

THE YOUNG ASTRONOMERS NEWSLETTER

Volume 23 Number 6

STUDY + LEARN = POWER

May 2015

AUSTRALIAN CRATER

A team of geophysicists has found the twin scars of the impacts of a huge meteorite that broke in two moments before it slammed into the Earth millions of years ago in central Australia. It is the largest impact zone ever found on Earth – 400 kilometers wide.

“YELLOW BALLS”

Citizen scientists recently found a new class of curiosities that had gone unrecognized before: **yellow balls**. Many "citizen scientist" projects make up the **Zooniverse** website which relies on "crowd-sourcing" to help process scientific data.

The rounded features are not actually yellow but appear that way in the infrared images the telescope sends to Earth. See: <http://www.spxdaily.com/images-ig/yellow-balls-process-star-formation-ig.jpg>

and <http://www.zooniverse.org>

CANADA'S NEW TMT TELESCOPE

Canada and an international partnership are funding the construction of the **Thirty Meter Telescope** - the top priority in Canada's Long Range Plan for Astronomy and Astrophysics. The TMT will be almost 100 times more powerful than current telescopes. It will examine the first stars to form in the universe, the black hole at the center of the Milky Way, atmospheres and other properties of planets within the habitable zones of other stars.

KOLA FIREBALL

The crackling fireball that exploded over Russia last year appears to share an orbit with a huge asteroid discovered in October 2014. The **Kola fireball** was spotted on April 19, 2014, as it lit up the night sky above the Kola Peninsula near the Finnish-Russian border. Its orbit is "disturbingly similar" to the asteroid **2014 UR116**, slated to pass by the Moon in 2017.

VUL 670

New observations made with **APEX** and other telescopes reveal that **Vul 1670**, a star that European astronomers saw appear in the sky in 1670 was not a nova, but a much more violent breed of stellar collision. It was a very rare, spectacular collision between two stars.

See: <http://www.eurekaalert.org/multimedia/pub/88626.php>

WATER

NASA missions are finding water in un-expected places. The most surprising water worlds are the five icy moons of Jupiter and Saturn that show strong evidence of oceans beneath their surfaces.

Scientists say: "In our lifetime, we may very well finally answer whether we are alone in the solar system and beyond."

PLANS FOR A NEW ISS

Russia announced initial plans to build a new orbital space station with NASA to replace the International Space Station which is set to operate until 2024. The project would be "open" and could include countries not currently involved in the ISS.

HIDDEN STARS

Scientists found a bright nebula around the Milky Way's nearby star **48 Librae** in a patch of sky that appears totally black in visible light but appears in infrared. They said: "This cluster is probably a group of very young stars forming inside a previously undiscovered molecular cloud, and the **48 Librae** nebula apparently is due to a huge cloud of dust around the star."

HUBBLE IS 25!

Hubble, the first telescope to revolutionize modern astronomy and change our view of the universe by offering glimpses of distant galaxies, has marked its 25th year in space. A senior scientist said: "Hubble absolutely has changed the way humans look at the universe and our place in it."

A DISTANT PLANET

The *Spitzer Space Telescope* teamed up with Poland's *OGLE* telescope in Chile to find a remote gas planet about 13,000 light-years away, making it one of the most distant planets known. The *OGLE's Warsaw Telescope* scans the skies for planets using "microlensing" --- an event when one star happens to pass in front of another and its gravity acts as a lens to magnify and brighten the more distant star's light.

ORBITING RAINBOWS

Standard telescopes use solid mirrors to image far-away objects. But the large, complex mirrors needed for astronomy can be expensive and difficult to construct. A new concept called **Orbiting Rainbows** uses clouds of reflective glitter-like particles in place of mirrors to enable a telescope to view stars and exoplanets.

See: <http://www.space.com/26773-nasa-advanced-space-technology-concepts.html>

A PECULIAR GALAXY

ESO 162-17 is what is known as a peculiar galaxy. It has gone through a **Type-1ax supernova, SN 2010ae** that resulted in interactions with its neighbors, an unusual amount of dust and gas, and an irregular shape. **Type 1ax supernovae** involves a white dwarf as the central star, but may survive the event.

See: <http://scitechdaily.com/images/Peculiar-Galaxy-ESO-162-17.jpg>

EUROPA'S WATER VAPOR

In December 2013 news was received that water vapor was detected in *Hubble* observations of Jupiter's moon Europa. However, follow-up observations have revealed no water vapor plumes emanating from the moon.

A new paper reveals that Europa's atmosphere is 100 times less abundant than previous claims.

MARS

New research from NASA's Mars rover *Curiosity* shows that it is possible that there is liquid water close to the surface of Mars. Perchlorate found in the soil lowers the freezing point so the water does not freeze into ice, but is liquid and very salty.

