WETUMPKA IMPACT CRATER
Discovery
AND VISITOR CENTER

WIC Docent Training

Learn and Teach

Wetumpka Impact Crater
Display & Exhibit Materials 1

WETUMPKA METEOR'S IMPACT EVENTS | 85 Million Years Ago

BEFORE IMPACT

At the time of impact: 85 million years ago… The southern half of future Alabama was covered by a warm, shallow ocean. Teeming with a variety of aquatic life, that part of the shallow seaway was full of invertebrates such as exogyrine oysters, inoceramids, and ammonites, while monstrous creatures such as marine reptiles inhabited the water, and dinosaurs lived on nearby land. About 40 to 60% of the forests appear to have been composed of flowering plant species, with the remainder composed of ferns and allied plants, including tree ferns, and the Gymnosperms, the group to which conifers belong.

METEOR APPROACH

***Meteor type:** It is thought that this meteor originated as an asteroid before interacting with the Earth.

***Meteor enters Earth's atmosphere:** A very large rock-type meteor (1,200 feet diameter) had intersected Earth's orbit.

***Outer layer of meteor burns:** Traveling approximately 43,000 miles per hour, the meteor creates what we would think of as a sonic boom and heats up, creating a tail of fire and a blinding light.

CONTACT AND COMPRESSION

***Impact:** After burning through the atmosphere, the meteor makes impact offshore in a southern part of the shallow (about 100 feet deep) sea of North America's Western Interior Seaway. The blast created as part of the impact would go about 2,000 feet deep into bedrock.

***Shattered rocks and earth:** Shock wave travels into earth. Asteroid is vaporized.

EXCAVATION AND IMPACT EFFECTS

***Explosion and blast with ejecta:** Some rocks went into low Earth orbit. The meteor impact created an explosion equivalent to 2.6 billion tons of TNT, and equivalent to the energy of 175,000 times the nuclear bomb at Hiroshima in 1945.

***Excavation, earthquake, and fires:** Explosion causes a 9.0 earthquake, and flash fires begin along the shore and far inland.

***Wind blast - stronger than hurricane force:** Wind from the explosion affects more than a fifty-mile radius.

***Falling rocks:** After the explosion, rocks would have fallen back down in a thirteen-mile radius.

***Flashfires:** Reached out more than 31 miles from the crater causing injury and destruction of life.

MODIFICATION

***Complex crater forms:** As the rocks fall back to Earth, the crater forms a bowl with sides about 1,200 feet high and a diameter of 4.7 miles wide. (No central uplift.)

***Tsunami:** Tsunami backwash hits the crater rim and shoreline. Part of the southern rim collapses and is washed away.

AFTERMATH

All life in the area is destroyed, later a part of the rim slides into the crater. It is thought that the total area affected was 830 to 3840 square miles and included parts of Alabama and Georgia (current names).

CHANGES OVER TIME

***Crater becomes an island in the shallow sea:** An ecosystem developed on the island. The crater was in the sea for more than 20 million years.

***Coosa River flows over the crater:** According to Dr. King, It is thought that about 5.3 million to 2.58 million years ago, what would become the Coosa River flowed over a land surface that was above the crater rim. At that time, the crater itself was completely buried in sediment, and the ancient Coosa River (or its predecessor river) was flowing directly across the area, which was essentially flat land that sloped ever so slightly to the south. The only remains today of that flat plain with the river are the small patches of river gravel on the tops of the highest hills in the area.

***Modification as sea recedes:** About 64 million years later, the sea continues receding, the predecessor of the Coosa River forms, and rocks from the crater creation are left 13 miles away.

***Coosa river changes course:** Millions of years later the sea continues to recede and the crater continues to erode. Coosa River begins to flow along the Northwest rim of the crater.

THE AGE OF DINOSAURS

During the late Cretaceous Period, the continents were starting to take on their modern shapes. There were no ice caps at the poles and the global climate was very warm. At this time the dominant land vertebrates were dinosaurs. Mammals had already been around for some time, but they were small and generally insignificant.

Many scientists believe that debris from asteroid impacts resulted in fires that, combined with the ash and smoke from continuing volcanic activity, significantly reduced the global temperatures for a few decades. The resulting lower temperatures may account for the extinction of both dinosaurs and giant marine reptiles, the largest animals of the time. It could also explain how smaller animals, such as the mammals and other animals with more modest energy requirements, managed to survive and diversify in the new Cenozoic Era.

Today all over North America, Cretaceous fossils are found directly beneath a thin layer of sediment that contains unusual amounts of iridium, an element otherwise uncommon in earth's crust. Also within this layer of sediment are indications of "shocked quartz" and tiny glass-like globes called tektites. Tektites form when rock is suddenly vaporized, then immediately cooled. This happens when an extraterrestrial object such as an asteroid strikes the earth with great force. Temperatures from asteroid strikes could have reached levels high enough to cause flash fires in many locations and a tsunami over much of the Eastern United States.

Storyboards

NORTH AMERICA PRIOR TO THE IMPACT

North America near the end of the Age of the Dinosaurs

APPALACHIA was an island land mass separated from **LARAMIDIA** to the west by the Western Interior Seaway. The seaway eventually shrank, divided across the Dakotas, and retreated towards the Gulf of Mexico and Hudson Bay. This left the island masses joined in the continent of North America as the Rocky Mountains rose.

Storyboards

85 MILLION YEARS AGO

There are millions of asteroids, most thought to be the shattered remnants of planetesimals that never grew large enough to become planets. A majority of asteroids orbit in the asteroid belt between the orbits of Mars and Jupiter. However, other orbital families, including the near-earth asteroids, exist with significant populations. Near-earth asteroids, or NEAs have orbits that pass close to the orbit of earth. Sometimes, because of the attraction of other planets, these asteroids change their orbit and collide with other asteroids. The resulting fragments that break off and fall to earth without being burned up are called meteorites.

Depending on their size, meteorites hit the earth anywhere from every day to once in 10,000 years. Specks of stardust are tiny meteorites and settle on our earth every day. Larger meteorites fall to earth about 1,500 times each year. The very large meteorites, weighing upwards of 50,000 tons, however, are believed to hit only once in every 10,000 years.

A meteoroid is a solid body in space before it reaches the earth's atmosphere. When a tiny meteoroid strikes the earth's atmosphere and burns up, the result is a fiery streak or "shooting star." If a larger meteoroid survives the fiery passage through the earth's atmosphere as a meteor and strikes the earth's surface, it is called a meteorite. Approximately 85 million years ago, scientists believe one such meteorite struck earth at the site of present day Wetumpka, Alabama.

Storyboards

THE ASTEROID APPROACHES

A large marine reptile catches a fish in the Gulf of Mexico waters 85 million years ago as an asteroid streaks through the sky on its approach to the area now known as Wetumpka. There is strong evidence that at the time of the impact, the area now known as Wetumpka was covered by a shallow sea of 100 feet in depth.

—Painting by Jerry Armstrong

Storyboards

IMPACT OCCURS IN THE SHALLOW SEA

A small tyrannosaurid dinosaur beachcombs on a barrier island shoreline just north of Wetumpka when he witnesses a meteorite impact about 15 miles away. Scientists estimate that the energy released by the Wetumpka impact event was over 175,000 times energy of the nuclear bomb detonated in 1945 at Hiroshima, Japan. *—Painting by Jerry Armstrong*

Storyboards

THE TSUNAMI APPROACHES

The intense heat from the enormous impact blast sets the shoreline woods on fire and a tsunami wave generated by the impact strikes the shore about 15 miles north of Wetumpka, as the crater walls begin to form in the shallow sea. —*Painting by Jerry Armstrong*

Storyboards

INSIDE THE CRATER

After impact, the Wetumpka crater rim stood well above sea level, thus excluding the seawater. Eventually, the weaker southwestern rim collapsed causing the interior to flood. Pterodactyls are circling the flooded interior of the crater. *—Painting by Jerry Armstrong*

Storyboards

GROUND ZERO

The above map highlights a five-mile, semi-circular pattern of hills that make up the remaining rim of the Wetumpka Impact Crater. The hard rocks of the Piedmont are bent sharply and point away from the center of the impact area. The normally horizontal layers of more recent surface rocks are mixed in and around the crater, suggesting an incredible explosion that would have destroyed all life within a radius of many miles and created an earthquake equal to 8.5 to 9.0 on the Richter scale.

