

THE YOUNG ASTRONOMERS NEWSLETTER

Volume 23 Number 4

STUDY + LEARN = POWER

March 2015

DAYLIGHT SAVINGS TIME BEGINS ON THE 8TH.

MARTIAN METEORITE

NWA 7034, a 4.4 billion-year-old meteorite found a few years ago in the Moroccan desert, is like no other rock ever found on Earth. It is a chunk of the Martian crust, and according to a new analysis, the bulk of rocks on the surface of Mars probably look a lot like this Black Beauty: "dark, messy and beautiful." See:

<http://www.spxdaily.com/images-lg/northwest-africa-nwa7034-black-beauty-mars-meteorite-lg.jpg>

MISMATCHED TWINS

The majority of stars in our galaxy come in pairs that tend to be somewhat equal partners when it comes to mass - but not always. In a quest to find mismatched star pairs known as **extreme mass-ratio binaries**, astronomers discovered a new class of binary stars. One star is fully formed while the other is still in its infancy.

A BLACK HOLE'S ACTIVITY

Astronomers found a supermassive black hole explosively heating and blasting the gas in a galaxy and transforming it from an actively star-forming galaxy into one devoid of gas and can no longer form stars. The galaxy has "bubbles" extending from 30,000 to 40,000 light-years on each side of its core, and smaller jet-like structures that are accelerating the gas in the galaxy.

PLUTO'S SMALL MOONS

Exactly 85 years after Clyde Tombaugh's historic discovery of Pluto, the *New Horizons* spacecraft, set to encounter the icy planet in July, is providing its first images of two of the small moons orbiting Pluto, **Nix** and **Hydra**. Each moon is probably between 25-95 miles in diameter, and two other moons, **Styx** and **Kerberos**, are still smaller and too faint to be seen by New Horizons at its current range.

See: <http://pluto.jhuapl.edu/index.php>

KEPLER-432B

Heidelberg astronomers discovered a rare red planet that has six times the mass of Jupiter but about the same size. Kepler-432b is one of the most dense and massive planets known and has an unusual orbit - in less than 200 million years, its expanding host star will most likely swallow up this "red giant".

SUPER SOLAR TELESCOPE

Queen's University in Belfast is leading a consortium of eight UK universities and associated businesses to build the cameras for the \$344 million Daniel K Inouye Solar Telescope (DKIST).

The super-telescope has a 13.1 foot diameter primary mirror and will be able to pick up unprecedented detail on the surface of the Sun.

ESA'S LAST SUPPLY SHIP

The European Space Agency (ESA) said it had destroyed its last supply ship to the International Space Station, bringing a seven-year venture to a successful close. The last of five robot delivery vessels that ESA pledged for the US-led ISS project burned up in a suicide plunge into Earth's atmosphere.

A SUBMARINE TO TITAN?

The seas of **Titan**, Saturn's largest moon, are no place for astronauts but scientists suggest it is possible some strange forms of life exist under the icy surface of **Kraken Mare**, Titan's largest sea. To learn more and search for signs of life, engineers at NASA have preliminary plans to send a robotic submarine there in the future.

The submarine would weigh about one ton and likely be nuclear-powered. It would probably need to be delivered by a sort of space plane capable of a soft water- landing. Researchers don't see such a feat being executed until at least 2047.

OMEGA NEBULA

Perhaps the most spectacular example of rebirth in our galaxy, this cavernous nebula is giving rise to the next generation of stars!

The **Omega Nebula**, also known as the **Swan Nebula**, **Checkmark Nebula**, **Lobster Nebula**, and the **Horseshoe Nebula** is considered one of the brightest and most massive star-forming regions of our galaxy. An open cluster of 35 stars lies embedded in the nebulosity and causes the gases of the nebula to shine due to radiation from these hot, young stars.

It's also one of the youngest clusters known, with an age of just 1 million years. Nine stars are all candidates for becoming Type II supernovae in the not-too-distant future! See: <http://www.eso.org/public/usa/images/omega-nebula/>

THE POLE STAR

Stars are essentially "fixed" in space but all stars are actually moving through space in orbit around the center of our galaxy. In our solar system, galaxy and universe ... everything is always moving. So the sky looked different hundreds of thousands of years ago than it does today.

Polaris is the present-day **North Star** but **Aldebaran** reigned as the North Star some 450,000 years ago. It appeared several times brighter in the sky then than it does now and was shining very close to the very bright star **Capella** on the sky's dome. In that distant past, these two brilliant stars served as a double pole star in the astronomical year -447,890 (447,891 BCE).