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 END OF MESSENGER

The MESSENGER spacecraft that has circled Mercury for the past four years will make a dramatic death plunge into the planet's surface on or around April 30 when it runs out of fuel.

Puzzles

FIND THE WORD

S D N E S S S A L C	ALONE	METER
D U O L C H D L O H	ANSWER	NORTH
S A N R A A L O P I	BREED	PAPER
E E T W R P R N A L	CHILE	PATCH
C N M E S E O E T E	CLASS	PLACE
A W P I T R W D C T	CLOUD	SCARS
L A R B T A E S H T	GREAT	SENDS
P N O H T E E G N R	LARGE	TIMES
M E T E R B I R L A	LIBRAE	WATER
E A R B I L A R G E	LIGHT	WORLDS

SCRAMBLED ASTRONOMY

SATURN'S SATELLITES

EPOAHB

HEAR

HYSTET

INDOE

SAMMI

(Answers on page 4)

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** *****

Rhea's surface features - <http://scitechdaily.com/images/New-Image-of-Surface-Features-on-Rhea.jpg>

A good reference resource - <http://www.kidinfo.com/science/astronomy.html>

Observational Astronomy - <http://www.stargazing.net/david/>

Best observing sites in North Carolina - <http://www.ourstate.com/stargazing/>

SITE OF THE MONTH

Planning a career in Astronomy - <https://aas.org/learn/planning-your-education#intro>

***** **MOON IN MAY** *****

Full Moon: 5/4 **Last Quarter:** 5/11 **New Moon:** 5/18 **First Quarter:** 5/25

Perigee: 5/14 8:26 PM 227,459 mi. (366,035 km) **Apogee:** 5/26 6:19 PM 251,208 mi. (404,252 km)

** The Full Moon was called the Planting Moon and Milk Moon. ** Best observing nights: 5/10 – 5/25

***** **PLANETS IN MAY** *****

JUPITER is high towards the west in the evening sky. **VENUS**, the brightest of all the planets, is low in the SW twilight. **MARS** returns in late July. **MERCURY** is very low in the WNW near the Pleiades on the 2nd and fades away by the 15th. **SATURN** rises in the ESE at sunset and is alone in the SW at dawn. Saturn is opposite the Sun on 5/25 (*opposition*).

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

<u>NAME</u>	<u>DATES</u>	<u>BEST (pre-dawn)</u>	<u>PER HOUR</u>	<u>WHERE TO LOOK</u>
ETA AQUARIDS	4/21 – 5/12	5/5	5+	Low in the NW. Meteors are yellow with bright trails and come from Halley's Comet debris. Best viewing is in the southern hemisphere with 20 to 60 meteors per hour. May has 4 minor showers and 5 detected by radio.

LOOK FOR: >>>> A celestial highlight as **Jupiter and Venus** gradually move toward their convergence on June 30th when they will be **only 1° apart (conjunction)**. >>>> **Mercury** reaches its highest position for this year on the 6th at dusk. >>>> Giant, yellow **CAPELLA**, – the brightest star in the NW sky and about 100 times as luminous as our Sun. >>>> **CORONA BOREALIS** – a shapely crown high in the E. It is one of the few constellations that look like its name. >>>> And just to the east is **M13** in Hercules, -- a cluster of more than a million stars.

G2

The strange mystery object G2 is a fuzzy-looking thing in most photographs. That's due partly the resolution of those images — it is very difficult to take pictures of the center of the galaxy from Earth's location on the outer edge of the galactic disk and G2 is also fuzzy-looking because it has an outer layer of gas and dust around it. What lies inside that dust cloud is the subject of an intense scientific debate.

NANOFLARES

"Nano" means "very small" but solar flares appear to be the exception. A type of explosion on the Sun is called a **nanoflare** -- a billion times less energetic than ordinary flares but with the same energy as 240 megatons of TNT. The Sun can go days, weeks or even months without producing an ordinary solar flare but nanoflares are crackling on the Sun almost non-stop.

The visible surface of the Sun has a temperature of 5500° C but the Sun's upper atmosphere, known as the **solar corona**, sizzles at a million degrees. For more than a half-century, astronomers have tried to figure out what causes the corona to be so hot. It is one of the most vexing problems in astrophysics.

PLUTO

1] As NASA's New Horizons spacecraft approaches the Pluto system, its space plasma instruments, *SWAP* and *PEPSSI*, have been taking measurements and assessing the space weather in the Kuiper Belt near Pluto.