Storyboards

THE CLIFFS

The unusual formation shown below, found near the center of the crater, is known by local residents as "The Cliffs." Scientific research indicates that the cliffs themselves were part of a major post-impact event, which caused a massive slide that brought vast quantities of very large blocks of sandy and clayey target sediment back into the crater. The effect of this event can be seen in the widespread interior crater-filling deposits. Good examples of this are the red and tan sands of "The "Cliffs" and other areas along Harrogate Springs Road. These red and tan layers were moved from the southern rim of the crater to their present locations during this massive event. This "trans-crater slide" came to rest against the crater wall in the vicinity of the cliffs, where – thanks to erosion in that spot – we can see slide layers folded up against the sands and harder rocks of the crater rim.

Storyboards

HOW WAS IT DISCOVERED?

In 1891, Alabama State Geologist Eugene Allen Smith noted the unusual geographical nature of the Wetumpka area. For many years the area was marked on geological maps as "structurally disturbed."

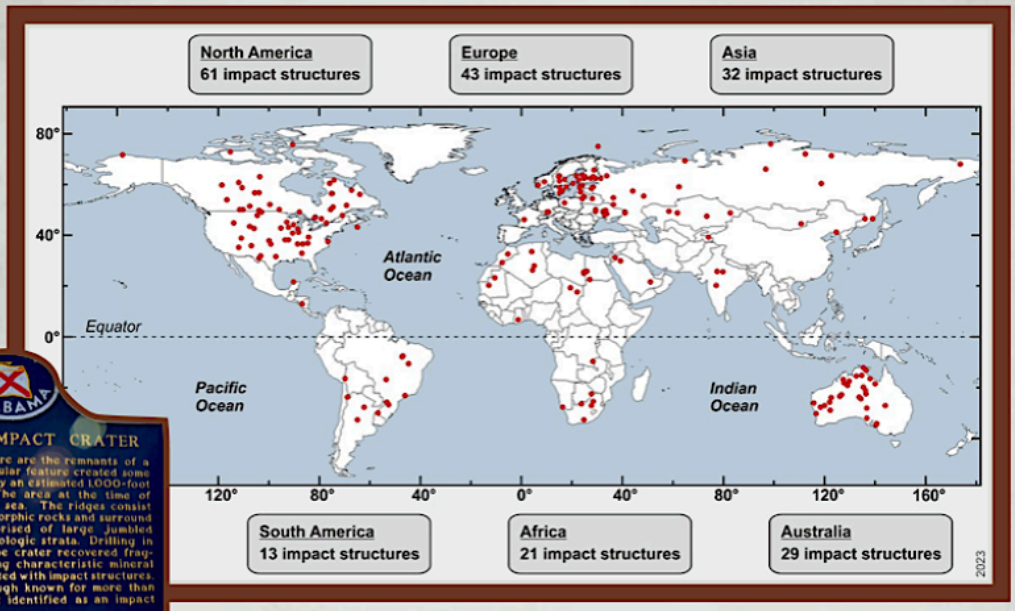
In 1969-1970, Geologist Tony Neathery headed a team making detailed geologic maps of Elmore County as part of a Geological Survey of Alabama. As they approached Wetumpka, they found rock layers bent at dramatically different angles and directions from other rocks in the area. It soon became clear that the unusual features were related to a disturbance centered in the hills east of downtown Wetumpka. Within this area, rocks were chaotically disturbed and intermixed, unlike the evenly layered horizontal rocks surrounding the area.

In 1976, when the findings were published, this feature was called an "Astrobleme," literally, a star wound. For a number of years, this conclusion was greeted with skepticism. During 1998, two cores were drilled and core samples were extracted for testing. Geologists hoped to find materials proving the "Astrobleme" theory. Dr. David T. King, Jr., Professor of Geology at Auburn University, headed the research team. The researchers indeed found the core contained shocked quartz, which can only be formed by pressures exerted during an enormous explosion such as a large meteor impact.

The research team also found chemical traces of fallen meteorite embedded in the local bedrock. In 2002, the research team published all of the evidence and established the site as an internationally recognized impact crater. There is very strong evidence that at the time of the impact, a shallow sea of approximately 100 feet deep covered the area. The Wetumpka Impact Crater is now recognized as one of the best preserved marine impact craters in the world.

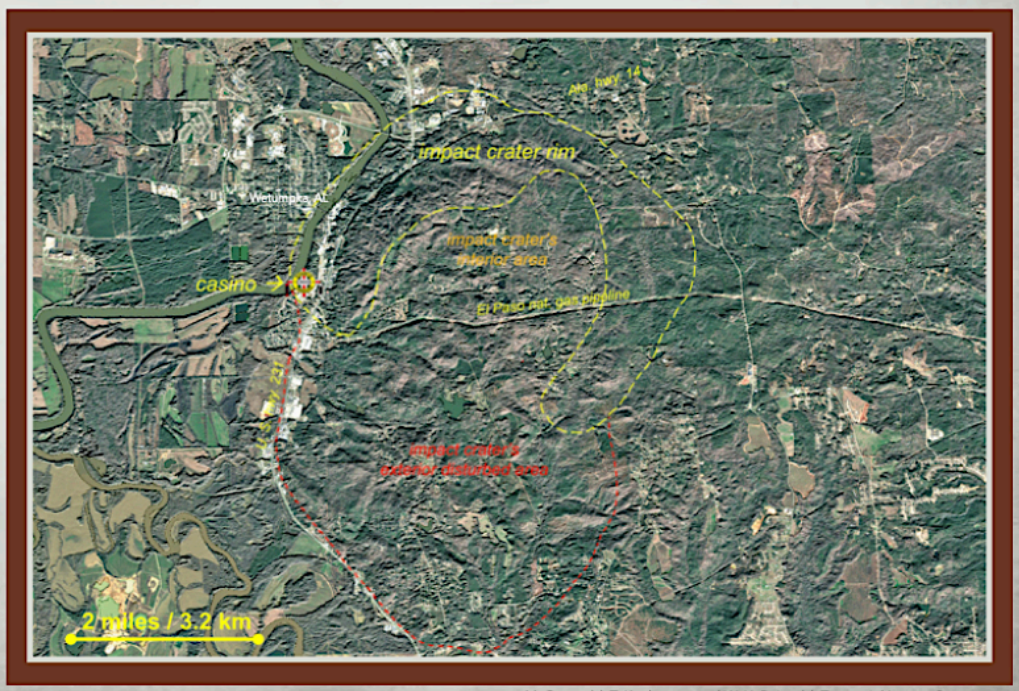
Storyboards

WETUMPKA IMPACT CRATER IN ALABAMA:
WHERE AN ASTEROID STRUCK THE EARTH



Locations of proven impact craters (●) on Earth.

TanDEM-X © image of Wetumpka area showing the impact crater's rim, the impact crater's interior area, and the impact crater's exterior disturbed area. The location of Wind Creek casino on the crater's western rim is marked, as are the main highways and roads. The crater rim is composed of dense, hard rock; the crater interior is soft sediments; and the exterior disturbed area is characterized by many small fractures.



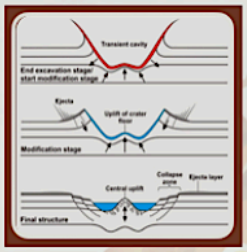
M. Gottwald, T. Kenkmann and W. U. Reimold, Terrestrial Impact Structures: The TanDEM-X Atlas Vol. 1 and 2, Munich, Germany: Verlag Dr. Friedrich Pfeil, pp. 608, 2020.

