# THE YOUNG ASTRONOMERS NEWSLETTER

#### WE HAVE LOST OUR FOUNDER

It is with deep sadness that I report the loss of our newsletter founder and creator, Art Gormley, who passed away on January 7. Art had poured his heart and soul into the Newsletter as its editor for over 23 years. At the age of 93, and becoming quite frail, Art gave up the job last November. Absolutely no one is going to be able to fill his shoes. I will continue the work for the foreseeable future, with some trepidation and humility.

Our FAS president, Dave Morgan will present his tribute to Art later in this Newsletter.

Bob Patsiga

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#### ASTRONAUT GENDER EQUALITY

For the first time in history, the new class of eight NASA astronauts is 50 percent women. This class could be the makeup of the first crew to head for Mars. Three of the four ladies are married and two are mothers. (New York Times, Jan. 7, 2016).

#### HOW DID WATER ACCUMULATE ON EARTH?

For the past few decades, scientists assumed that Earth's water arrived by early bombardment by comets. However, now the consensus leans toward water being brought in by displaced asteroids. This is supported by the analysis of the deuterium to hydrogen ratio in the water (Deuterium and ordinary hydrogen are isotopes of each other. A hydrogen atom possesses one electron and one proton, while a deuterium has an electron, a proton, plus a neutron. Otherwise the two isotopes show nearly the same chemical properties. Water can be H2O or HDO or D2O.) The water analyzed on most comets has a D/H ratio at least twice that of Earth. The Rosetta probe found the D/H ratio on the 67P comet to be three times that of Earth. By contrast, meteorites released by the asteroid Vesta showed a D/H ratio that matched Earth's ratio. Asteroids that originate

from the region of the gas giant planets, like Jupiter and Saturn may have water content as high as 20 percent. The jostling in the orbits of Jupiter and Saturn, several million years after the start of the solar system could have knocked ice-ladened asteroids in towards Earth and at the same time deprived Mars from accumulating enough material to become as big as the Earth. (Science News, May 16,2015).

#### SALTY CERES

After examining the asteroid, Vesta from 2011 to 2012, the spacecraft Dawn arrived at the dwarf planet, Ceres in early 2015. Ceres has given us an intriguing display of physical features and ebullient behavior it observed on this second asteroid object. White spots appear to be salt deposits, possibly magnesium sulfate (related to Epsom salts), that was pushed up by subsurface watery brine. In addition, there is indication of complex ammoniated phyllosilicates which coat the landscape. As Dawn made passes over the Occator crater, it observed a diffuse haze which could be water vapor or fine particles lifted up by sublimating water. Further analyses are needed. (Science News, 1/9/2016 and NASA JPL website).

#### PLUTO LIKE A LAVA LAMP

There's some chilly action taking place on Pluto. Sufficient internal heat inside the dwarf planet melts the solid form of nitrogen (N2) into liquid which then squeezes out to the surface, where it again solidifies and sinks. (Nitrogen melting point is minus 210 degrees Celsius.). Similarly, methane (CH4, melting point of minus 182 degrees C.) condenses on crater rims and over millions of years has reacted with nitrogen and carbon monoxide to form dark red complex organic solids, called tholins. (Johns Hopkins U. website: http://pluto.jhuapl.edu).

Nicholas Copernicus was born on February 19, 1473.

#### THE FUTURE OF GREEN BANK IN JEOPARDY

Three years ago, a National Science Foundation panel recommended that the Green Bank radio telescope center in West Virginia be defunded by 2017. The National Radio Astronomy Observatory (NRAO), primarily using large dish telescopes, has been producing significant deep space discoveries since the 1960's. This includes the mapping of the spiral structure of the Milky Way, the discovery of our galaxy's massive central black hole, Sagittarius A\*, discovery of the Crab Nebula pulsar, detection of interstellar clouds of formaldehyde and other organics, and the list goes on. Now, with the lower costs of electronics, it is less expensive to do radio astronomy based on small dish, interferometric arrays. This can be seen in the construction of the Very Large Array (VLA) in New Mexico, the Atacama Large Millimeter Array (ALMA) in Chile, and other similar radio observatories under construction around the world. Green Bank's old interferometer is based on outdated technology and geometry. So, the NRAO is looking for funding sources that will help it stay alive. The University of West Virginia has offered to contribute \$1million, and additional funds may come from collaboration with Chinese astronomers. (American Scientist, vol. 104, Jan.-Feb. 2016).