SCIWORKS – For information and Planetarium schedules, call 767-6730

The Sky Tonight? <http://www.skymaps.com/downloads.html> and also
http://amazing-space.stsci.edu/tonights_sky/
and http://hubblesite.org/explore_astronomy/tonights.sky

*** **Astronomy Picture of The Day** - <http://apod.nasa.gov/apod/astropix.html> ***

THE PLEIADES - The Zuni of New Mexico call the Pleiades the “Seed Stars,” because this cluster’s disappearance in the evening sky every spring signals the seed-planting season. In both myth and science, the Pleiades are considered to be sibling stars. Modern astronomers say the Pleiades stars were born from the same cloud of gas and dust some 100 million years ago.

Puzzles

FIND THE WORD

W T I T A N E V E S ABOUT
A H R R Y C E G A R CABLE
T E D A A G N L S E DENSE
E R T P N U O M L W FAINT
R E S A L L R B Y O FIRST
E N R P L O A E H T FORMS
T N I A F C S Y D H FOUND
U I F O U N D N E I HYDRA
O N L A E R N F E R INFALL
I L E D A R T I G D INNER

LAYER
OUTER
PLUNGE
RANGE
SPACE
THERE
TITAN
TOWERS
TRADE
WATER

SCRAMBLED ASTRONOMY

TOOLS AND HELPERS

AXSTETN _ _ _ _ _
SHILEC _ _ _ _ _
ALESE _ _ _ _ _
BETAL _ _ _ _ _
KLOCC _ _ _ _ _

(Answers below)

The YOUNG ASTRONOMERS NEWSLETTER is on the Internet at:

<http://www.fas37.org> (FAS) and <http://204.200.153.100/pwood/sfair/yan.html> (The Summit School)

***** **INTERNET SITES** *****

Rare three moon conjunction - <http://www.nasa.gov/content/goddard/hubble-captures-rare-triple-moon-conjunction#.VNQQ5CLF-NA>

Images of Ceres - <http://www.jpl.nasa.gov/spaceimages/details.php?id=pia19174> and <http://www.jpl.nasa.gov/spaceimages/details.php?id=pia19179>
NGC 7814 the “Little Sombrero” - <http://scitechdaily.com/images/Hubble-Telescope-Views-NGC-7814.jpg>
Smiling? - <http://scitechdaily.com/images/Hubble-Image-of-the-Day-Galaxy-Cluster-SDSS-J1038-4849.jpg>

SITE OF THE MONTH

BBC Universe - <http://www.bbc.co.uk/science/space/universe/>

***** **MOON IN MARCH** *****

Full Moon: 3/5 **Last Quarter:** 3/13 **New Moon:** 3/20 **First Quarter:** 3/27
Apogee: 3/5 2:21 AM 252,537 mi. (406, 390 km) **Perigee:** 3/19 3:29 PM 222,204 mi. (357,578 km)

** The Full Moon on the 5th is the smallest Full Moon in 2015 and was called the Worm, Magpie, Crow and Grass Moon.

** Best observing nights: 3/11 – 3/21

***** **PLANETS IN MARCH** *****

JUPITER is shining brightly in the NE sky all month. **VENUS** is in the west at sunset and sets 2 1/2 hours after the Sun. It will be only 0.3° from **URANUS** one hour after sunset on the 4th. **MARS** is at the lower right of Venus all month and passes **URANUS** by 0.4° on the 11th (a *second conjunction in one month – very rare!*) **MERCURY** is low in the morning ESE during the first week and then moves below the horizon. **SATURN** is in the south at dawn.

***** **METEOR SHOWERS** *****

NAME **DATES** **BEST (pre-dawn)** **PER HOUR** **WHERE TO LOOK**

March is another month with only a few minor showers and sporadics.

LOOK FOR: >>>> With binoculars - **URANUS** on the 4th and midway between Venus and Mars in the west on the 6th and 7th. >>>> Orion’s two famous companions – **Canis Major** and **Canis Minor**, his hunting dogs. **SIRIUS**, the brightest star in the sky, is in Canis Major in the southwest. >>>> The **BIG DIPPER**, high in the NE, with its two stars at the end of the dipper’s bowl always showing our way to Polaris – the North Star.