Based on research done at Auburn University, Department of Geosciences, Auburn, Alabama 36849 | Supported by NASA, City of Wetumpka, Creek Endowment Fund, and Auburn University | Poster by Prof. David T. King, Jr., his colleagues, and students (1997-2023)

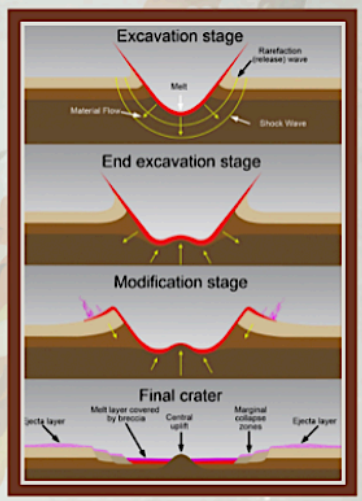
WETUMPKA IMPACT CRATER IN ALABAMA:
WHERE AN ASTEROID STRUCK THE EARTH

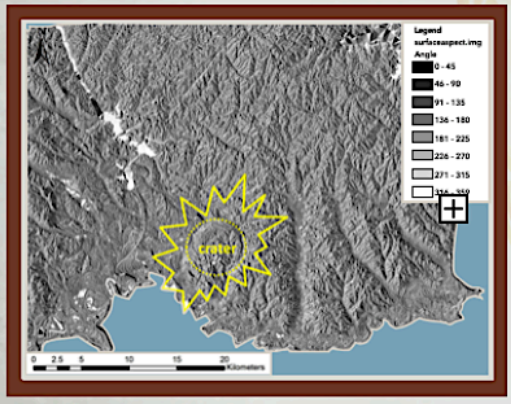
Possible asteroid flight line across eastern North America.

Above: North America, 84.4 million years ago, during the age of dinosaurs.



Stages of crater formation.





Wetumpka impact crater rim – the aerial view from laser mapping of the local topography.

Wetumpka impact crater rim – the view from US 231 highway..

Wetumpka impact crater rim – the view from aircraft over US 231, looking south.

Wetumpka impact crater floor – the view across the crater from crater center looking east along the gas pipeline.

Based on research done at Auburn University, Department of Geosciences, Auburn, Alabama 36849 | Supported by NASA, City of Wetumpka, Creek Endowment Fund, and Auburn University | Poster by Prof. David T. King, Jr., his colleagues, and students (1997-2023)

Focal Wall

See descriptions that follow.

Jerry Armstrong

Asteroid Approaches Ocean | 85 Million Years Ago
Acrylic on Canvas, 2005

Geologic Period: Late Cretaceous (kree-TAY-shus)

A marine reptile catches a fish in the Gulf of Mexico waters that covered Central Alabama, 85 million years ago as an asteroid streaked through the sky on its approach to the area now known as Wetumpka. There is strong evidence that at the time of the impact, the area now known as Wetumpka was covered by a shallow sea of 100 feet in depth.

Focal Wall JA50

Jerry Armstrong

Impact Occurs in the Shallow Sea | 85 Million Years Ago
Acrylic on Canvas, 2005

Geologic Period: Late Cretaceous (kree-TAY-shus)

A small tyrannosaurid dinosaur beach-combs on a barrier island shoreline just north of Wetumpka when he witnesses a meteorite impact about 15 miles away. Scientists estimate that the energy released by the impact event was over 175,000 times the energy of the nuclear bomb detonated in 1945 at Hiroshima, Japan.

Focal Wall JA51

Jerry Armstrong

After Impact: Inside the Crater | 85 Million Years Ago
Acrylic on Canvas, 2005

Geologic Period: Late Cretaceous (kree-TAY-shus)

After impact, the Wetumpka crater rim stood well above sea level, thus excluding seawater. Eventually the weaker southwestern rim collapsed causing a catastrophic flood across the interior. Pterodactyls are circling the flooded interior of the crater.

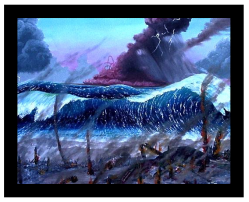
Focal Wall JA52

Jerry Armstrong

After Impact: Tsunami Approaches Land | 85 Million Years Ago
Acrylic on Canvas, 2005

Geologic Period: Late Cretaceous (kree-TAY-shus)

The intense heat from the enormous impact blast sets the shoreline woods on fire and a tsunami wave generated by the impact strikes the shore about 15 miles north of Wetumpka as the impact crater walls begin to form in the shallow sea.



Focal Wall JA53

Jerry Armstrong

Final Crater: Southern Rim has Collapsed | 85 Million Years Ago
Acrylic on Canvas, 2005

Geologic Period: Late Cretaceous (kree-TAY-shus)

The speed of the Wetumpka impact crater's creation:

- 11.5 seconds - The crater opens (crater is created).
- 26.0 seconds - The central rebound area reaches its maximum height of 200 feet.
- In less than 30 seconds - The crater rim was raised to its final height and position.
- 203 seconds (just over 3 minutes) - The crater ejecta reached out to a distance of 15 miles from the crater.

Focal Wall JA54

Jerry Armstrong

Impact Enlargement Study | 85 Million Years Ago
Acrylic on Canvas, 2005

Geologic Period: Late Cretaceous (kree-TAY-shus)

This enlarged illustration depicts one of Jerry's ideas showing what happened when the meteor hit in the shallow sea near Wetumpka, Alabama.

Focal Wall JA55

Barry Chrietzberg

Eroded Crater Interior Today “The Cliffs”

Photograph

All around the semi-circular pattern of hills that make up the remaining rim of the crater, the hard rocks of the Piedmont are bent sharply and point away from the center of the impact. The normally horizontal layers of older Cretaceous surface rocks, also highly deformed, are mixed in and around the crater resulting from the incredible explosion that destroyed all life in a radius of many, many miles.

“The Cliffs” area is composed of layers of rock that slide across the crater floor and collided with the rim during the modification stage.

Focal Wall

BC141

Hope Brannon

The Cliff’s Grotto (The Quiet Reshaping)

Photograph, 2023

Crater Hike with The Baillifs, December 19

After the meteor’s impact, there was a massive landslide from the southern rim that brought vast quantities of clay and sandy sediment back into the crater. The effect of this event can be seen in the wide-spread red, white, cream and tan crater-filling deposits. At the cliffs, the slide layers folded up against the harder rocks of the crater rim. These sediments were originally part of a short-lived southern crater rim, which no longer exists. Today, “The Cliffs” are the results of intensive stream erosion as groundwater emerges from the buried crater rim and lays bare many layers of deformed sediments and sedimentary rocks. The erosion on these formations illustrates geological processes at work and the passage of time.

The process of erosion is a phenomenal thing, constantly transforming the landscape inside the crater. Notice the colors and textures of this unusual sandy composition and the two prominent towers of earth. The vibrant colors are indicative of the various mineral contents comprising these towering formations.

Focal Wall Option A

HB198

Hope Brannon

The Cliff's Interior Slopes (Geological Tapestry)

Photograph, 2023

Crater Hike with The Baillifs, December 19

After the meteor's impact, there was a massive landslide from the southern rim that brought vast quantities of clay and sandy sediment back into the crater. The effect of this event can be seen in the wide-spread red, white, cream and tan crater-filling deposits. At the cliffs, the slide layers folded up against the harder rocks of the crater rim. These sediments were originally part of a short-lived southern crater rim, which no longer exists. Today, "The Cliffs" are the results of intensive stream erosion as groundwater emerges from the buried crater rim and lays bare many layers of deformed sediments and sedimentary rocks.

The process of erosion is a phenomenal thing, constantly transforming the landscape inside the crater. This tranquil yet dynamic natural setting invites the viewer to ponder the beauty of untouched landscapes and the intricate balance within ecosystems.

Focal Wall Option B

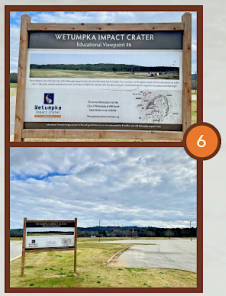
HB199

THE WETUMPKA IMPACT CRATER ROCKS! VISIT SOME OF OUR FAVORITE VIEWPOINTS!

LOCATION: WETUMPKA SPORTS COMPLEX, 2350 COOSA RIVER PKWY, WETUMPKA"

"From a distance, one of the best vistas of the Wetumpka impact crater is from the Wetumpka Sports Complex. Your view here is of the highest remains of the northwestern rim of the crater. In the center, several communication towers are located on Bald Knob (elevation 587 feet above sea level). Scientists estimate that the original rim was about twice that height."

This site is outside the Wetumpka impact crater rim and is located on the other side of the Coosa River from the crater. In this view, we are looking southwest toward the crater rim and the nearly flat land between the Viewpoint #6 location and the crater rim is the floodplain of the Coosa River. As can be seen in the map on the sign, the Coosa River approaches the crater rim from the north and then makes a notable bend as it flows parallel to the curve of the western crater rim before it flows more nearly west toward its confluence with the Tallapoosa River.



