



Teacher's Guide to
GIANTS
African Dinosaurs
at The Garfield Park Conservatory
created by Project Exploration

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OVERVIEW OF TEACHING STATIONS

STATION	LOCATION	OBJECT NUMBER	TOPICS/THEMES
1	PALM HOUSE	#1 – <i>Jobaria</i>	<ul style="list-style-type: none"> • Introduction to <i>Jobaria</i> • Begin to look at bones and skeletons carefully • Begin to recognize shapes and patterns
2	FERN ROOM	#5 - <i>Afrovenator</i>	<ul style="list-style-type: none"> • The “Lost World” is like a living diorama • Most of the plants in the fern room date back to the time of the dinosaurs
3	SHOW HOUSE	#10 – <i>Deltadromeus</i>	<ul style="list-style-type: none"> • Dinosaurs and humans <u>DID NOT</u> live at the same time • Dinosaurs and humans – and all vertebrates are built on the same body plan
4	ARIOD HOUSE	#17 – Pterosaur Model	<ul style="list-style-type: none"> • “Form mirrors function” • Introduction to the pterosaur
5	DESERT HOUSE	#22 - Tooth Garden	<ul style="list-style-type: none"> • “Form mirrors function” • Observing carefully/developing a “search image”
6	CHILDREN'S GARDEN	#23 – Dissected Neck	<ul style="list-style-type: none"> • Paleontologists study living animals to figure out what dinosaurs might have looked like
7	SWEET HOUSE	#26 – Skull Mobile	<ul style="list-style-type: none"> • Skulls are made from many individual bones • The <i>Carcharodontosaurus</i> skull was pieced together from many fossil fragments
8	SWEET HOUSE	#32 – <i>Jobaria</i> femur	<ul style="list-style-type: none"> • This is a REAL 135 million year old fossil that you can touch • How fossils are formed • Viewing the original African pterosaur fossil material



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STATION #1

OBJECT #1 (Rearing *Jobaria*)

LOCATION: Palm House

ROOM THEME: Growing

OBJECTS in ROOM:

- Rearing *Jobaria* - #1
- Femur Field - #3
- Tail Vine - #2
- Tail Vine with Shoot - #36
- *Jobaria* Carcass - #37
- Photo Station - #38

SAMPLE SCRIPT

Let me introduce you to Jobaria. This is Africa's dinosaur giant. There are pieces of Jobaria in every room so we want to look at the shapes of the bones in its skeleton very carefully – and we are going to be able to touch a 135 million year old fossil thigh bone of Jobaria when we get to the Sweet House.

IMPORTANT IDEAS AT STATION #1, Rearing Jobaria

- *Jobaria* is the only plant eater in the exhibit. It is 135 million years old.
- There are two-life sized skeletons of *Jobaria* in this exhibit. The adult here and a juvenile in the Fern Room in front of us.
- *Jobaria's* teeth are different from the other dinosaurs in the exhibit. They're mitten shaped and were used for nipping ferns, cycads and conifers – the common plants of the dinosaur era.

[HOLD UP JOBARIA TOOTH and PASS IT AROUND]

- This adult dinosaur is about 60 feet long from snout to tail tip. The largest adult that Sereno's team found, however, grew to 70 feet.
- When we walk down the path we'll see a "Femur Field" made of *Jobaria* thigh bones.

IMPORTANT IDEAS ABOUT THE ROOM THEME: "GROWING"

- This room opens with *Jobaria* – which towers above us 33 feet high.
- The "Femur Field," (#3) made of *Jobaria* thigh bones shows femora sprouting, growing and decaying like plants.
- The "Tail Vine" (#2) grows 16 feet up a palm tree and is made from a cast of our adult *Jobaria* tail
- The Carcass (#37) and Tail Vine with Shoot (#38) represent death and rebirth. *Jobaria's* half-buried carcass comes back to life as a tail vine.



