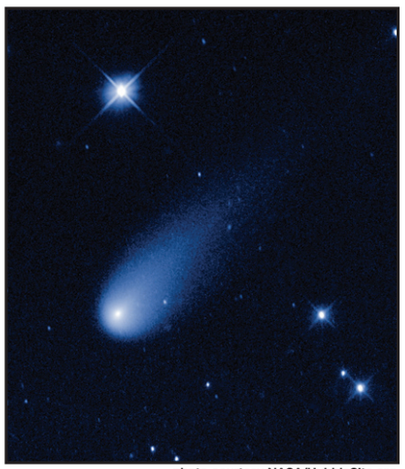
The Mini Page®
Betty Debnam, Founding Editor and Editor at Large

Comet Approaches

All Eyes on ISON



This image of comet ISON's approach to the sun was taken by the Hubble Space Telescope.

photo courtesy NASA/HubbleSite.org

For more than a year, astronomers have eagerly watched as an icy visitor from the outer limits of the solar system has hurtled toward the sun. This cosmic "ghost" has now entered our neighborhood among the inner planets, and it's expected to provide an impressive light show that could last into January.

If it holds together, and if you know when and where to look, you may be able to catch a glimpse of comet ISON — a 3-mile-wide chunk of ice and dust that has journeyed billions of miles over billions of years.

The Mini Page spoke with an astronomer and comet specialist at the McDonald Observatory in Austin, Texas, to learn more about these ancient and mysterious objects.

A comet recipe

All of the comets we know of — nearly 5,000 of them — are as old as the solar system itself, at about 4.5 billion years old. This makes them **primordial**, or "from the beginning."

The same processes that later created the planets also created comets, asteroids and many moons. While asteroids are composed mainly of solid rock and metals, comets are more like balls of dust and dirt, loosely packed together. They also contain a large amount of ice and frozen gases. These key ingredients make them special.

photo courtesy NASA/ESA/STScI/AURA

The Hubble Space Telescope captured this photo of comet ISON in April 2013.

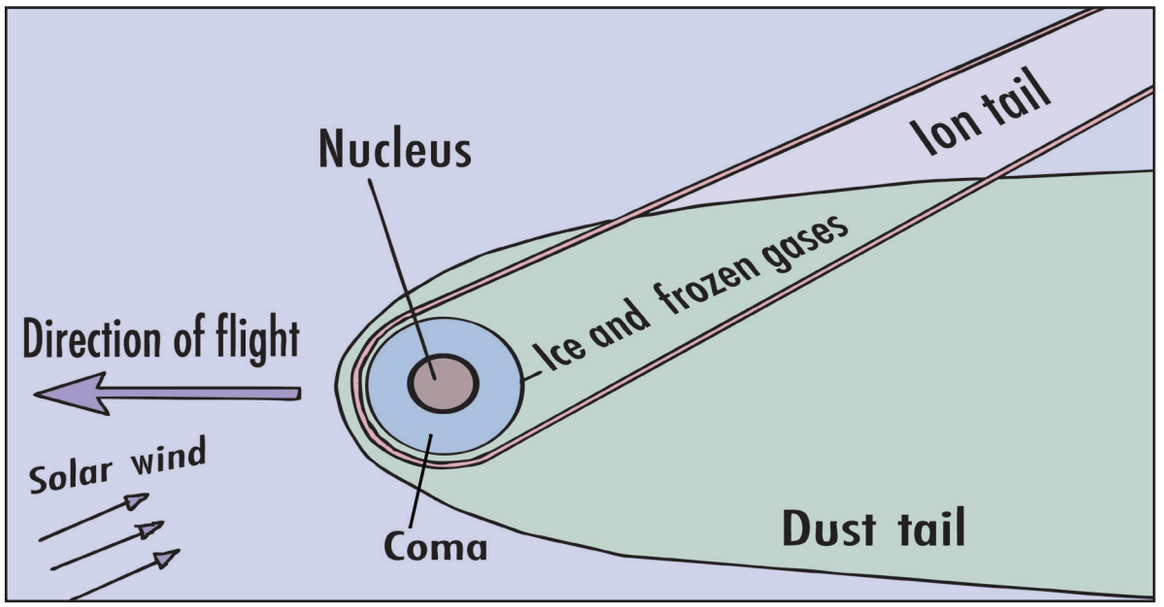
It was long believed that comets formed in the coldest reaches of the solar system. However, in the past 10 years, NASA probes have discovered that certain comets include particles that are created only in extreme heat, which means they must have formed near the sun before moving to the outer solar system. This brought up many more questions for astronomers to answer: How did comets end up so far out? What moved them? Why do they return?

Where comets live

Most comets likely come from two regions of the solar system located beyond Neptune. The closer area is called the Kuiper Belt. This group of objects includes Pluto, which was once considered a planet but is now classified as a dwarf planet.