2] On July 14th, the *New Horizons* probe will fly past Pluto, offering the first close-up look at this small, distant world and its largest satellite, **Charon**. In celebration of this historic occasion members of the public are invited to participate in naming newly imaged and identified features on the surfaces of Pluto and its natural satellites. See: <http://ourpluto.seti.org>

3] *New Horizons* has traveled a longer time, and farther than any space mission – more than nine years and three billion miles. Its flyby of Pluto on July 14 will open an entirely new "third" zone of mysterious small planets and planetary building blocks in the Kuiper Belt.

BLACK HOLE ACTIVITY

Many nearby galaxies blast huge, wide-angled outpourings of material from their center, ejecting enough gas and dust to build more than a thousand stars the size of our Sun every year. Astronomers have sought the driving force behind these massive molecular outflows, and now a team led by University of Maryland scientists has found that a supermassive black hole at the center of a large galaxy can power these huge molecular outflows from deep inside the core. The outflows influence the size, shape and overall fate of the host galaxy.

ALIEN LIFE

While scientists have long suspected that we may not be alone in the universe, they've never had concrete evidence. But top NASA officials say that may not be the case much longer. In less than a decade, we may at last find alien life. Our image of the solar system has changed dramatically over the last few years. Many worlds which were once thought to be dry and cold are now believed to contain liquid water, the most crucial element for life as we know it.

VENUS' ATMOSPHERE

A group of Russian, European and American scientists has found a warm layer in Venus' atmosphere. The researchers made the discovery when compiling a temperature map of the upper atmosphere

STARS IN SCULPTOR

A Carnegie-based search of nearby galaxies for their oldest stars has uncovered two stars in the **Sculptor** dwarf galaxy that were born shortly after the galaxy formed, approximately 13 billion years ago.

The unusual chemical content of the stars may have originated in a single supernova explosion from the first generation of **Sculptor** stars.

HOPS 383

An international team of astronomers has discovered an outburst from a star in the earliest phase of its development. The eruption reveals a sudden accumulation of gas and dust by an exceptionally young **protostar** known as **HOPS 383**.

A **protostar** has not yet developed the energy-generating capabilities of a Sun-like star but shines from the heat energy released by its contraction and by the accumulation of material from the disk of gas and dust surrounding it. The disk may one day develop asteroids, comets and planets.

ORGANIC MOLECULES FOUND

Astronomers have detected the presence of complex organic molecules in a **protoplanetary disk** surrounding a young star, indicating that the conditions that spawned our Earth and Sun are not unique in the universe.

The disk surrounding star **MWC 480** is brimming with methyl cyanide (CH₃CN), a complex carbon-based molecule. Both this molecule and its simpler cousin hydrogen cyanide (HCN) were found in a region that astronomers believe is like the Kuiper Belt.

THE EARLIEST STARS

The first stars in the Universe were born several hundred million years after the Big Bang, when atoms of hydrogen and helium had formed, but nothing shone in visible light. Canadian researchers have calculated that the first stars could have clustered together in phenomenally bright groups.

The earliest stars lived very short lives and produced the first heavy elements, - like the carbon and oxygen that the chemistry of life depends upon.

HANNY'S VOORWERPS

The *Hubble Space Telescope* has photographed a set of wispy, goblin-green objects that are the short-lived ghosts of quasars that flickered to life and then faded. The glowing structures have looping, helical, and braided shapes that don't fit a single pattern.

These "wisps" are believed to have been illuminated by powerful ultraviolet radiation from a supermassive black hole at the core of the host galaxy (a quasar).

The first "green goblin" type of object was found in 2007 by Dutch schoolteacher Hanny van Arkel. She discovered the ghostly structure in the online Galaxy Zoo project and it was named **Hanny's Voorwerp** -- Dutch for Hanny's object. See:

<http://www.nasa.gov/sites/default/files/thumbnails/image/p1513aw-voorwerps-150330.png>

NASA SPIDER-DROIDS

Tethers Unlimited is developing a futuristic "Arachnid-like" droid system that hopes to help humanity's journey into outer space and settlement.

The "SpiderFab," droids will work similarly to a 3D printer to help construct spacecraft, radio antennas, and, in the long term, infrastructure to support the expansion.

See: <http://www.wired.co.uk/news/archive/2013-09/10/spiderfab-tethers-unlimited/viewgallery/307855>

SATURN'S GREAT WHITE SPOTS

Once every 20 or 30 years, a super-storm breaks out on Saturn and whips around the ringed planet in a violent spectacle that rages for months on end. The storm can stretch hundreds of thousands of miles before fizzling out. Dubbed "Great White Spots", the outbursts are so large they can be seen with telescopes on Earth.