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JOBARIA STATS

Type:

Sauropod, plant eater

Age:

135 Million years old

Height at hip:

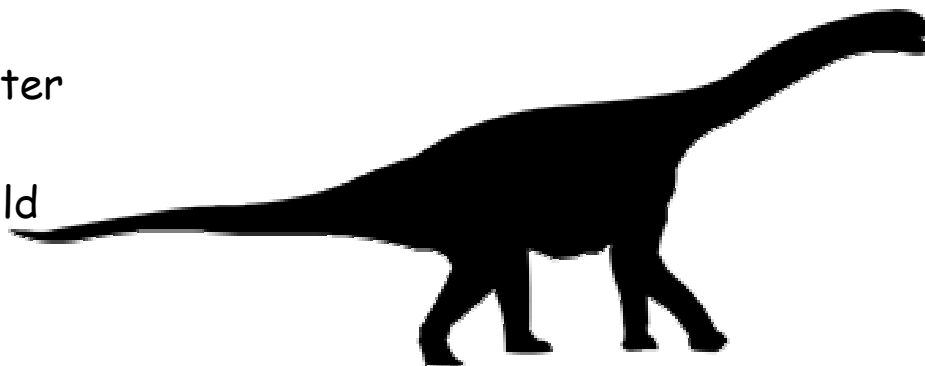
15 feet

Length:

70 feet

Discovery site:

Niger, West Africa



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Notes:

Jobaria was discovered in 1997. It was a primitive, long-necked dinosaur discovered in a mass-death site in the Sahara. With over 95% of its skeleton preserved, *Jobaria* is the most complete long-necked dinosaur ever discovered from the Cretaceous period.



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STATION #2

OBJECT #5 (*Afrovenator*)

LOCATION: Fern Room

ROOM THEME: Lost World

OBJECTS in ROOM:

- Carcass - #4
- *Afrovenator* - #5
- Fern Fronds - #6
- African pterosaur - #7
- *Jobaria* juvenile - #8
- Dinotails - #9

SAMPLE SCRIPT

Enter the Lost World. This is what an early-Cretaceous dinosaur world probably looked like 135 million years ago – when Jobaria and Afrovenator were alive. Most of the plants in this room were alive at the time of the dinosaurs. Ferns, cycads, club mosses are all around us.

The predatory dinosaur near the front is *Afrovenator*, the “African hunter.” It’s eating a partial adult *Jobaria* carcass. The large dinosaur at the back of the room is a juvenile *Jobaria*. It’s a “teenage” specimen of the same species of dinosaurs we saw when we first entered the Conservatory. (It’s the one right behind us)

Can you see the pterosaur way at the back flying over the Juvenile *Jobaria*? It’s a skeletal model. The flesh model we’ll see later was based on this skeleton.

IMPORTANT IDEAS at AFROVENATOR

- Most of the plants in the Fern Room are descendants of plants that were alive during the dinosaur era.
- Sereno’s team has evidence that *Afrovenator* did eat *Jobaria*. They have *Jobaria* ribs with predatory dinosaur tooth marks on them and *Afrovenator* was found nearby.

IMPORTANT IDEAS ABOUT THE ROOM THEME: “Lost World”

- This is a room that recreates a “lost world” – it’s like a living diorama
- This room includes three “plant mimics” that are EASY to miss if you’re not looking for them:
 - Fern fronds made from *Afrovenator* hands mimicking how a fern unfurls
 - Lily pads made from *Jobaria* juvenile shoulder bones in the pond at *Jobaria*’s feet
 - Dinotails, like cattails, made from *Deltadromeus* tails, near the streams at the back of the room



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AFROVENATOR STATS

Type:

theropod, meat eater

Age:

135 million years old

Height at hip:

8 feet

Length:

27 feet



Discovery site:

Niger, West Africa

Notes:

Afrovenator was discovered in 1993. It is the most complete predatory dinosaur from the Cretaceous period ever discovered in Africa. *Afrovenator's* skull has rows of long, blade-shaped teeth for slicing into prey. *Afrovenator's* bones reveal that it was a cousin to *Allosaurus*, a 150-million year old dinosaur that lived in North America, however, *Afrovenator* has longer, more slender bones and was likely more light-weight and fleet footed than *Allosaurus*.



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STATION #3

OBJECT #10 (*Deltadromeus*)

LOCATION: Show House

ROOM THEME: Transforming

OBJECTS in ROOM:

- *Deltadromeus* - #10
- Human Skeleton - #11
- Rib Chimes - #12
- Femur Bench - #13
- "Daliraptor" - #14
- "Giacomettissaurus" - #15

SAMPLE SCRIPT

Humans and dinosaurs DID NOT live at the same time. But for every bone in your body, there is a match on a dinosaur skeleton!