LOCATION: HISTORIC DOWNTOWN WETUMPKA

LOCATION: HARROGATE SPRINGS ROAD AT THE ENTRANCE TO "THE CLIFFS"

"You are on the crater floor inside the western rim of the Wetumpka impact crater, in an area called the "cliffs." After the meteor's impact, there was a massive landslide from the southern rim that brought vast quantities of clay and sandy sediment back into the crater. The effect of this event can be seen in the wide-spread red and tan crater-filling deposits along Harrogate Springs Road. At the cliffs, the slide layers folded up against the harder rocks of the crater rim. The large gully is due to erosion when groundwater emerges from the buried crater rim."

This site is on the western side of the crater floor area, which is adjacent to the western rim. The western rim can be seen in the distance in the photograph on the Viewpoint #3 sign. At this site, the cliffs – which are located on private property – can be seen in the distance through a gap in the trees. The sign shows a close-up photograph of results of intensive stream erosion that has laid bare many layers of deformed sediments and sedimentary rocks, which were part of a colossal landslide that moved from the southern rim and thus brought vast quantities of clay and sandy sediment back into the crater. Thus, these sediments were originally part of a short-lived southern crater rim, which no longer exists. This modification of the southern rim by massive landslide accounts for the present arc-shaped (or "horse-shoe" shaped) crater rim (note this shape in the crater relief map shown in the lower right-side corner of the interpretive viewpoint signs).

LOCATION: ON RIVER WALK BETWEEN ORLINE STREET AND THE COOSA RIVER

"The rock layers here in the Coosa River are part of the deeply eroded western rim of the Wetumpka impact crater. The Coosa River curves around the rim in the downtown area and these rock layers tilt away from the crater center, typical of layers affected by meteor impact."

This site is located on the outside, low-relief part of the Wetumpka impact crater's western rim. The western rim is much wider than the eastern rim, and the rocks of the western rim underlie all the land area between US highway 231 and the Coosa River and considerable land area to the east of the highway. The rocks where the Viewpoint #7 sign is located and the rocks depicted in the image on the sign are all part of the western rim. The inclination (tilt) of the rock layers is evident in the image of the rocks within the river. They are inclined toward the west, which is the same direction of inclination seen at Viewpoint #1. The difference between Viewpoint #1 and here (#7) is that Viewpoint #1 is located on the steeper part of the western rim.

LOCATION: BUCK RIDGE ROAD AT THE EL PASO NATURAL GAS PIPELINE

"This section of Buck Ridge Road is unusual because you can easily see hills created on both sides of the road that are related to the impact of a large meteor, 85 million years ago. These hills contain large boulders that came to rest near the center of the Wetumpka impact crater. Scientists say the impact would have caused Alabama's greatest earthquake, measuring 8.5 to 9.0 on the Richter scale."

This site is very near to the geographic center of the Wetumpka impact crater, and is part of the hilly central region of the crater floor. Unlike the deformed sedimentary rocks and sediments seen at the cliffs (Viewpoint #3), the impact materials at the surface in this region of the crater floor (within the road loop formed by Buck Ridge Road and Trotter's Trail) are composed of sandy and gravelly clay-rich sediment that contains very large boulders of metamorphic bedrock. To date, research has revealed at least 20 of these immense metamorphic bedrock boulders, some of which are more than 20 m (66 ft) across.

LOCATION: BEHIND FIRST COMMUNITY BANK ON US 231 IN WETUMPKA

"You are on the northwestern rim of the Wetumpka Impact Crater. In this area of the crater rim, there are several man-made cuts into the metamorphic bedrock. Mica schist forms the bedrock in this area down to depths of several thousand feet. After the meteor impact's explosion, the layers of rock were reconfigured so that they dip away from the crater center. The layers and their telltale westward inclination can be seen well at this site."

The eroded remains of the western rim of the Wetumpka impact crater are relatively wide on the crater's western side (where the sign is located). The crater rim extends from the Coosa River to a few hundred meters east of this location. U.S. Highway 231 lies upon the crater rim as it goes through this area. The crater rim was excavated in order to have space to build the highway and the adjacent commercial buildings like the First Community Bank and Waffle House.

LOCATION: ELMORE COUNTY HEALTH DEPARTMENT, 6501 U.S. HIGHWAY 231

"The ridges here are the remnants of a six-mile diameter circular feature created some 85 million years ago by an estimated 1,000-foot diameter asteroid. The area at the time of impact was a shallow sea. The ridges consist of a variety of metamorphic rocks and surround a central area comprised of large jumbled blocks of younger geologic strata. Drilling in the central area of the crater recovered fragments of rocks showing characteristic mineral alteration only associated with impact structures. The structure, although known for more than a century, was first identified as an impact crater in the 1970s."

As shown on the map at the outset of this guidebook (see point marked AHA), this location is on the western rim of Wetumpka impact crater. Rocks exposed in an old quarry on the opposite side of U.S. Highway 231 are the same crater-rim metamorphic rocks, which are tilted toward the west, as seen at Viewpoints #1 and #7. Adjacent to this marker, on the north side of E-S Boundary Street where it joins U.S. Highway 231, you can see deeply weathered crater rim metamorphic rocks with layers that are inclined toward the river (to the west).

LOCATION: BALD KNOB ROAD AT THE ALABAMA POWER COMPANY POWERLINE

"The beautiful vista across the Wetumpka Impact Crater is best seen from the highest point on the northwestern rim here at Bald Knob. A favored area for communication towers, Bald Knob is almost 600 feet above sea level. Looking down the power line cut-through shows the rim on the east side and some of the disruption and changing terrain inside the crater. Best views of the other side of the crater are from private property also pictured here."

This site is nearly atop the western rim of the Wetumpka impact crater. A view to the east along the power-line cut shows the interior of the crater and a view to the west shows the wide floodplain area of the Coosa and Tallapoosa rivers, which abuts the western crater rim. The crater floor, which can be seen here (downhill, along the power-line cut) consists of red, brown, and tan sediments that are directly adjacent to the crater-rim rocks (seen on the side of the road driving up Bald Knob Road to the sign's location). The crater-rim rocks are the same metamorphic rocks (specifically mica schist) as seen at Viewpoint #1. The sediments and sedimentary rocks of the cliffs area will be described more specifically at Viewpoint #3.

LOCATION: TROTTER'S TRAIL AT THE EL PASO NATURAL GAS PIPELINE

"Because of the cleared natural gas pipeline, this area provides an excellent view of the eastern Rim of the Wetumpka impact crater. The notch on the far rim is over a mile away. On the other side of Trotter's Trail (behind you), the high point is near the epicenter of the crater."

This site is slightly east of the geographic center of the Wetumpka impact crater, and is part of the hilly central region of the crater floor (as at Viewpoint #4). However, we do not find large boulders here as described at Viewpoint #4. Because of the relatively low relief of the crater floor in this part of the crater, and (as the sign text notes) the cleared corridor for the natural gas pipeline, one can see clearly all the way to the eastern rim. This distance is just over 1.6 km (or about 1 mile away). The notch where the natural gas pipeline crosses the eastern rim is marked by a red arrow on the Viewpoint #5 sign's image. The eastern rim is much lower than the western rim, and this is evident in the sign's image as well.

Impact Events Wall

85 MILLION YEARS AGO

IMPACT Crater

WETUMPKA

HOW FAST DID ALL THIS HAPPEN?

0.00 SECOND
Forward shock wave begins travel into Earth & reverse shock wave begins travel back into asteroid.

0.02 SECOND
Asteroid reaches depth of 1,000 feet into the ground. *Did not "see" the water! That is, the 100 feet of water where it hit made no difference to the incoming object.*

0.02 SECOND
Shock wave reaches back end of the asteroid and it is vaporized yielding about 2,600 megatons of energy (175,000 x the energy of Hiroshima bomb).

0.02 SECOND
Flashfires reach a radius of over 31 miles; total fire area probably was more than 3,000 square miles. (For example, Montgomery is in the area of total destruction).

0.02 SECOND
First ejecta material leaves the crater at 159,000 miles per hour.

0.60 SECOND
First ejecta material reaches outer space (goes into low orbit around earth).

2.00 SECONDS
Shock wave reaches out to 25 miles, flattening everything in its path. Total flattened area probably was more than 2,000 square miles. Middle part of Alabama is flattened; dinosaurs and most other living things in the area are killed.

