



The Mini Page

Betty Debnam, Founding Editor and Editor at Large



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Superpower in Space

The Black Hole Mystery

Have you heard amazing tales about black holes? Black holes are the most powerful forces in the universe. A black hole is so mighty that nothing can escape it, not even light. It is so powerful that it bends time and space. But no one will ever see one. We have no way of discovering what goes on inside one.

The Mini Page talked with the curator of astronomy at the Smithsonian Institution's National Air and Space Museum to discover more about this mysterious cosmic superpower.

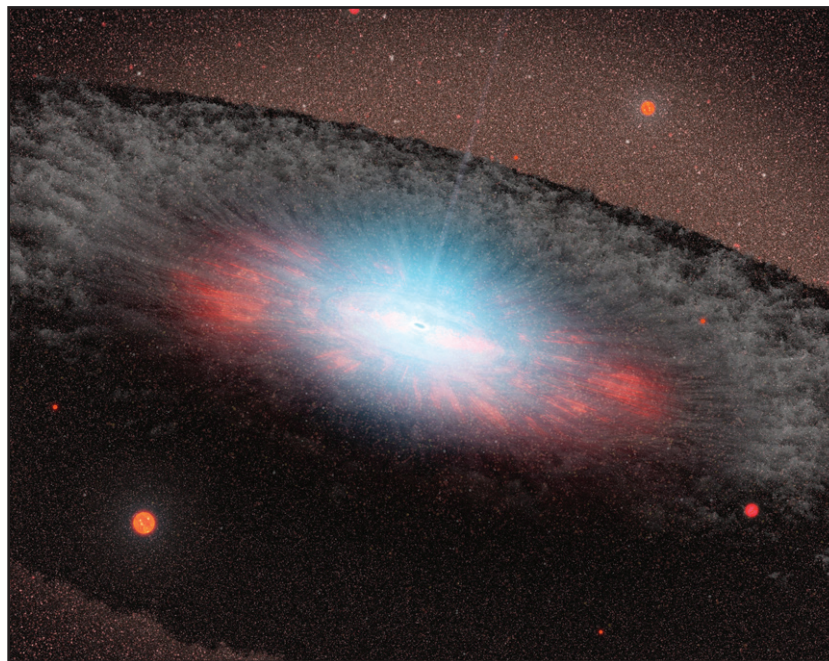
A shining star goes dark

A super-big star might be millions of miles wide. At the end of its life, it collapses into a point only a few miles wide. This crunched star core becomes a black hole.



The Crab Nebula is the glowing gas from a supernova, formed after a star exploded.

photo courtesy NASA, ESA, CXC, JPL-Caltech



This drawing shows a supermassive black hole in the center of a galaxy. When matter gets close to the black hole, the black hole sucks it in. The matter is crushed, and it becomes part of the black hole. This way a black hole can get more mass.

As the matter is pulled into the black hole, it heats up so much that it gives off radiation such as X-rays or radio waves. This helps us discover black holes.

art courtesy NASA/JPL-Caltech

A change in power

A **star** is a burning ball of gas. When the star is "alive," gravity tries to pull the star matter into the center, or **core**. At the same time, nuclear explosions in the star push out.

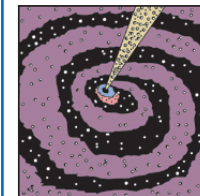
The star stays balanced this way until it runs out of its nuclear fuel. Then the star heats up until it explodes.

The outer gas is blown into space as a **supernova**. The star's core collapses in seconds. If the star is big enough, the smashed core becomes a black hole. (Our sun is a star, but it is too small to ever become a black hole.)

Types of black holes

A black hole formed from a dying star is called a **stellar black hole**. A star would need to be at least 25 times heavier than our sun to form a black hole when it dies and explodes.

There are also **supermassive black holes** that are a million to a billion times bigger than our sun. They may have grown and grown by "eating" stars and gas over billions of years. Or maybe, two black holes collided, joining into one super black hole.



The Big Crunch

Any size will do

Scientists believe a black hole can be any size. But they don't know for sure. They believe a black hole can be smaller than a pinpoint or have millions of times more material, or **mass**, than our sun.