OPPORTUNITY

NASA's *Opportunity's* original mission on Mars was only to last three months but it has more than a decade of bonus performance in extended missions. In the attached image, the flag printed on the aluminum cable guard is meant as a tribute to the victims of the September 11 attacks on the World Trade Center. The aluminum guard came from the wreckage of the twin towers. See:

http://www.jpl.nasa.gov/spaceimages/images/largesize/PIA19109_hires.jpg
ANOTHER RING SYSTEM

The University of Rochester's Eric Mamajek found a giant ring system, sort of like Saturn's, but some 200 times bigger and circling what may be an exoplanet between ten and 40 times the size of Jupiter.

If you put these rings in our Solar System, they'd stretch all the way from the Earth to the Sun -- 93 million miles. If the scientists are right about what they're seeing, the ring system will get smaller over time as the outer bands condense into moons.

COMET'S WATER

Comet **67P/Churyumov-Gerasimenko**, the 2.5-mile-wide (4-kilometer) comet on which the *Rosetta* mission's **Philae** lander touched down in November 2014 was releasing the Earthly equivalent of 40 ounces (1.2 liters) of water into space every second at the end of August. By studying the gas, dust and structure of the nucleus and organic materials associated with the comet, the *Rosetta* mission should become a key to unlocking the history and evolution of our solar system, as well as answering questions regarding the origin of Earth's water and even life.

NILI FOSSAE

New images from ESA's *Mars Express* show **Nili Fossae**, one of the most enticing regions on Mars. Intriguing hints of methane have been seen in this **graben** system northeast of the volcanic region of Syrtis Major.

Grabens are blocks of land that have fallen between parallel faults, sometimes forming rift valleys.

The region displays a fascinating mineral diversity, drawing the attention of planetary scientists. See: http://www.esa.int/Our_Activities/Space_Science/Mars_Express/Mysteries_in_Nili_Fossae

NGC 7714

A new *Hubble* image shows spiral galaxy **NGC 7714** in an especially striking view of the galaxy's smoke-ring-like structure. The golden loop is made of Sun-like stars that have been pulled deep into space, far from the galaxy's center. The galaxy has witnessed some violent and dramatic events in its recent past.

Tell-tale signs of its merging with **NGC 7715** can be seen in **NGC 7714's** strangely shaped arms, and in the smoky golden haze that stretches out from the galactic center. See: <https://www.youtube.com/watch?v=YOvdofR1GgU>

QUADRUPLE STAR SYSTEM

An international team of astronomers reported the discovery of the first multiple-star system in its earliest stage of formation. The quadruple star system is forming from fragments of a filamentary gas cloud in the **Perseus** constellation.

It consists of a young star still in an early development phase and three gas clouds which are rapidly condensing by gravitational forces -- each will develop into a star in 40,000 years according to the astrophysicists' calculations. See:

<http://scitechdaily.com/images/Chandra-Views-Supernova-Remnant-G299.jpg>
A "DIMMER SWITCH"?

Yale University astronomers have identified the first "**changing look**" quasar, a gleaming object in deep space that appears to have its own dimmer switch. Quasars are massive, luminous objects that draw their energy from black holes.

Until now, scientists have been unable to study both the bright and dim phases of a quasar in a single source. All galaxies have black holes, and quasars are a phase that black holes go through before becoming dormant

BLACK HOLE EATING A STAR

A five-year analysis of an event captured by a tiny telescope at McDonald Observatory has led astronomers to believe they witnessed a giant black hole tear apart a star. The event was as bright as a "**superluminous supernovae**" (a new category of the brightest stellar explosions known).

Team members now think that disrupted stellar matter was generating so much radiation that it pushed back on the infall and the black hole was choking on the rapidly infalling matter.

COMETARY GLOBULES

In 1976 several elongated comet-like objects were discovered on pictures taken with the UK *Schmidt Telescope* in Australia and are known as **cometary globules** though they have nothing in common with comets. They were in a huge patch of glowing gas called the **Gum Nebula** and had dense, dark, dusty heads and long, faint tails.

The object seen in **CG4** is a cometary globule in the constellation **Puppis**. See:

<http://www.eurekalert.org/multimedia/pub/85698.php>

EARTH-LIKE EXOPLANETS

Australian National University planetary scientists have calculated that there are hundreds of billions of Earth-like planets in our galaxy which might support life. They found the typical star has about two planets in the so-called "**goldilocks zone**" - the distance from the star where liquid water, crucial for life, can exist.

They said: "However, the universe is not teeming with aliens with human-like intelligence that can build radio telescopes and space ships. Otherwise we would have seen or heard from them."

WHIRLPOOL GALAXY

In observations of the first known spiral galaxy, **M51**, Case Western Reserve University astronomers found new details in its faint plumes that extend from the northeast and south of the galaxy.

