U A
M A Z N W X E N X O I K T T I B S B V U
W H Y Z D R E B B U E Z C Q F E N M L Q
E G R M I S O N W A W U P A G K O R A F H
N W H C N U K Z T S M P F K V B U Z J T
O O A V D M C X D Y H H E T D B B E D R
X L N O O S Q O Q K O Z U M L O D O S A
E Y Q N U M G C F Z G P Q B R U I N Y E
H H P A R G O M S I E S I Z T S A N O W
H F I S S U R E T C L Y L I F X R F V B
A B W W L W Z E U P Y W N I C L Z Y I A
B N H G X B B Z C U G G F S R V L W F F
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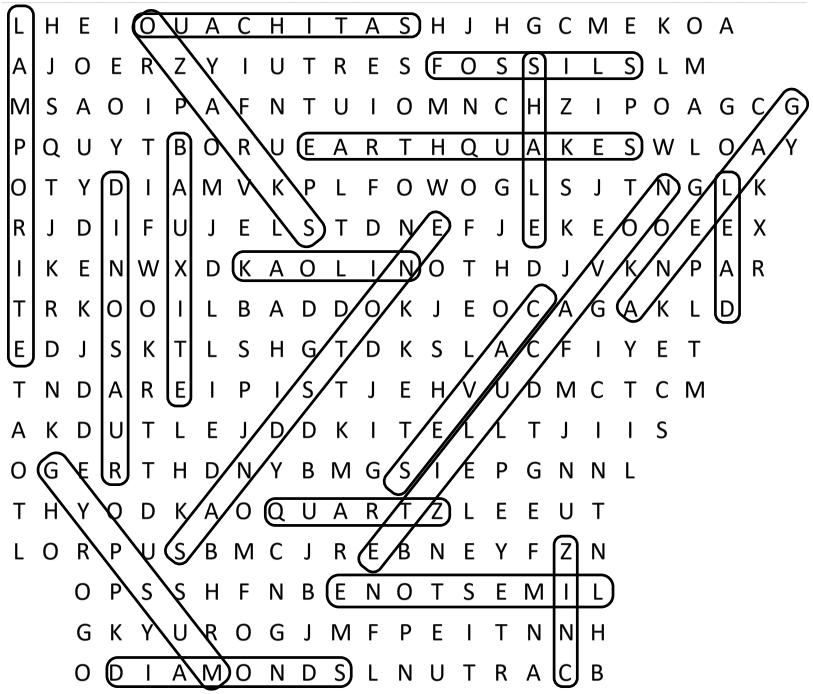
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P Q U Y T B O R U E A R T H Q U A K E S W L O A Y
O T Y D I A M V K P L F O W O G L S J T N G L K
R J D I F U J E L S T D N E F J E K E O O E E X
I K E N W X D K A O L I N O T H D J V K N P A R
T R K O O I L B A D D O K J E O C A G A K L D
E D J S K T L S H G T D K S L A C F I Y E T