#### HOW DOES A FLAME BEHAVE IN MICROGRAVITY?

With personnel safety as the prime motivator, extensive research is taking place on the behavior of flames in microgravity environment. The essential observation is that when a flame produced in microgravity is subjected to a reduced oxygen supply, the flame dies down, but splits up (bifurcates) into tiny, hemispherical flamelets. These miniscule, offspring flames can survive without detection at limited oxygen levels-lower than the minimum levels needed with Earth-bound flames. This means that a packet of flamelets can hide in confined spaces, like wire bundles or conduit, and then burst into a dangerous blaze if oxygen should suddenly be restored. A detailed analysis of the various influences on flames and flamelets was carried out by researchers at Michigan State Univ., NASA, San Diego State Univ. and Ford Motor Co. (American Scientist, vol. 105, Jan.-Feb. 2016).

#### SHAPES OF MOON CRATERS

If a meteor strikes the moon, the crater will be circular in shape even if the meteor comes in at a low angle. The natural assumption would be that such craters would be oblong in shape. Research by NASA, using projectiles fired at various targets, shows that even if the incoming angle is as low as 25 degrees, the resulting crater will be circular. This is due to the explosive collision which displaces debris outward in a circular pattern. If the angle is low enough, however, the ejecta will favor the forward direction, although the crater itself remains circular. (Sky & Tel., Feb. 2016).

#### HOW MUCH WATER DID MARS HAVE?

Using Earth-based spectral analysis of Mars' atmosphere so that the relative amounts of ordinary and heavy water could be measured, NASA researchers were able to calculate how much water Mars has lost over the past 4.5 billion years. Since ordinary water evaporates more quickly to leave behind water enriched in deuterium, it was possible to calculate the total water present in the distant past. This amounts to some 6.5 million cubic miles of water. That's a bit larger than Earth's Atlantic Ocean. (One of the top space stories for 2015 in Astron. Mag., Jan. 2016).

#### CASSINI'S END

Having circled all of Saturn's seven major moons plus its rings since 2004, the Cassini spacecraft will conclude its mission by plunging into the planet's thick atmosphere in 2017. (Astronomy mag., Feb. 2016).

#### **HUGE PLANETARY NEWS**

It is quite possible that the solar system planet count will return to nine. But we will not reinstate Pluto to the elite group of major solar orbs. Instead, astronomers at Caltech have proposed the existence of an actual ninth planet. Astronomers Mike Brown and Konstantin Batygin have carefully plotted the orbits of several Kuiper Belt objects and found that their unexpected clustering could be explained by the gravitational herding by a distant large planet, called Planet 9. Furthermore, the presence of Planet 9 explains the odd, 180 degree orbital angle of four other objects, relative to the plane of the Solar System planets.

The interaction of Planet 9 and the other objects was subjected to computer simulations as well as mathematical analysis. The new planet has not yet been observed, but it should be detectable with modern telescopes.

What we know: Planet 9 is about ten times more massive than the Earth. It is 2 to 4 times Earth's diameter. It has a semi-major axis of about 700 AU (AU = Sun-Earth distance). It takes between 10,000 and 20,000 years to make one orbit around the Sun. NASA's stance is to be cautious about claiming the existence of Planet 9.

Mike Brown has discovered, or co-discovered Eris, Sedna, Haumea and Makemake, as well as numerous other, lesser-known objects and he is often labeled as the man who killed Pluto.