IMPORTANT IDEAS at DELTADROMEUS

- Vertebrate body plan is made up of: skull, backbone, shoulder girdle, pelvic girdle and four limbs with the same structure. The limb pattern is: one bone; two bones; many bones.
- *Deltadromeus* is the fastest large meat-eating dinosaur. It was faster than T-rex.
- *Deltadromeus* was a predatory dinosaur. Like other carnivorous dinosaurs, it walked on two legs; it's teeth are blade-shaped and would have been good for slicing meat.
- Look at *Deltadromeus*' femur (thigh) – see how thin and long it is? When you see *Suchomimus*' thigh in the next room we will think back and remember how narrow *Deltadromeus*' thigh proportions are.

IMPORTANT IDEAS ABOUT THE ROOM THEME: "Transforming"

- *Deltadromeus* and the Human show us that dinosaurs and humans have the same vertebrate body plan
- This room includes an art gallery with objects that are like sculptures and play with the beauty of bones.
- Rib Chimes – adult and juvenile *Jobaria* ribs, are hung like wind chimes in the form of a rib cage
- Daliraptor and Giacomettissaurus were artists that took everyday objects and distorted them so that people would look at familiar things in new ways.
- Daliraptor distorts a normal skeleton (*Herrerasaurus*) by MELTING some of the bones. Daliraptor sculpture plays on Salvador Dali's most famous painting, "Memories of Time, DATE."
- Giacomettissaurus distorts the main limb bones of a normal skeleton (*Eoraptor*) just like Giacometti did with his human sculptures.
- A Femur Bench is available for people to sit on; bones can make stylish furniture!



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DELTADROMEUS STATS

Type:

theropod, meat eater

Age:

90 million years old

Height at hip:

8 feet

Length:

25 feet

Discovery site:

Morocco, Africa



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Deltadromeus was discovered in 1995 by Gabrielle Lyon. *Deltadromeus* has extraordinarily delicate and long limbs, making it one of the fastest dinosaurs to have existed.



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STATION #4

OBJECT #17 (Pterosaur model)

LOCATION: Aroid House

ROOM THEME: Fishing

OBJECTS in ROOM:

- Lungfish (*Ceratodus*) - #16
- Pterosaur - #17
- *Suchomimus* - #18
- Ancient Aroids - #19

SAMPLE WELCOME SCRIPT

Your are looking at the first reconstruction of an African pterosaur – this was the first flying reptile from Africa. It was unveiled on December 18th right here at the Conservatory.

*Look at the teeth of the pterosaur – and those of *Suchomimus*. They are both slender, and the largest teeth are at the front of the jaws.*

[HOLD UP SUCHIOMIMUS TOOTH AND PASS IT AROUND]

Why are they similar? These animals were doing the same thing: catching fish. The long, curved teeth were perfect for snaring fish –like the lungfish in the pond.

IMPORTANT IDEAS AT Pterosaur

- The flesh model is the first reconstruction of an African pterosaur and is based on fossil material.
- The three animals in this room all lived at the same time – 110 million years ago.
- *Suchomimus* and the pterosaur both ate fish. This is why their jaws are narrow and have long, curved teeth at the front end.
- The lung fish in the water – *Ceratodus* – is based on fossil evidence - just like *Suchomimus* and the pterosaur.
- The “Ancient Aroids” are actually *Jobaria* shoulder bones. They’re copying the glass sculptures in the pond.

IMPORTANT IDEAS ABOUT ROOM THEME

- “Form mirrors function” – the reason the teeth on the pterosaur and *Suchomimus* have a similar shape is because they were doing similar things – fishing! Shape (form) mirrors activity (function).
- A pterosaur is a flying reptile – not a dinosaur
- Pterosaurs and dinosaurs are both reptiles – but pterosaurs don’t have important “dinosaurian anatomy.” They don’t have flexible wrists and stiff tails like meat eaters; and they don’t have long necks of the sauropods.