2.00 SECONDS
Tsunami wave reaches height of 39-128 feet high and extends out to a distance of several miles from the crater.

11.5 SECONDS
Crater opens (crater is created).

26.0 SECONDS
Central rebound area reaches its maximum height of 200 feet.

IN LESS THAN 30 SECONDS
Crater Rim was raised to its final height and position; then the southern part collapses, and debris flows back into the crater.

203 SECONDS (IN JUST OVER 3 MINUTES)
Crater ejecta has reached out to a distance of 15 MILES from the crater.

FOR THE WETUMPKA CRATER, THIS WAS NOT THE END
Ongoing research indicates that a secondary, "tsunami backwash" washed back into the crater, washing away parts of the southern rim!

IF IT HAPPENED TODAY—
400,000 human casualties!

This is clearly Alabama's greatest natural disaster!

Source: Wetumpka Impact Crater Timeline on Dr. King's website with additional editing by James Lowery for use in presentations. Acquired online March 27, 2003. JRL revision 3-13-2017

Hope Brannon

Meteor Approaches Earth

Mixed Media, 2022

Late Cretaceous Period Impact Craters:

Including Wetumpka 84.4 million years ago, there are nine Late Cretaceous terrestrial impact craters known, ranging in size from 6 to 170 kilometers (3.73 - 105.6 miles) diameter, and all are situated in the northern hemisphere. Two of these impact craters are temporally correlated with global marine mass extinctions. Steen River impact crater (25 kilometers or 15.5 miles in diameter; Canada) may be related to the terminal Cenomanian (91 million years ago) mass extinction of 14 to 19 percent of all marine genera. Chicxulub (170 kilometers or 105.6 miles diameter; Mexico) is firmly established as a significant causal factor in the well-documented terminal-Cretaceous (66 million years ago) mass extinction that included 39 to 47 percent of all marine genera and many terrestrial genera as well.

Impact Events Wall

Hope Brannon

Meteor Enters Earth's Atmosphere

Mixed Media, 2022

Meteor Approach: Wetumpka's imperfect horseshoe-shaped crater rim is thought to be associated with an interior northeast-trending aeromagnetic anomaly. The meteor is presumed to have arrived at average intra-solar system velocity of 20 kilometers per second (44,738 miles per hour). The most impressive phenomenon accompanying a hypervelocity impact such as the Wetumpka impact is the destruction of the projectile.

HB82

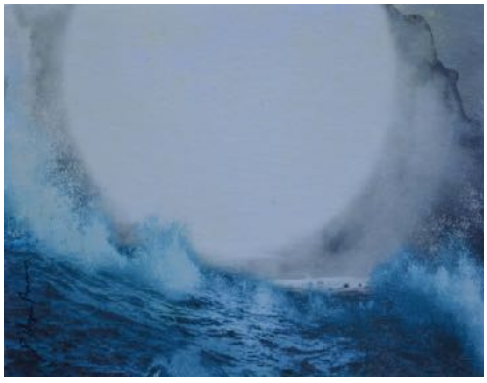
Hope Brannon

Flash Point Radiation

Mixed Media, 2022

Flash Point Radiation: A brilliant light flash (including ultraviolet, visible, and infrared) typically accompanies a hypervelocity impact. This would have blinded all surviving animals. This phenomenon is attributed to the ionization of gasses at the instant of impact, as well as the ejection of incandescent molten material. For Wetumpka on a clear day, maximum burn area would have been 7500 square kilometers (or 4,660 square miles), and maximum burn radius would have been 47 kilometers (29.2 miles). For comparative purposes, the area of Montgomery County is approximately 2.1 x 105 hectares (1,304 square miles,) and downtown Wetumpka, AL and the State Capitol building in Montgomery, AL are separated by approximately 18 kilometers (12 miles) along a straight line.

HB83



Impact Events Wall

Hope Brannon

Excavation Begins

Mixed Media, 2022

Ground Zero: Area of Impact:
Wetumpka's impact is thought to have occurred in about 100 feet of water and 10-15 miles offshore from a barrier-island coastline in a shallow sea; teaming with aquatic Cretaceous life. Dinosaurs and other reptiles roamed and ruled the shoreline, barrier-islands and a tropical-rainforest of cycads, conifers, angiosperms, and other lush vegetation that thrived on future Alabama's low coastal plain. First ejecta material leaves the crater at 159,000 miles per hour.

Hope Brannon

Excavation & Explosion

Mixed Media, 2022

Destruction of Life: When the meteorite vaporized after surface impact, energy equivalent to 175,000 times the energy of the nuclear bomb at Hiroshima was released and thus opened a 3.3 to 4.2 kilometer (2 to 2.6 mile) diameter transient crater.

Stage 1: contact and compression -
0.00 to 0.02 seconds
Stage 2: excavation -
within 0.02 seconds to 11.5 seconds

Impact Events Wall

Hope Brannon

9.0 Earthquake

Mixed Media, 2022

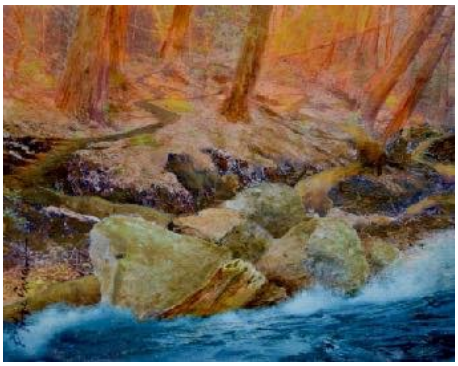
Earthquake: The terrestrial surface-wave magnitude of seismic shock-wave (an earthquake) would have been 8.4 to 9.0 on the Richter scale.

At 0.00 SECOND - Forward shock wave begins travel into Earth and the reverse shock wave begins travel back into asteroid.

At 0.02 SECOND - Asteroid reaches depth of 1,000 feet into the ground. Did not "see" the water! That is, the 100 feet of water where it hit made no difference to the incoming object.

At 0.02 SECOND - Shock wave reaches back end of the asteroid and it is vaporized yielding about 2,600 megatons of energy (175,000 times the energy of the Hiroshima bomb.)

HB86



Hope Brannon

Blast Wave: Hurricane Force Winds

Mixed Media, 2022

Hurricane Force Straight Winds: (Force 5 Hurricane winds, as high as 500 mph) On a vegetated plain, both atmospheric peak over-pressure wave and infrared flash-burn combustion due to the impact explosion would have devastated a region estimated to have comprised of 830 to 3840 square miles. At Wetumpka, a ground impact would have set up an atmospheric blast wave that delivered key peak pressure at a maximum radius of 19 to 40 km (11.8 to 24.8 miles). The maximum radius of key peak pressure would have been 96 kilometers (59.7 miles). To put the maximum radii above in perspective, downtown Wetumpka, AL and Auburn, AL are separated by a straight-line distance of 69 kilometers (42.8 miles.) The shock wave would have flattened the middle of today's Alabama and Georgia, killing most animal life.

HB87

Impact Events Wall

Hope Brannon

Flash Fires

Mixed Media, 2022

Flash fires occur when direct, radiant thermal energy exceeds 109 erg/cm2 on combustible natural materials. These effects would have occurred within the 7500 square kilometers (4,660 square mile) area. The combustible natural materials at Wetumpka were likely tropical-rainforest angiosperms, cycads, conifers, and other lush vegetation thriving on future Alabama's low coastal plain. Subsequent reentry of particles sent into low orbits would have secondarily heated the atmosphere and would have caused additional radiant thermal damage. Flash-fires would have disintegrated everything for 3,000+ square miles, including modern-day Auburn, Montgomery, Clanton, and some of Birmingham.

HB88

Hope Brannon

Falling Rocks Along the Shore

Mixed Media, 2022

Falling Projectiles: A cascade of falling rocks and molten materials were blasted out of the developing crater bowl and were most likely traveling at a high velocity, perhaps disintegrating, perhaps falling back to earth as weapons from the sky. The debris reached out a minimum of 15 miles.

HB89

Impact Events Wall

Hope Brannon

Falling Rocks Into the Sea

Mixed Media, 2022

Falling Projectiles: The cascade of falling rocks bombarded the shallow sea and any remaining marine life that inhabited the turbulent waters. In just a matter of seconds many Cretaceous creatures met their demise.