The other region is known as the Oort Cloud. This dark, unknown area of space is believed to be a massive cloud of icy objects that surrounds the entire solar system. However, the existence of the Oort Cloud has not been confirmed, as no one has ever observed it.

What's in a Comet?



Heating up

The main body of a comet is called its **nucleus**. It looks much like an asteroid or even an ordinary rock. But as the nucleus approaches the sun, the ice and frozen gases begin to heat up and vaporize into space, along with a lot of dust. This creates a layer of gas and dust around the nucleus called the **coma**.

As the gases (ions) leave the coma, pushed by the **solar wind***, they form a **tail** behind the comet. Dust may form a second tail. The tail (or tails) often is what makes a comet stand out in the sky.

*** The solar wind describes the flow of particles away from the sun in all directions. A comet's ion tail always points away from the sun because of the solar wind.**

Come back soon!

Comets known as **short-period comets** visit the inner solar system every 200 years or so. The most famous of these is Halley's comet, named for astronomer Edmond Halley, who predicted its re-appearance in 1705. Halley's comet, which last appeared in 1986, is visible from Earth about every 76 years.

Long-period comets may take several hundred or even thousands of years to make a return trip. Other comets, including comet ISON, are **non-periodic comets**. They may make only one pass through the inner solar system.

photo by Phillipp Salzgeber

Comet Hale-Bopp was visible from Earth in 1997. Astronomers calculated that it had last visited the inner solar system about 4,200 years ago.

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:

- phillips.seti.org/kids/comets.html
- 1.usa.gov/16A0Wjd
- mcdonaldobservatory.org

At the library:

- "Seven Wonders of Asteroids, Comets and Meteors" by Ron Miller
- "Comets" by Nick Hunter

TM Basset Brown The News Hound's

Comet ISON

TRY 'N' FIND

Words that remind us of the comet ISON are hidden in the block below. Some words are hidden backward or diagonally, and some letters are used twice. See if you can find: APHELION, COMA, COMET, DUST, ECCENTRIC, ECLIPTIC, ELLIPSE, GAS, HALLEY, ICE, ISON, NUCLEUS, PERIHELION, PLANE, PRIMORDIAL, SOLAR, SPACE, SUN, SUNGRAZER, SYSTEM, TAIL, VIEW, WIND.

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

Mini Spy . . .

Mini Spy and Basset Brown are searching for comet ISON with her telescope. See if you can find:

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

Rookie Cookie's Recipe
Spicy Baked Potato

You'll need:

- 1 medium potato
- 2 teaspoons butter
- 1/2 teaspoon taco seasoning
- 1 tablespoon chunky salsa
- 2 tablespoons shredded reduced-fat cheddar cheese
- 1 tablespoon low-fat sour cream
- 1/2 cup black beans, drained and rinsed

What to do:

1. Wash, rinse and poke holes in potato with a fork.
2. Cook potato in microwave for 6 to 7 minutes on high.
3. Cut potato in half lengthwise; allow to cool slightly.
4. Scoop out potato halves into a medium bowl.
5. Mix and mash in butter, taco seasoning, salsa, cheese and sour cream.
6. Place mixture back in potato shells; microwave again for 45 to 50 seconds.
7. Top with black beans.

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

Meet Sierra McCormick

photo by Bob D'Amico, courtesy Disney Channel

Sierra McCormick stars as Olive Doyle in the Disney Channel TV series "A.N.T. Farm." She has acted in several movies, including "Ramona and Beezus," "The Dog Who Saved Christmas" and "Land of the Lost." She has also appeared in several TV shows, including "Jessie," "Hannah Montana" and "Are You Smarter Than a 5th Grader?"

Sierra, 16, was born in Asheville, N.C., where she attended drama school. She enjoys playing the piano, reading, biking and swimming. She now lives in Los Angeles with her parents and sister.

Gus Goodsport's Report

Supersport: Tajh Boyd

Height: 6-1 **Birthdate: 9-25-90**
Weight: 225 **Hometown: Hampton, Va.**

All across the college football scene, quarterbacks are lighting up scoreboards, running and passing.

Meet one of those dazzling dual threats — Clemson's Tajh Boyd, who has an eye-catching game to go along with his catchy first name.

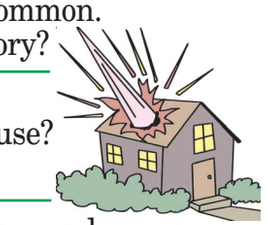
He runs, throws and wins. In the midst of a stellar season with the highly ranked Tigers, Boyd is approaching 10,000 career passing yards.

Boyd, a sociology major, is big, strong and tough. At Phoebus High, he led his team to a state title while playing with a torn ACL.