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SUCHOMIMUS STATS

Type:

Theropod, meat eater

Age:

100 million years old

Height at hip:

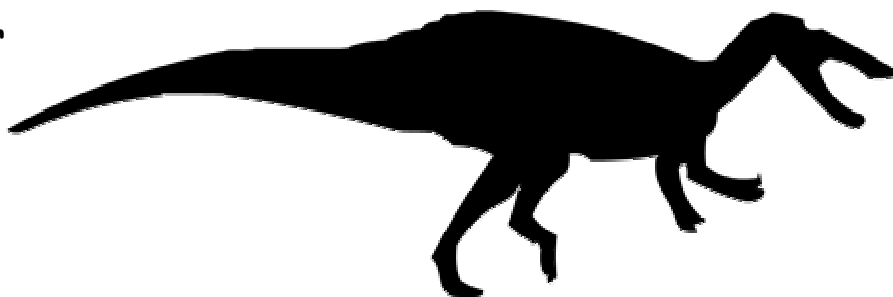
12 feet

Length:

36 feet

Discovery site:

Niger, West Africa



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Notes:

Suchomimus was discovered in 1997 in the heart of the Sahara desert of Niger. It was named for its bizarre, narrow, 4-foot long skull, which ends in a cage of long, curved teeth, suggesting that, like crocodiles, this dinosaur ate fish. *Suchomimus* had powerful forelimbs and foot-long thumb claws. *Suchomimus* was the largest and most common predator of its day in Africa. *Suchomimus* belongs to the Spinosaur family of dinosaurs. Its closest relative is *Baryonx*, a spinosaur dinosaur discovered in England.



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STATION #5

OBJECT #21 (Tooth Garden)

LOCATION: Desert House

ROOM THEME: Searching

OBJECTS in ROOM:

Chicken - #20

Tooth Garden - #21

Paleocactus - #22

SAMPLE SCRIPT

Welcome to the world of paleontologists. Imagine you are on an expedition in search of fossil teeth. Can you find four different kinds of teeth in this scatter?

IMPORTANT IDEAS AT "Tooth Garden"

- Developing a search image and learning how to look carefully - even when there are a lot of visual distractions – is what paleontology (and science) is all about.
- Form mirrors function: herbivorous and carnivorous dinosaurs have different tooth shapes because they were eating different things with their teeth
- The *Jobaria* teeth are mitten-shaped for nipping leaves, cycads and conifers
- The predatory dinosaur teeth (*Carcharodontosaurus*) are pointed and blade-shaped for slicing into meat.
- *Suchomimus*' teeth are slender for snatching fish out of the water.
- The SuperCroc teeth are round and blunt and would have been good for crunching bones.
- Why is the chicken here? Not only because it is funny – but because it reminds us that birds (like the chicken) are dinosaurs.
- The chicken skeleton comes from a REAL chicken. IT's not a cast.

IMPORTANT IDEAS ABOUT ROOM THEME: "Finding"

- This room is about searching for objects just like paleontologists do in the field
- Visitors are challenged to find four types of teeth in a tooth scatter. If they develop a strong search image they can try to spot teeth in the Paleocactus "tooth flowers"
- The Paleocactus has four-kinds of teeth in it
- The chicken has found a tooth, too



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STATION #6

OBJECT #23 (Dissected Neck)

LOCATION: Children's Garden

ROOM THEME: Imagination

OBJECTS in ROOM:

Dissected Neck - #23

Carcharodontosaurus Head - #24

SAMPLE SCRIPT

What do you imagine dinosaurs REALLY looked like when they were alive? What did they look like with flesh on? We can't know what color dinosaurs were, but we can study rare impressions of dinosaur skin and living animals to get a sense of what they probably looked like.

*Bones are all that are left of *Jobaria*. What would *Jobaria* have looked like in the flesh? Paleontologists think this neck model comes pretty close.*

IMPORTANT IDEAS AT "Dissected Neck"

- Artist Gary Staab created this model of a head and neck of an adult *Jobaria*
- First he worked with casts of *Jobaria's* bones and attached the skull to the 12 vertebrae of the neck
- THEN he studied the anatomy of living birds and reptiles as a guide to add
 - The main muscles
 - The food tube (esophagus)
 - The air tube (trachea)
- Artist Garfield Minot made the *Carcharodontosaurus* flesh head by studied the scale patterns of iguanas as a model.