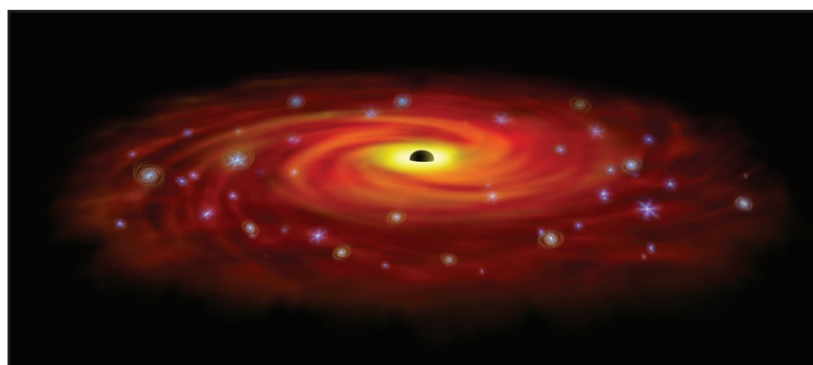
What they know for sure is that the massive black holes in space were probably all formed by dying stars.

It's really dense

A black hole is formed when a whole bunch of material (as from a star) is crammed into a tiny area (like a ball a few miles wide).

The more material that's smashed into a small **volume**, the more **dense** something is. The more dense an object is, the stronger its gravity is. A black hole is super dense.

If the Earth were smashed into the size of a marble, it would be dense enough to be a black hole.



art by M. Weiss, courtesy NASA/CXC

In this drawing, a black hole in our Milky Way galaxy is surrounded by stars. Scientists believe there are more than a million black holes in the Milky Way.

They're everywhere

Scientists have discovered evidence that millions of stellar black holes are in every galaxy, including our own, the Milky Way. (But don't worry, they can never pull us in.)

There is probably also a supermassive black hole in the center of each galaxy. The supermassive black hole in the Milky Way appears to weigh 2 million to 3 million times more than our sun.

Some experts believe that supermassive black holes may have helped form galaxies by pulling star material into their neighborhood.

When stars collide

Another idea scientists have is that when stars are coming together, supergigantic stars may collide and form supermassive black holes. Or galaxies may collide, forming a supermassive black hole.



photo courtesy NASA, ESA, The Hubble Heritage

Two spiral galaxies nearly collide.

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Ready Resources



The Mini Page provides ideas for websites, books or other resources that will help you learn more about this week's topics.

On the Web:

- http://imagine.gsfc.nasa.gov/docs/science/know_11/black_holes.html
- http://hubblesite.org/explore_astronomy/black_holes/
- http://starchild.gsfc.nasa.gov/docs/StarChild/universe_level1/black_holes.html
- www.nasm.si.edu/

At the library:

- "Mysterious Universe: Supernovae, Dark Energy and Black Holes" by Ellen Jackson
- "Black Holes" by Ker Than

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Words that remind us of black holes are hidden in the block below. Some words are hidden backward or diagonally. See if you can find: CORE, DENSE, END, EVENT, EXPLOSION, FAR, GALAXY, GAS, GRAVITY, HORIZON, LIGHT, MATTER, MILKY, POINT, POWERFUL, SEE, SPACE, STAR, SUN, SUPERNOVA, TIME, WARP, WAY, WORMHOLE.



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

Mini Spy . . .



Mini Spy is looking at the Milky Way. See if you can find:

- balloon
- word MINI
- question mark
- sailboat
- carrot
- fish
- kite
- ruler
- belt
- canoe
- letter T
- number 7
- heart
- letter E
- pencil
- letter I
- letter C
- boomerang
- letter Z



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Rookie Cookie's Recipe Zucchini Spears

You'll need:

- 2 medium zucchini squash
- 1 medium bell pepper (red, orange or yellow)
- 1 teaspoon olive oil
- 1/2 teaspoon seasoned salt
- 1/4 teaspoon pepper (optional)



What to do:

1. Cut zucchini into spears by cutting lengthwise in half. Next, cut crosswise into two pieces. Cut each piece into three spears (24 spears total).
2. Cut bell pepper into strips.
3. Heat olive oil in large pan; add vegetables and saute* for 5 to 7 minutes on medium heat until lightly browned.
4. Sprinkle seasonings on vegetables and stir.

*"Saute" means to cook quickly in a little hot oil or fat.

You will need an adult's help with this recipe.

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Meet Ella Jenkins



photo by Bernadette Richier/
Adventures in Rhythm

Ella Jenkins' new CD, "A Life of Song," is full of songs from her childhood in Chicago.

Ella has sung and composed music for many CDs. In 2004, she received a Grammy Lifetime Achievement Award for her music. She has appeared several times on "Sesame Street," "Barney and Friends" and "Mr. Rogers' Neighborhood."

She never had any formal, or official, music training. Besides singing, she also plays the harmonica, ukulele, pipe-organ, and several percussion instruments, or instruments that have a strong beat, such as drums.

Ella, 86, was born in St. Louis, Mo., and grew up in Chicago. One of her first jobs after college was as the program director for teenagers at a YWCA in Chicago. While performing on the street with several young people, she was asked to perform on a public television show. She began composing her own music for that show. Eventually, she left her job at the YWCA and became a full-time folk singer and musician.