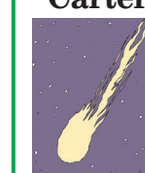
As for his name, Tajh means "crown." If he keeps playing at his current level, Boyd and his Tigers could wind up wearing a championship crown.

Mighty Funny's Mini Jokes

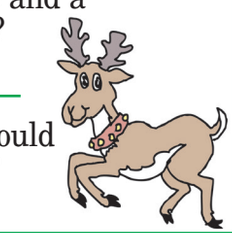
All the following jokes have something in common. Can you guess the common theme or category?



Charlene: What time is it when a comet crashes into the top of your house?
Carter: Time to get a new roof!



Christine: What do Mickey Mouse and a comet have in common?
Connor: Both are stars with tails!



Cecilia: Which of Santa's reindeer would be the fastest and brightest?
Corey: Comet!

A Visit From ISON

Comet ISON

Comets are usually named for the person or people who discover them. Comet ISON, however, is named for the International Scientific Optical Network, a group of telescopes and observatories headquartered in Russia.

ISON is a non-periodic comet making its first-known visit to the solar system. It is also a **sungrazer**, which means it will pass very close to the sun at its **perihelion*** (pair-eh-HEEL-yehn) on Nov. 29 — fewer than 1 million miles above the sun's surface. Temperatures there could reach close to 5,000 degrees Fahrenheit. With the combined heat and gravitational pull of the sun, there is a chance that comet ISON will disintegrate during this period.

*** An object orbits closest to the sun at a point called the perihelion, meaning "near the sun." It is farthest from the sun at a point called the aphelion (a-FEEL-yehn).**

Orbits and the ecliptic

Most of the objects in our solar system — and each of the eight planets — reside in what's known as the **plane of the ecliptic**. In this case, a plane is a flat surface. If you think of the solar system as a DVD or CD, the plane of the ecliptic is the disc itself. The sun is located in the center, and the planets orbit the sun at various distances, while still being on the disc.

For example, Neptune's orbit, as the solar system's outermost planet, would be at the disc's outer edge. Earth's orbit would be located much closer to the center.

Most of the comets we know of also orbit the sun like the Earth does, but their orbits are much different than our own. Rather than rotating around the sun at roughly the same distance, like the planets, comet orbits can be **eccentric**, or irregular. They often pass much closer to the sun than Earth does and also travel much farther away. In addition, many long-period comets have orbits that do not belong in our ecliptic plane. Instead, their orbits may take them far above the plane, below it or both. This can affect who on Earth is able to see such a comet.

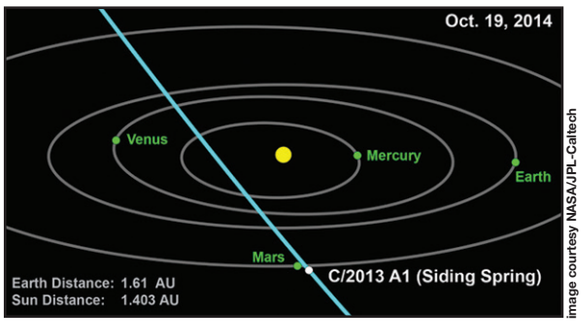


image courtesy NASA/JPL-Caltech

This computer graphic shows how comet 2013 A1 (Siding Spring) will pass close to Mars in October 2014. Siding Spring is approaching Mars and the rest of the inner solar system from below the ecliptic, and will exit far above the inner planets' orbits.

Looking at ISON

Here are some tips for observing this once-in-a-lifetime visitor:

• View the comet from the darkest area possible, away from the lights of towns or cities. If you live in a city, turn off or block out as much light as possible.

• ISON will be very close to the **horizon**, where the sky meets the land, at sunset and just before sunrise. Try to find an area where you can see the sun set fully below the horizon. ISON will be close by.

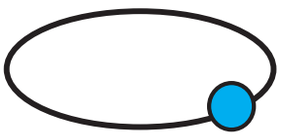
• Do not look directly at the sun! ISON will be close to the sun, and the sun's light can harm your eyes. Be safe!

• Local astronomy clubs and observatories may offer opportunities to observe ISON. Check to see if there are any groups in your area.

photo courtesy NASA

Comet Lovejoy was visible from Earth in December 2011 and was nicknamed "The Christmas Comet." This image was taken from the International Space Station with Earth's horizon in the foreground. It broke up soon after its perihelion.

Fun fact: *Though we often think of the shape of Earth's orbit as a circle, it is actually an ellipse — which is more like an oval.*



Look through your newspaper for articles about comet ISON.

The Mini Page thanks Dr. Anita Cochran of the McDonald Observatory in Austin, Texas, for help with this issue.

Next week, The Mini Page celebrates Thanksgiving with an issue about what early Native Americans ate.

The Mini Page Staff

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