[HOLD UP CARCHARODONTOSAURUS TOOTH and PASS IT AROUND]

IMPORTANT IDEAS ABOUT THE ROOM THEME: "Imagination"

- This room has two flesh models in it to help children imagine what the skeletons would look like when they were alive
- This room lends itself to hands-on activities with fossils, art supplies and books



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JOBARIA STATS

Type:

Sauropod, plant eater

Age:

135 Million years old

Height at hip:

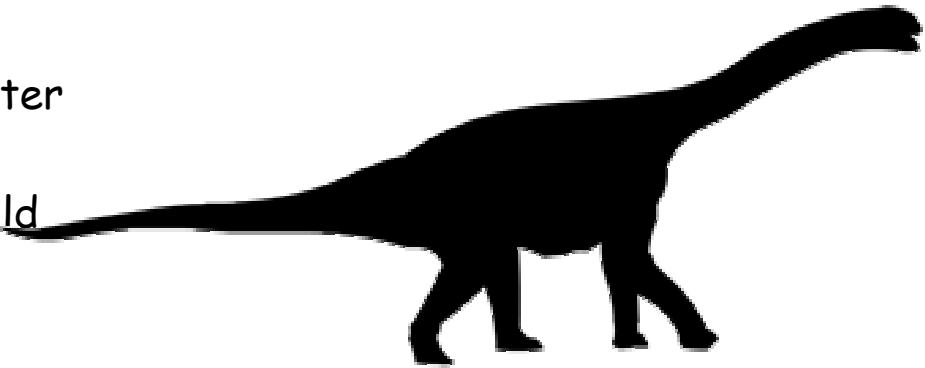
15 feet

Length:

70 feet

Discovery site:

Niger, West Africa



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Notes:

Jobaria was discovered in 1997. It was a primitive, long-necked dinosaur discovered in a mass-death site in the Sahara. With over 95% of its skeleton preserved, *Jobaria* is the most complete long-necked dinosaur ever discovered from the Cretaceous period.



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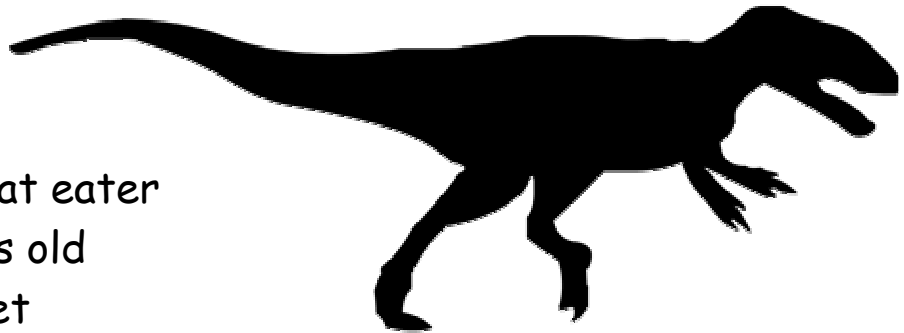
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CARCHARODONTOSAURUS

STATS



Type: Theropod, meat eater

Age: 90 million years old

Skull length: 5.5 feet

Length: 45 feet

Discovery site: Morocco

Notes:

Carcharodontosaurus is Africa's answer to *Tyrannosaurus*. One of the largest carnivores that ever walked on earth, *Carcharodontosaurus*, had 6-inch long serrated teeth. Sereno and his team unearthed the *Carcharodontosaurus* skull in the Moroccan Sahara in 1995, solving a mystery borne from the destruction of World War II.

At the beginning of this century, fragmentary bones and some serrated teeth were discovered in Egypt and described in scientific literature. Collected by Ernst Stromer von Reichenbach in central Egypt, these bones and teeth were housed in Munich's Bavarian State Collections of Paleontology and Historical Geology. On the night of April 24, 1944 a Royal Air Force bombing run destroyed the dinosaur fossils, leaving modern paleontologists to wonder what kind of dinosaurs those fossils had come from. Sereno solved the mystery when he matched the teeth in the *Carcharodontosaurus* skull with the literature descriptions of the Egyptian fossils destroyed in Munich over a half-century ago.



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STATION #7

OBJECT #26 (Skull Mobile)

LOCATION: Sweet House

ROOM THEME: Finding

OBJECTS in ROOM:

- Skull Mobile - #26
- *Carcharodontosaurus* Jaw - #27
- African pterosaur fossils - #28
- *Suchoomimus* fossils - #29
- Fossil wood - #30
- *Jobaria* juvenile skull - #31
- *Jobaria* fossil femur - #32
- *Jobaria* hand print - #33
- Femur Bench - #34
- Video Theater - #35

SAMPLE WELCOME SCRIPT

*Can you find the cast of the brain cavity in the mobile? (IT doesn't look like ours!)
It's the bone that is a different color.*