T N D A R E I P I S T J E H V U D M C T C M
A K D U T L E J D D K I T E L L T J I I S
O G E R T H D N Y B M G S I E P G N N L
T H Y O D K A O Q U A R T Z L E E U T
L O R P U S B M C J R E B N E Y F Z N
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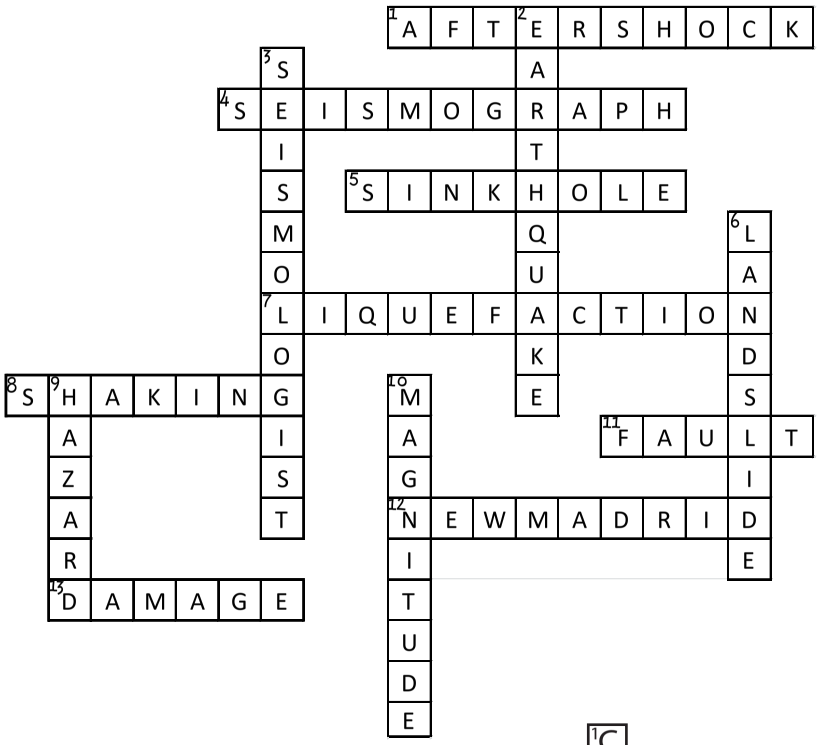
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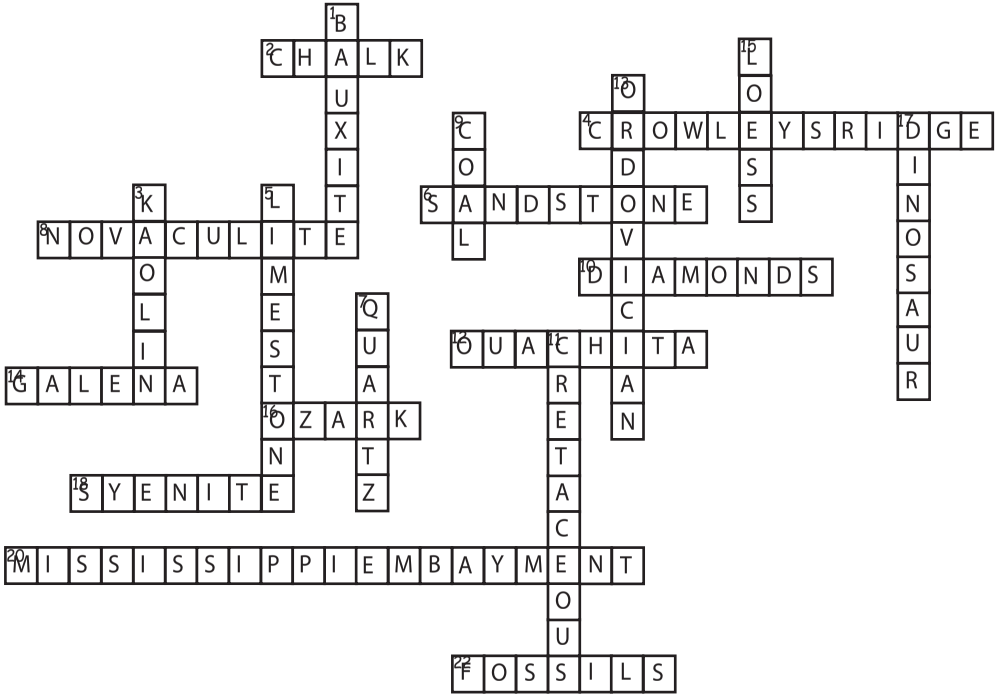
SINKHOLE
LIQUEFACTION
SHAKING
MAGNITUDE
FAULT
NEWMADRID
DAMAGE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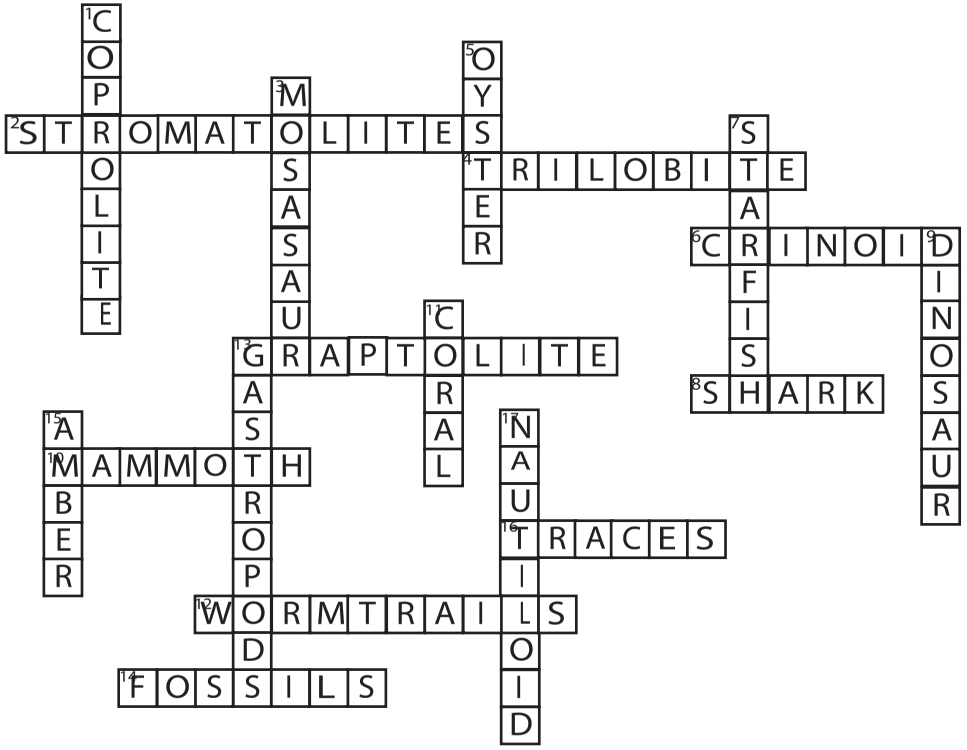
NOVACULITE
GALENA
SYENITE
OZARK
QUARTZ
CROWLEYSRIDGE
SANDSTONE
DIAMONDS
QUACHITA
RETACMENT
MISSISSIPPIEMBAYMENT
FOSSILS


COPROLITE
STROMATOLITES
OYSTER
TRILOBITE
CRINOID
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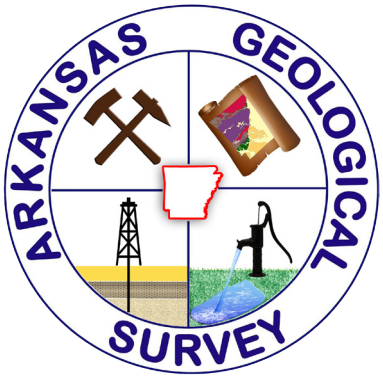

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