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NEW!

The Mini Page® Book of States

The Mini Page's popular series of issues about each state is collected here in a 156-page softcover book. Conveniently spiral-bound for ease of use, this invaluable resource contains A-to-Z facts about each state, along with the District of Columbia. Illustrated with colorful photographs and art, and complete with updated information, The Mini Page Book of States will be a favorite in classrooms and homes for years to come.

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Especially for kids and their families

The Mini Page

By BETTY DEBNAIM

The Bluegrass State

Kentucky From A to Z

Agriculture is one of the most important industries in the state. It is usually played with arranged instruments such as fiddle, mandolin, guitar and banjo.

Bowling Green is near the only factory in the world where this famous sports car is made.

Coal is the third-largest coal-producing state. Oil, natural gas and limestone are also important.

Daniel Boone's role in settling the wilderness is celebrated at Fort Boonesborough State Park near Richmond.

Early residents include the Cherokee, Delaware, Chickasaw, Iroquois and Shawnee peoples. The Cherokee Indians gave the state its name, from words meaning "great mound."

Fish and game are important.

Goats are raised in the state.

Horse breeding and racing have made Kentucky famous. Coal mining is one of the most important industries. Manufacturing of transportation equipment, industrial machinery, electronic equipment and metal products is important.

It is a surprising fact that both the Union president, Abraham Lincoln, and the Confederate president, Jefferson Davis, were born there. Today it is the 26th most-populated state, with more than 4 million people.

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MIGHTY FUNNY'S

Mini Jokes

All the following jokes have something in common. Can you guess the common theme or category?

Alice: What do you get if you cross an alligator with a pickle?

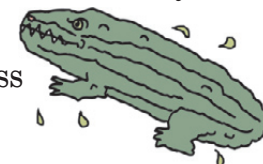
Alvin: A crocodill!

Angus: I'd like to get a pair of alligator shoes.

Arlo: Fine — what size does your alligator wear?

Atticus: How do alligators make telephone calls?

Angela: They crocodial!



Truth Stranger Than Fiction

Get your mind around this

The closer anything gets to a black hole, the weirder everything gets. Normal rules don't apply. Space and time act differently than they do in the normal universe.

The point of no return

If anything gets too close to a black hole, it will disappear forever. Anything that goes past a certain point will be sucked into the black hole. Nothing, not even light, can ever escape past that point.

This imaginary boundary is called the **event horizon**. The size of the event horizon depends on the density of the black hole. Event horizons can range from about 6 miles wide to millions of miles wide.

Now it gets weird

Black holes distort, or **warp**, space. If you could orbit near the event horizon, you could actually see the back of your head. The light **reflecting from**, or bouncing off, the back of your head would be bent around the black hole to your eyes.

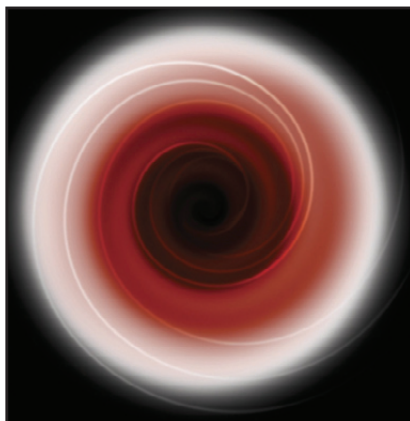
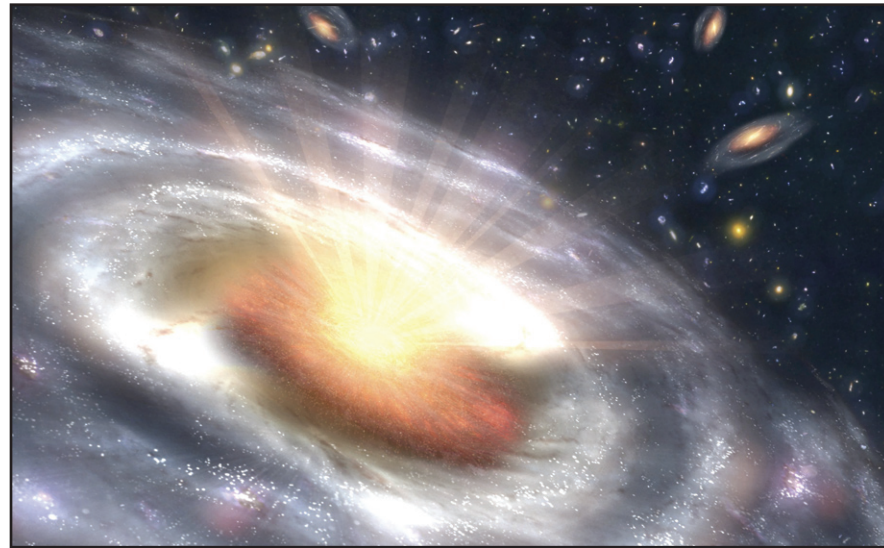


photo courtesy NASA Chandra Space Telescope Collection

We will never be able to see a black hole because light cannot escape from beyond the event horizon.