*Can you imagine these bones coming together? This whole mobile is made of bones of the skull of the dinosaur below it – *Carcharodontosaurus*.*

*You can touch the oldest fossils in the exhibit in this room. Don't miss the huge *Jobaria* fossil femur (thigh bone) just down the path on the left hand side. It's 135 million years old.*

IMPORTANT IDEAS AT "Skull Mobile"

- The skull model of *Carcharodontosaurus* was built from individual skull bones
- Many of the skull bones were built from lots of small broken pieces – like the real *Carcharodontosaurus* jaw in the case nearby
- *Carcharodontosaurus* is Africa's answer to T-rex. It was as big as – or bigger than – *Tyrannosaurus rex* and was the largest predator on Africa 90 million years ago.

IMPORTANT IDEAS ABOUT ROOM THEME: "Finding"

- This room is all about what gets found – and what we can learn from it
- This room displays original fossil material – including the first pterosaur wing bones from Africa
- This room has all the "Touch Objects" in it
- This room includes the video theater which shows film clips from expeditions that discovered the dinosaurs in GIANTS



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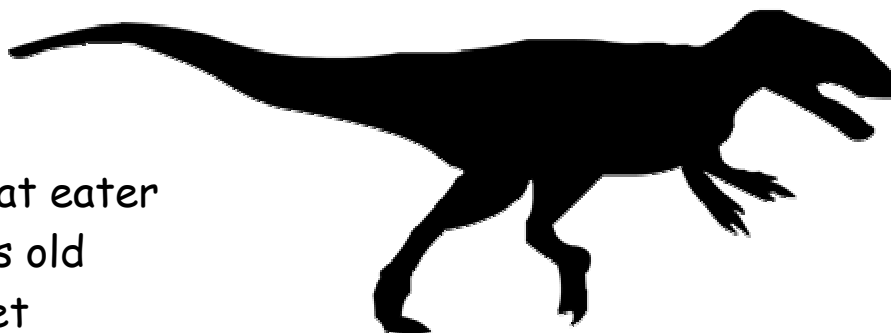
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CARCHARODONTOSAURUS

STATS



Type: Theropod, meat eater

Age: 90 million years old

Skull length: 5.5 feet

Length: 45 feet

Discovery site: Morocco

Notes:

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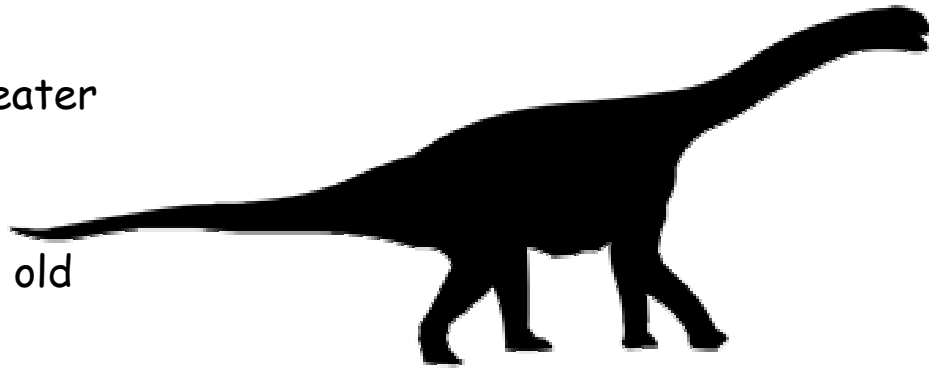
JOBARIA STATS

Type:

Sauropod, plant eater

Age:

135 Million years old



Height at hip:

15 feet

Length:

70 feet

Discovery site:

Niger, West Africa

Notes:

Jobaria was discovered in 1997. It was a primitive, long-necked dinosaur discovered in a mass-death site in the Sahara. With over 95% of its skeleton preserved, *Jobaria* is the most complete long-necked dinosaur ever discovered from the Cretaceous period.



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STATION #8

OBJECT #32 (*Jobaria* femur)

LOCATION: Sweet House

ROOM THEME: Finding

OBJECTS in ROOM:

- Skull Mobile - #26
- *Carcharodontosaurus* Jaw - #27
- African pterosaur fossils - #28
- *Suchoomimus* fossils - #29
- Fossil wood - #30
- *Jobaria* juvenile skull - #31
- *Jobaria* fossil femur - #32
- *Jobaria* hand print - #33
- Femur Bench - #34
- Video Theater - #35

SAMPLE SCRIPT

We can touch this 135 million year old femur (thigh bone) of Jobaria. It's a REAL FOSSIL.