HB90

Hope Brannon

Tsunami

Mixed Media, 2022

Tsunami: In shallow seawater, this impact would have generated a tsunami-like wave estimated to have been as much as 39-128 high at a distance of five asteroid radii (875 meters or .54 miles) from the target center.

HB91

Impact Events Wall

Hope Brannon

Tsunami Approaches the Forming Crater

Mixed Media, 2022

Sediments outside the southern side of the crater were washed into place by the resurgence of sea water that had been forced away from the area by the impact. The outward surge occurred in 5 - 200 seconds before returning in a matter of minutes. It is thought that the southwest side of the rim collapsed at about 25 seconds.

HB92

Hope Brannon

Crater Forms

Mixed Media, 2022

Crater Formation, Reshaping the Landscape: The impact's blast effect pulverized rock within a crater cavity that extends over 650 feet deep (beyond the limit of the drilling depth at the time of investigation). Judging from the crater diameter, the Wetumpka asteroid was approximately 1200 feet in diameter and was composed mostly of stone.

HB93

Impact Events Wall

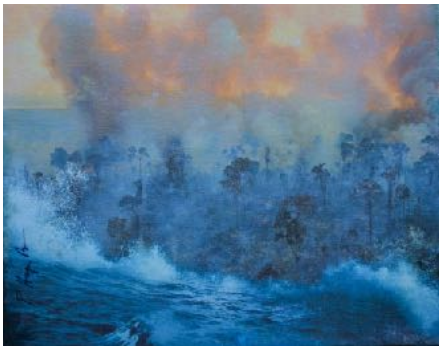
Hope Brannon

Aftermath

Mixed Media, 2022

Aftermath Area: In the aftermath of the Wetumpka impact, the devastated area for Wetumpka would have been between 830 to 3840 square miles. To put the disaster area in perspective, Montgomery County, AL comprises an area of approximately 800 square miles.

HB94



Hope Brannon

Smoke & Ash-Life Destroyed

Mixed Media, 2022

Loss of Life: Thousands of living things were decimated by the event: plants, dinosaurs, reptiles, and aquatic life.

HB95

Impact Events Wall

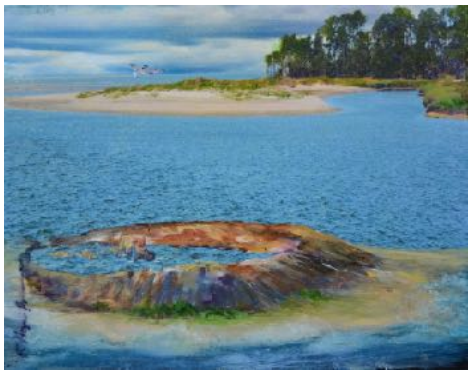
Hope Brannon

Crater Becomes A Terrestrial Island: Many Years Later

Mixed Media, 2022

As life begins to return, an ecosystem develops on the crater island. The crater remains in the sea (Gulf of Mexico) for millions of years until the sea level recedes.

HB96



Hope Brannon

Coosa River Flows Over the Sediment Filled Crater

Acrylic on Canvas, 2023, Trypitch

As the sea recedes, the crater, which was eroded and buried in sediment, becomes dry land. When the Coosa River develops, it flows over the buried crater. Today river gravel is found on the highest hills in the area.

HB97

Impact Events Wall

MICA SCHIST OF THE CRATER RIM

These slabs of rock are layers of mica schist, a metamorphic rock that comprises the bedrock underlying softer, sands, gravels, clays, and chalks covering much of the surface area within the crater vicinity in southern Elmore County. This layered (or foliated) metamorphic rock was formed during the development of the southern Appalachian Mountains between about 290 and 310 million years ago. During that time of mountain-building and of metamorphism of the bedrock, the shiny, black mineral that is so common in these rocks (biotite mica) was formed within the bedrock. This flat, flakey mineral is the most common component of the mica schist, however, this rock also contains some quartz, feldspar, and other mica minerals.

These schist pieces represent the rocks at Interpretive Sign #1 – Located behind the 1st Community Bank on US 231. See Dr. King's *"Guide to Interpretive Signs"*

The effect of impact at Wetumpka was to uplift this bedrock mica schist, so that it formed the hard crater rim that we see today (encircling the crater as a horseshoe-shaped rim of hills).

The mica schist of the crater rim is best seen on the western side of the crater, for example, behind the 1st Community Bank, CVS Pharmacy, and the Waffle House. These rocks came from that general area. This is also Educational Viewpoint #1 where the Crater Commission has placed an interpretive sign near the 1st Community Bank parking lot.

***This display illustrates the actual dip (of about 48 degrees) on Tony Neathery's map.**

QUARTZITE BOULDER FROM CRATER EJECTA LAYER

16

Quartzite is a metamorphic rock that formed as a result of temperature and pressure effects on pre-existing quartz-rich rocks during regional metamorphism. In the Elmore County area, this regional metamorphism occurred about 290 to 310 million years ago when the southern Appalachian Mountains were formed by tectonic processes. Layers of quartzite thus formed along with the mica schists (displayed elsewhere) and comprise the part of the local bedrock of this area.

About 85 million years ago, boulders and megaboulders of quartzite were excavated by the force of impact at Wetumpka, and landed on and near the crater rim during the explosive impact crater.

A boulder is a broken fragment of rock with size greater than 25.6 cm (10.1 in) in diameter up to 10 m (32.8 ft) in diameter; fragments larger than boulder are sometimes called megaboulders. At Wetumpka crater, boulders and megaboulders, were ejected from the crater, thus forming part of the crater ejecta layer. Some boulders and megaboulders were composed also of mica schist and other metamorphic rock (gneiss). Some of that boulder-bearing ejecta layer is still preserved within the crater itself. This ejecta layer is found near Educational Viewpoint #4 where the Crater Commission has placed an interpretive sign on the El Paso Natural Gas Pipeline.

Studies of boulders like the one in this display have shown that quartz and other minerals in the rock (for example, feldspar), were damaged by the force of impact. This damage, known as shock effect, has caused permanent changes within the crystals of the minerals. This can only be seen microscopically, however, the darker areas of this boulder are likely to be more intensively damaged by shock effects than the

IMPACTITE SAND FROM THE CRATER FILLING LAYER

The impactite sand is a thick deposit of sandy and clayey sediment that fills most of the upper half to two-thirds of the Wetumpka impact crater bowl. The impactite sand is a mixture of the target sandy formations (Upper Cretaceous Tuscaloosa Group and the Eutaw Formation, plus finely pulverized metamorphic bedrock). In some places, the impactite sand contains boulders and megaboulders of metamorphic and sedimentary rock. On the southeastern side of the crater, the impactite sand was drilled to a depth of more that 218 m (715 ft).

About 85 million years ago, Upper Cretaceous target formation and the local metamorphic bedrock were disintegrated by the force of impact at Wetumpka, and a vast amount of sandy and clayey sediment was thus formed as a result of the impact cratering event. Much of this impactite sand, either flowed, slumped, or slid back into the crater, thus forming the thick impactite sand crater-filling deposit.

The samples shown here are typical of the impactite sand of the crater interior that occurs between Educational Viewpoints #3 and #4. The red parts of the rock are more clay-rich and the lighter tan parts are more sandy.

Studies of impactite sands like the one in this display have shown that these sands are a composed mainly of target Upper Cretaceous sands and clays and only a minor component of metamorphic bedrock, which has been pulverized. These sands do not typically show any shock effects within the constituent quartz grains.

Crater Composition

Mixed Media, 2022

It is composed of a chaotic mixture of piedmont and sedimentary clastic particles ranging from micron-sized clay to large boulders. In this chaotic mix, are internally deformed as well as relatively undeformed mega-boulders, commonly supported on one another with a sheared, finer-grained interstitial matrix. The internal stratigraphy of the Wetumpka assorted crater mix may be divided into two parts: (1) deformed blocks of Upper Cretaceous strata and clastic matrix; or (2) deformed blocks of crystalline piedmont rocks and sheared piedmont matrix.

Mica Schist

A metamorphic rock made of mica, quartz, and other hard minerals; organized into flat layers called foliation and breaks into flat pieces

Shocked Quartz

Shocked quartz is a form of quartz that has a microscopic structure different from normal quartz, caused by intense pressure and temperature undergone by the crystal. It is found in meteor craters, nuclear weapons testing sites, and lightning strikes. It can be identified by shock lamellae under a microscope.