art courtesy NASA/JPL-Caltech/T. Pyle (SSC)

This drawing shows a supermassive black hole growing in the center of a galaxy. The black hole is feeding on the doughnut-shaped cloud of gas and dust. As it feeds, the gas and dust get so hot, they shoot out X-rays (the white lines streaming out in the art).

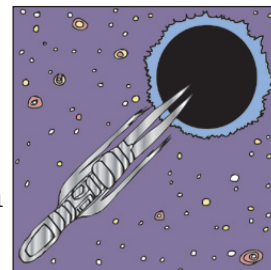
Imagine

NASA experts and others like to imagine what would happen if we could get near a black hole. This helps us understand the mysteries. For example, we could never really fly into a black hole. Our friends could not really watch it happen.

But just imagine if we could. If you decided, for some strange reason, to jump out of your spaceship near a black hole, your shipmates safely far away would see you appear to move slower and slower as you got close to the event horizon.

But your friends would never see you actually cross it. To them, you would appear to stay frozen in one place forever.

To you, time would seem to move normally until all the little bits of you were made part of the black hole.



Science fiction, or is it?

A black hole is also called a **singularity**. All of the star's matter, and anything else that falls in, is packed into this super-tiny point that can't really be measured.

Some scientists think a black hole might be joined by a kind of bridge to another universe, called a **wormhole**. It's impossible to travel through a wormhole now. But who knows what we'll figure out in the future?



The Mini Page thanks Dr. David DeVorkin, curator of astronomy, Smithsonian's National Air and Space Museum, for help with this issue.

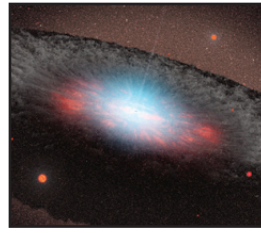
Next week, The Mini Page is about a group of kids helping out animals and the environment.

Look through your newspaper for stories about space.

The Mini Page Staff

Betty Debnam - Founding Editor and Editor at Large Lisa Tarry - Managing Editor Lucy Lien - Associate Editor Wendy Daley - Artist

Read all about black holes



in
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by Betty Debnam

Appearing in your
newspaper on _____.

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(Note to Editor: Above is camera-ready, one column-by-3 1/2-inch ad promoting Issue 11.)

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The Mini Page® Standards Spotlight: The Black Hole Mystery

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Mini Page activities meet many state and national educational standards. Each week we identify standards that relate to The Mini Page's content and offer activities that will help your students reach them.

This week's standard:

- Students understand changes in the Earth and sky. (Science: Earth and Space Science)

Activities:

1. Draw a large picture of space. Include planets and stars. Paste newspaper words of things you would find in space as a border around your picture.
2. What is in the sky? In the newspaper, circle things in the sky that are man-made. Use a star to mark things that are natural.
3. On a piece of paper, list the three things that surprised you most about black holes. Then write two questions you still have.
4. What do these words tell you about black holes: (a) event horizon, (b) core, (c) singularity, and (d) density?
5. Write a short story about space explorers who discover a black hole.

(standards by Dr. Sherrye D. Garrett, Texas A&M University-Corpus Christi)

(Note to Editor: Above is the Standards for Issue 11.)



Gus Goodsport's Report Supersport: Jared Sullinger

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Height: 6-9 Weight: 280 Hometown: Columbus, Ohio

Jared Sullinger could have played college basketball anywhere, but the highly sought center stayed in his hometown and went to Ohio State.

That's a big reason the Buckeyes were still undefeated as of Feb. 11 and ranked No. 1 nationally.

A fearless freshman, Sullinger's performance sometimes makes Buckeye fans blink in disbelief. In OSU's 24-0 start, he averaged a double-double — 18 points and 10.3 rebounds.

Sullinger comes from a hoops family. His dad, Satch, coached him in high school. Brother J.J. played at Ohio State, and brother Julian played at Kent State.

According to his OSU bio, Jared also enjoys golf and someday wants to own a business. The way it looks, basketball will be his chief business for a long time.

(Note to Editor: Above is copy block for Page 3, Issue 11, to be used in place of ad if desired.)