Have you sat on a femur bench yet? It's a replica of this bone. The bones we saw in the femur field are also made from replicas of this kind of bone.

Look across the path. See the hanging pterosaur wing finger? Right underneath it is the original fossil material that was discovered in Niger in 2000. This is the first time the public can see these precious African fossils.

IMPORTANT IDEAS AT TOUCH FEMUR

- This fossil weighs about 350 pounds (160 kilograms)
- This is the oldest touchable fossil in the exhibit
- The femur (thigh bone) is the largest bone in *Jobaria*'s skeleton – and in a human skeleton, too
- After an adult *Jobaria* died, this bone was buried. Minerals carried by groundwater were deposited in all of the empty spaces in the bone. Some of the original bone remains, but the rest is rock.
- There is NO DNA in this bone. The oldest DNA on record is only about 72,000 years old.
- The hand-print and skull nearby are also from *Jobaria*. You can touch these objects also.

IMPORANT IDEAS ABOUT THE ROOM THEME: "Finding"

- This room is all about what gets found – and what we can learn from it
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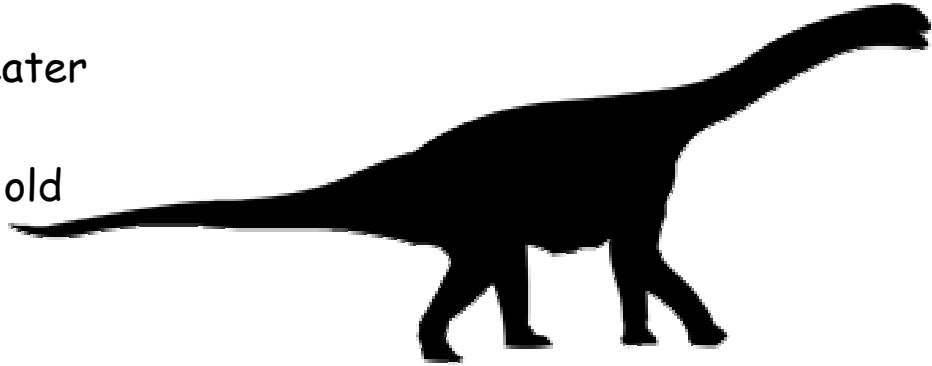
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RECOMMENDED RESOURCES

Beginning Readers

- Aliki. Dinosaur Bones and My Visit to the Dinosaurs.
 Cole, J. The Magic School Bus in the Time of the Dinosaurs. 1995
 Kerley, B. The Dinosaurs of Waterhouse Hawkins. 2001
 Moss, J. Bone Poems. 1997
 Sereno, P. How Tough Was a Tyrannosaurus? 1989

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LINKS

- **Museum of Paleontology**
www.ucmp.berkeley.edu/
- **The New Scientist - The Rex Files**
www.newscientist.com/nsplus/insight/rexfiles/
- **Project Exploration**
www.projectexploration.org
- **UCMP Phylogeny Wing**
www.ucmp.berkeley.edu/plants/plantae.html
- **Zoom Dinosaur**
www.ZoomSchool.com/subjects/dinosaurs/



Teacher's Guide to

GIANTS African Dinosaurs

at The Garfield Park Conservatory
and the Garfield Park Conservatory
created by Project Exploration



ABOUT GIANTS

On December 20, 2003 the Chicago Park District unveiled *GIANTS, African Dinosaurs at the Garfield Park Conservatory, created by Project Exploration*. This major new exhibit premieres the first-ever display of new African dinosaurs, renders skeletons as garden sculptures and immerses visitors in a prehistoric world full of wonder.

For more information, classroom activities and special features, visit the official www.dinogiants.org.

PROJECT EXPLORATION

Project Exploration is a Chicago-based, nonprofit science education organization founded by Gabrielle Lyon and Paul Sereno to make science accessible to the public - especially city kids and girls. The organization works in three arenas - youth development programs that provide a pipeline to science careers for students who might not otherwise have the opportunity, services for schools at teachers, and online initiatives and public exhibits.



For more information on Project Exploration— or the expeditions that unearthed the dinosaurs in *GIANTS*, visit www.projectexploration.org

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