See: <http://www.sci-news.com/space/science-cassini-saturns-great-white-spots-02696.html>

'DWARF PLANET' CERES – A GIANT MYSTERY

Ceres, the first object discovered in the main asteroid belt, was observed in 1801 by Sicilian astronomer Father Giuseppe Piazzi. After more, but smaller objects turned up, **Ceres** was downgraded to an asteroid only to get a status boost in 2006, becoming a "dwarf planet. Now, *Dawn* has imaged about a dozen "unknown" spots.

See <http://www.space.com/28704-bright-spots-on-dwarf--planet-ceres-not-explained-yet-video.html>

The *Dawn* spacecraft has captured the highest-resolution views of Ceres to date. After spending more than a month in orbit on the dark side of dwarf planet Ceres, NASA's *Dawn* spacecraft has captured several views of the sunlit north pole of this intriguing world.

WHERE DID THEY COME FROM?

Astronomers have found objects in the distant Universe seen at a time when it was only 3.8 billion years old and what could be the earliest of the vast clusters of galaxies that we see now.

In today's Universe, many are in dense clusters of tens, hundreds or even thousands of galaxies that have not always existed, and a key question in modern cosmology is how such massive structures assembled in the early Universe. See:

http://www.esa.int/spaceinimages/Images/2015/03/Proto-cluster_candidates

GRB'S

Gamma-ray bursts are rare explosions that happen when extremely massive stars go supernova. A stars' strong magnetic fields channel most of the explosion's energy into two powerful plasma jets, one at each magnetic pole.

The jets spray energetic particles for light-years in both directions, at close to light speed. Researchers also suspect--but haven't been able to prove conclusively--that GRBs are the source of at least some of the cosmic rays and neutrinos that pepper Earth from space.

WHITE DWARF

Using archival data from the Japan-led Suzaku X-ray satellite, astronomers have determined the pre-explosion mass of a white dwarf star that blew up thousands of years ago, and ruling out "a pair of merging white dwarfs." Supernova remnant **3C 397** is in the constellation Aquila.

A COSMIC RING

Astronomers discovered a distant galaxy that looks like a "cosmic ring" with the aid of a **gravitational lens** - thanks to the highest resolution images ever taken with **Alma** in Chile. Forged by the chance alignment of two distant galaxies, this ring-like structure is a rare and peculiar example of **gravitational lensing** as predicted by Albert Einstein in his theory of general relativity.

Gravitational lensing occurs when a massive galaxy or cluster of galaxies bends the light emitted from a more distant galaxy, forming a highly magnified, distorted image. See: <http://news.discovery.com/space/galaxies/alma-captures-ancient-galaxies-near-perfect-einstein-ring-150407.htm>

EARTH AND THE MOON

It's long been believed that Earth's moon was formed in a major planetary collision with a Mars-like protoplanet called Theia. Now, a new study suggests that it was quite similar in size and composition.

A model was able to simulate an early solar system overcrowded with would-be planets, and formations and collisions were more common than previously thought.

WHITE DWARF AND A PLANET

Researchers think they have discovered the remains of a planet that may have been ripped apart by a white dwarf star. When a star reaches its white dwarf stage, nearly all of the material from the star is packed inside a radius one hundredth that of the original star. The gravitational pull of the star and the associated tides are greatly enhanced. Then, a planet passing too close to the white dwarf can be torn apart by the intense tidal forces of the white dwarf.

SEARCH FOR LIFE

After searching 100,000 galaxies for signs of highly advanced extraterrestrial life, a team of scientists using the *WISE* orbiting observatory found no evidence of advanced civilizations but did find about 50 galaxies that have unusually high levels of mid-infrared radiation. They said that follow-up studies may reveal if the radiation results from natural astronomical processes, or the presence of a highly advanced civilization."

BLACK HOLES CLEAR STAR-MAKING GAS

Astronomers using ESA's *Herschel* space observatory have found that the winds blowing from a huge black hole are sweeping away its host galaxy's reservoir of raw star-building material.

Found at the hearts of most galaxies, supermassive black holes are extremely dense and compact objects with masses many times that of our Sun.

ROVER CHALLENGE

University Gardens High School of San Juan, Puerto Rico, won first place in the high school division of the **2015 NASA Human Exploration Rover Challenge**. Finishing in second place was Rafaelina Lebron Flores of Patillas, Puerto Rico. Third place went to The Academy of Arts, Careers & Technology of Reno, Nevada.

See: www.nasa.gov/roverchallenge

The **YOUNG ASTRONOMERS NEWSLETTER** is

distributed by the Forsyth Astronomical Society

:srewsnA ymonortsA delbmarcS

SAMIM ,ENOID ,SYHTET ,AEHR ,EBEOHP