Other researchers discovered the southern gas tail in 1990 and assumed it was pulled out during an interaction with another galaxy. It has no stars which is unusual for such a tail but provides a clear test for future interaction models. See:

[http://www.sciencedaily.com
releases/2015/02/150203155923.htm](http://www.sciencedaily.com/releases/2015/02/150203155923.htm)

ROSETTA

As comet **67P/Churyumov-Gerasimenko** nears the Sun, its jets are heating up -- spewing noxious gases and water vapor into space as it speeds along at roughly 84,000 mph. The Sun's energy is slowly heating up the comet's insides allowing *Rosetta's* instruments to "see" the gases trapped in its icy core being released and escaping to the surface.

GALAXIES' EARLY DEATH

New research suggests galaxies can die early because the gas they need to make new stars is suddenly ejected.

Most galaxies age slowly as they run out of raw materials needed for growth over billions of years but some might shoot out this gas early on, causing them to redden and die prematurely.

University of Western Australia researchers found that it is unclear why the gas was being expelled. Possibly, it could be blown out by the galaxy's supermassive black hole or that the gas could be ripped out by a neighboring galaxy,

CASSIOPEIA A'S NICKEL AND IRON

Supernova remnant **Cassiopeia A**, or **Cas A**, still holds major surprises. Harvard-Smithsonian and Dartmouth College astronomers found that **Cas A** is composed of a collection of about a half dozen massive cavities - or "bubbles."

The bubble-like cavities were likely created by plumes of radioactive nickel generated during the stellar explosion. Since this nickel will decay to form iron, they predict that **Cas A's** interior bubbles should be enriched with as much as a tenth of a solar mass of iron!

EARTH'S "INNER, INNER" CORE

Seismic waves are helping scientists to plumb the world's deepest mystery: Earth's inner core. A research team of the University of Illinois and Nanjing University in China have found that the Earth's inner core has an inner core of its own, which has surprising properties that could reveal information about Earth.

The inner core, once thought to be a solid ball of iron, has a distinct inner-inner core about half the diameter of the whole inner core. The iron crystals in the outer layer of the inner core are aligned north-south but in the inner-inner core, the iron crystals point roughly east-west.

G299.2-2.9 REMNANT

In a new *Chandra* image, supernova remnant **G299.2-2.9** looks like a beautiful flower. It is a Type Ia supernova explosions that may not be as symmetric as previously thought and could be an example of an "unusual" variation. Researchers discovered the shell of debris from the exploded star is expanding differently in various directions. See:

<http://scitechdaily.com/images/Chandra-Views-Supernova-Remnant-G299.jpg>

CASSINI'S RADAR IMAGES

During 10 years of discovery, the *Cassini* spacecraft has mapped almost half of the surface of Titan, Saturn's largest moon, revealed vast, desert-like expanses of sand dunes, and plumbed the depths of expansive hydrocarbon seas. Cassini's radar pulled back the smoggy veil that obscures the surface of Titan. And now, its grainy images have been greatly improved using a technology known as "Speckle Interferometry."

WHITE DWARFS

A team of astronomers has discovered a close pair of white dwarf stars - extremely dense stellar remnants that have a total mass of about 1.8 times that of the Sun and orbit each other every four hours. They will grow closer before eventually merging into a single star within the next 700 million years.

The resulting star will be so massive that nothing can then prevent it from collapsing in on itself and subsequently exploding as a supernova.

KEPLER'S STRANGE DISCOVERIES

NASA's *Kepler* telescope has discovered many strange, new worlds but none are stranger than the planetary systems that are commonly seen orbiting very close to their host star. Some of these planets are almost 100 times closer to their star than the Earth is to the Sun, and many of these orbits are much smaller than those of Mercury. The relative inclination between the orbits in these systems is even lower than our solar system making these systems very flat.

TESS

NASA's *TESS* is planned to be launched in August 2017 and is designed to discover thousands of exoplanets by focusing on stars 30-100 times brighter than those surveyed by the *Kepler* telescope. The newly discovered planets should be far easier to characterize with follow-up observations.

Previous sky surveys with ground-based telescopes have mainly picked out giant exoplanets. In contrast, *TESS* will examine a large number of small planets around the very brightest stars in the sky. Approximately 500,000 stars will be studied, including the 1,000 closest red dwarfs, across an area of sky 400 times larger than that covered by *Kepler*.

The YOUNG ASTRONOMERS NEWSLETTER is distributed by the Forsyth Astronomical Society

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