Fossilized Oyster

Alabama Cretaceous Invertebrates: Three commonly found Late Cretaceous invertebrate fossils include exogyra oysters, inoceramid clams, and ammonites.

- Exogyra is an extinct genus of free-living oyster.
- Inoceramids were large thin-shelled clams that could grow up to three-feet in diameter.
- Ammonites: Ammonites were cephalopods distantly related to the modern Nautilus, but their ancestors diverged more than 380 million years ago. They had complexly chambered, coiled shells housing a soft body and appeared much like a giant squid coiled in a shell. Some ranged to nearly three feet across and were predatory animals, as well as food themselves for even larger marine predators, such as mosasaurs.

Coprolite

A coprolite (also known as a coprolith) is fossilized feces. Coprolites are classified as trace fossils as opposed to body fossils, as they give evidence for the animal's behavior (in this case, diet) rather than morphology. The name is derived from the Greek words (kopros, meaning "dung") and (lithos, meaning "stone").

They were first described by William Buckland in 1829. Before this, they were known as "fossil fir cones" and "bezoar stones". They serve a valuable purpose in paleontology because they provide direct evidence of the predation and diet of extinct organisms. Coprolites may range in size from a few millimeters to over 60 centimeters.

Brooks Barrow
Crater Reflection, 2023
Black Marble

Inspired by the soapstone bird effigy bowl discovered at Creek Settlement at Moundville, Alabama; this bowl imagines the ***Wetumpka impact crater*** as it might have been reflected upon by early travelers and explorers as they observed its dramatic, tree-covered contours.

Carved from a block of black marble, Brooks presents an imaginative view of the crater along with its reflection on an ancient Cretaceous Sea. Like the bird effigy bowl, it encourages contemplation on our natural environment in our own time.

THE CLIFFS
OF THE WETUMPKA IMPACT CRATER

"The crater floor inside the western rim of the Wetumpka impact crater, is comprised of an area called the "cliffs." After the meteor's impact, there was a massive landslide from the southern rim that brought vast quantities of clay and sandy sediment back into the crater. The effect of this event can be seen in the wide-spread red and tan crater-filling deposits along Harrogate Springs Road. At the cliffs, the slide layers folded up against the harder rocks of the crater rim. The large gully is due to erosion when groundwater emerges from the buried crater rim."

These photographs portray the results of intensive stream erosion that has laid bare many layers of deformed sediments and sedimentary rocks, which were part of a colossal landslide that moved from the southern rim and thus brought vast quantities of clay and sandy sediment back into the crater. Thus, these sediments were originally part of a short-lived southern crater rim, which no longer exists. This modification of the southern rim by massive landslide accounts for the present arc-shaped (or "horse-shoe" shaped) crater rim.

Scientific research conducted at or near this site:
In 2015, research at Auburn University for two geology Master of Science students' theses was conducted on these sediments and sedimentary rocks, which showed that they are deformed and folded in a manner consistent with a "trans-crater" landslide. Outcrops of deformed sediments on Harrogate Springs Road, which are also related to this trans-crater landslide, are in some places upside down and in other places, intensively deformed. In 2009, a scientific borehole was drilled a few hundred meters east of the cliffs (in the meadow located behind the Viewpoint #3 sign). The drill penetrated the nearly 30 m (90 ft) of chalk, which is interpreted to have washed back into the crater by the return of sea water (as a muddy tsunami wave). There is no chalk, which is a distinctive marine shelf sediment, located in the cliffs area proper, which indicates that the adjacent meadow area was likely a depression upon the crater floor that was filled by the chalk, which settled out from the chalk-laden sea water of the tsunami. In 2018, study of sand grains removed from the chalk layer revealed that the chalk in the crater contains fine particles of shocked and melted materials that were ejected from the crater during the impact process and then fell into the adjacent waters of the Gulf of Mexico where they were mixed into the chalk deposits of the shelf area.

Cliffs Exhibit Wall - See descriptions that follow.

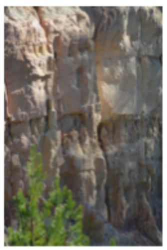
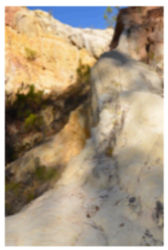


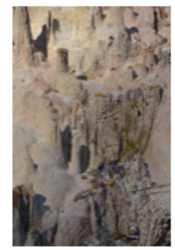








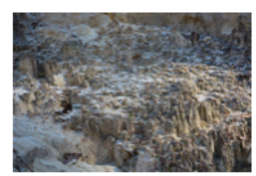











Hope Brannon

The Cliffs: Monolith Canyon Viewpoint
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB180

Hope Brannon

The Cliffs: King's Point
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB181

Cliffs Exhibit Wall

Hope Brannon

The Cliffs: Neathery Canyon I
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB182

Hope Brannon

The Cliffs: Gemstone Wash II
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB183

Cliffs Exhibit Wall

Hope Brannon

The Cliffs: Smith Butte
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB184

Hope Brannon

The Cliffs: Tallus Slopes
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB185

Cliffs Exhibit Wall

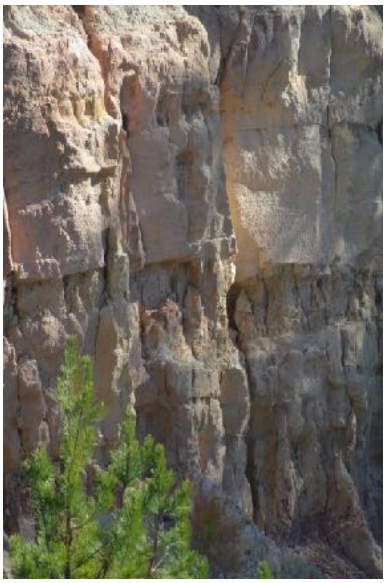
Hope Brannon

The Cliffs: Kuppe (Kup-eh) Viewpoint
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB186

Hope Brannon

The Cliffs: Cliff Dwellers
Photograph, 2023
Crater Hike with The Baillifs, December 19
12″ x 8″



HB187

Cliffs Exhibit Wall

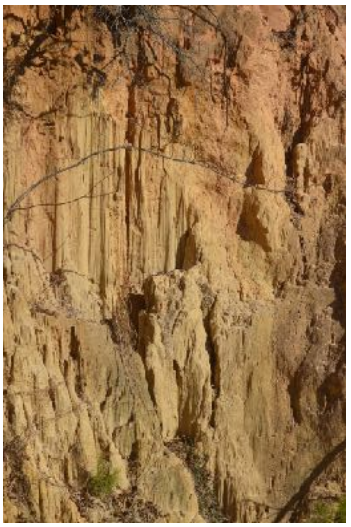
Hope Brannon

The Cliffs: Gemstone Wash I
Photograph, 2023
Crater Hike with The Baillifs, December 19
12″ x 8″

HB188

Hope Brannon

The Cliffs: Tsunami Deposit I
Photograph, 2023
Crater Hike with The Baillifs, December 19
12″ x 8″



HB189

Cliffs Exhibit Wall

Hope Brannon

The Cliffs: Hoodoos of Gemstone Wash VI

Photograph, 2023
Crater Hike with The Baillifs, December 19
12″ x 8″

A hoodoo (also called a tent rock, fairy chimney, or earth pyramid) is a tall, thin spire of rock formed by erosion. Hoodoos typically consist of relatively soft rock topped by harder, less easily eroded stone that protects each column from the elements. They generally form within sedimentary rock and volcanic rock formations.

HB190

Hope Brannon

The Cliffs: Neathery Canyon II

Photograph, 2023
Crater Hike with The Baillifs, December 19
12″ x 8″

HB191

Cliffs Exhibit Wall

Hope Brannon

The Cliffs: Sentinel
Photograph, 2023
Crater Hike with The Baillifs, December 19
12″ x 8″

HB192

Hope Brannon

The Cliffs: Tsunami Deposit III
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB193

Cliffs Exhibit Wall

Hope Brannon

The Cliffs: Stalagmites I
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB194

Hope Brannon

The Cliffs: Stalagmites II
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

HB195

Cliffs Exhibit Wall

Hope Brannon

The Cliffs: Hoodoos of Gemstone Wash I

Photograph, 2023, 8" x 12"
Crater Hike with The Baillifs, December 19

Hoodoos typically form in areas where a thick layer of a relatively soft rock, such as mudstone, poorly cemented sandstone, or tuff (consolidated volcanic ash), is covered by a thin layer of hard rock, such as well-cemented sandstone, limestone, or basalt. In glaciated mountainous valleys the soft eroded material may be glacial till with the protective capstones being large boulders in the till.

HB196

Hope Brannon

The Cliffs: Hoodoos of Gemstone Wash II

Photograph, 2023
Crater Hike with The Baillifs, December 19
8" x 12"

Over time, cracks in the resistant layer allow the much softer rock beneath to be eroded and washed away. Hoodoos form where a small cap of the resistant layer remains, and protects a cone of the underlying softer layer from erosion. The heavy cap pressing downward gives the pedestal of the hoodoo its strength to resist erosion. With time, erosion of the soft layer causes the cap to be undercut, eventually falling off, and the remaining cone is then quickly eroded

HB197

Cliffs Exhibit Wall

Hope Brannon

The Cliffs: Grotto

Photograph, 2023

Crater Hike with The Baillifs, December 19

8″ x 12″

HB200

Cliffs Exhibit Wall

Kevin Reuter

The Cliffs: Clava Cairn

Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

KR220

Kevin Reuter

The Cliffs: Neathery Canyon III

Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

K221

Cliffs Exhibit Wall

Kevin Reuter

The Cliffs: Spine Wall
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

KR222

Kevin Reuter

The Cliffs: Enslen Gletscherspaltes (Let-cher-spal-tees)
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

K223

Cliffs Exhibit Wall

Kevin Reuter

The Cliffs: Hoodoos of Gemstone Wash V

Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

In addition to frost wedging, rain is another weathering process causing erosion. In most places today, rainwater is slightly acidic, which lets the weak carbonic acid slowly dissolve sediment grain by grain. Rain is also the chief source of erosion (removing the debris).

KR224

Kevin Reuter

The Cliffs: Hoodoos of Gemstone Wash III

Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

Typically, hoodoos form from weathering processes that continuously work together in eroding the edges of a rock formation known as a fin.

K225

Cliffs Exhibit Wall

Kevin Reuter

The Cliffs: Tsunami Deposit II

Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

KR226

Kevin Reuter

The Cliffs: Hoodoos of Gemstone Wash IV

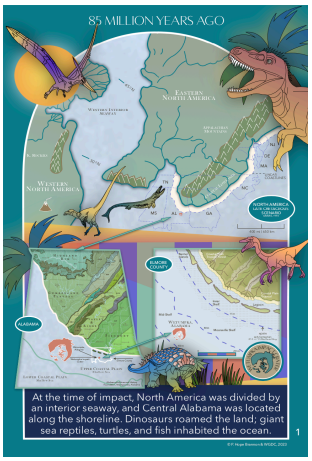
Photograph, 2023
Crater Hike with The Baillifs, December 19
8″ x 12″

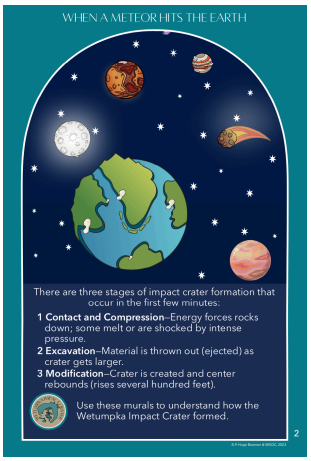
The name is derived from Hoodoo spirituality, in which certain natural forms are said to possess certain powers, but by the late 19th century, this spirituality became associated with bad luck. Prior to the English name for these geographic formations they were already the origin of many legends from Native Americans. For example, some hoodoos were considered petrified remains of ancient beings who had been sanctioned for misbehavior.

K227

Cliffs Exhibit Wall

CHRONOLOGICAL SEQUENCE OF IMPACT EVENTS





DOWNTOWN WETUMPKA IN THE ALLEYWAY

113 COMPANY STREET, WETUMPKA, AL 36092

Text printed on the Alleyway Murals:

85 Million Years Ago: A shallow offshore area of the ancient Gulf of Mexico eventually became the land upon which downtown Wetumpka was built and through which today's Coosa River flows. Our area also was the site of Alabama's greatest natural disaster and the or "bull's eye" of a great explosion caused by the impact of a huge object from outer space.

During the "age of dinosaurs in Alabama," (Late Cretaceous or about 85 million years ago) a meteor the size of a large college football stadium blasted 2,000 feet deep into local bedrock and exploded under the shallow sea. At the time of impact, marine reptiles, fish, and turtles inhabited the sea, and dinosaurs lived on nearby lands.

The meteor impact created a 2.6 billion-ton TNT explosion thousands of times larger than the largest atomic weapon ever developed, thus causing heavy damage and death, affecting both land and sea.

The Wetumpka Impact Crater (4.7 miles in diameter) is the only confirmed impact crater in Alabama and one of only about 200 other recognized craters. Its age is based on fossils found in the youngest disturbed deposits in the crater and atomic age-dating of impact-affected crystals. The arc of hills east of the Coosa River and downtown Wetumpka are the eroded remains of the Wetumpka Impact Crater's rim.

1. 85 MILLION YEARS AGO: At the time of impact, North America was divided by an interior seaway, and Central Alabama was located along the shoreline. Dinosaurs roamed the land; giant sea reptiles, turtles, and fish inhabited the ocean.

2. WHEN A METEOR HITS THE EARTH: There are three stages of impact crater formation that occur in the first few minutes:

   1 *Contact and Compression*—Energy forces rocks down; some melt or are shocked by intense pressure.
   2 *Excavation*—Material is thrown out (ejected) as crater gets larger.
   3 *Modification*—Crater is created and center rebounds (rises several hundred feet).
   Use these murals to understand how the Wetumpka Impact Crater formed.

3. METEOR APPROACHES EARTH: A very large stony meteor (1,200 feet in diameter) approaches Earth from outer space.

4. METEOR ENTERS ATMOSPHERE: The meteor enters Earth's atmosphere, traveling approximately 43,000 miles per hour. It heats up, creating a blinding light, a tail of fire, and a sonic boom.

5. CONTACT AND COMPRESSION: After burning through the atmosphere, the meteor makes contact (impact) in a shallow sea (100 feet deep). The blast travels about 2,000 feet deep, compressing bedrock and sending shock waves into the Earth. Crater begins forming.

6. EXCAVATION AND EJECTION OF ROCK DEBRIS: The explosion which occurs upon impact causes a blast of rock debris to fly from the shallow sea into the atmosphere. Some of the debris reaches low Earth orbit.

7. EXCAVATION AND EARTHQUAKE: Excavation results in a 9.0 (Richter scale) earthquake. Flash fires occur along the nearby shore, and rocks begin to fall on land and into the sea.

8. HURRICANE FORCE WINDS: Wind blasts more powerful than a violent hurricane extend out in excess of a 15 mile radius and affect the nearby shore.

9. FALLING ROCKS: During the first three minutes after the explosion began, ejected rocks fall within a thirteen mile radius causing injury and destruction of life.

10. MODIFICATION AND TRANS-CRATER SLIDE: Located within the crater formed by the meteor impact, “The Cliffs” area is composed of layers of rock that slide across the crater floor and collide with the rim during the modification stage. Disturbed and folded layers can be seen in the walls of “The Cliffs” today.

11. MODIFICATION AND TSUNAMI: At this point, the crater has sides up to 1,000 feet high except where the south side collapses. A tsunami wave from the impact moves outward and then comes back, bringing sea-floor sediment (chalk) from the south.

12. LATER THE CRATER BECOMES A TERRESTRIAL ISLAND: As life begins to return, an ecosystem develops on the crater island. The crater remains in the sea (Gulf of Mexico) for millions of years until the sea level recedes.

13. CRATER BURIED IN SEDIMENT: As the sea recedes, the crater, which was eroded and buried in sediment, becomes dry land. When the Coosa River develops, it flows over the buried crater.

14. WETUMPKA IMPACT CRATER REVEALED: Over time, the sediment that buries the crater is eroded away. The Coosa River ceases to flow across the crater and changes its course to bend around the crater rim, as seen today. The rocks in the Coosa River are part of the crater rim.