With Caltech colleague, Konstantin Batygin as co-author, the publication of the research and revelation about Planet 9 appeared in The Astronomical Journal, volume 151, number 2, January 20, 2016. The full article, as well as other information about Mike Brown are readily available on the internet.

## ASTRONOMICAL EVENTS FOR FEBRUARY 2016

#### Moon phases: Full: 2/22; New: 2/8; First quarter: 2/15; Last quarter: 2/1

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**Planets:** In the early morning, Mercury and Venus are drifting toward the Sun, and are getting to be harder to see in the pre-dawn glare. Saturn is higher up, in the constellation Scorpius. Jupiter rises late in the evening and is located between Leo and Virgo, while Mars rises after midnight and is found a little west of Saturn and Scorpius.

**Constellations:** At mid to late evening, you will see the familiar winter constellations of Orion, Taurus, Gemini, Auriga and Canis Major. You can't miss the brightest star in the whole sky: Sirius, in C. Maj. **Word search: Junar craters** 

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**Teachers:** Class topic for discussion: Why do we have leap years?

Forsyth Astronomical Society website: <u>http://www.fas37.org</u> SciWorks No.: 336-767-6730

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Art Gormley's Graduation Photo From the U.S. Merchant Marine Academy

### "STUDY + LEARN = POWER + SUCCESS" A tribute to Art Gormley, by David Morgan, President of the Forsyth Astronomical Society

STUDY + LEARN = POWER + SUCCESS was Art Gormley's mantra for life. His was a life dedicated to learning, teaching, sharing, doing, and serving, all defined by a certain, unwavering focus. Art Gormley was the originator, writer, and publisher of the Young Astronomer's Newsletter.

Arthur John Gormley, 93, passed away on January 7th, 2016. He was born June 19, 1922 in Flushing NY. Art was a graduate of the United States Merchant Marine Academy, Kings Point studying engineering. As a Cadet-Midshipman in WW2, Mr. Gormley sailed on the SS Stanley Matthews during several invasions in the South Pacific. He also served as a First Lieutenant, USNR, on the USS Cotton during the Korean War. Art worked for Western Electric here in Winston Salem, Burroughs in Pennsylvania and California, and finished his working career with Xerox in 1987. Upon retirement he moved back to Winston-Salem and joined the Forsyth Astronomical Society, where he became an active member and mentor to Rick Blakley, a future FAS president, encouraging Rick to pursue a career in optical design. In short order upon returning here, and on Art's own initiative, Art and Rick volunteered to restore the 12.5" Classical Cassegrain telescope located in the Fountain Observatory at Winston-Salem State University. Art funded and he and Rick performed all the labor for a full restoration of the facility, including recoating and recollimating the optics, restoring the electrical and mechanical systems to operating status, and painting the dome, in and out. They turned an unusable relic into a working scientific instrument, and in the process formed a close and lifelong friendship with Dr. Deva Sharma of WSSU. Shortly thereafter, Art established a friendship with Gray Bowman of the Physics Department of High Point University and ended up funding and

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personally restoring their historic 4" Alvan Clark refractor, a true museum quality telescope. The restored refractor is a beautiful work of art (pun intended) and is currently on display at Congdon Hall at HPU. High

Point University presented Art with an award for his work in February of 1992. Dr. Sharma recalls that Art was instrumental in arranging for Pluto discoverer Clyde Tombaugh to give a lecture for FAS and WSSU, shortly before Tombaugh's passing. Art was an expert in solar astronomy and spent years meticulously documenting sunspot numbers. Art originated and published The Young Astronomers Newsletter for the Forsyth Astronomical Society. For more than twenty-three years, he performed the detailed and extensive research required for the monthly publication, a monumental task, especially in the early years before the internet was available to the public. The YANL appears on the FAS website and was distributed to all 85 WSFC schools, plus other students and teachers, and has been downloaded in over 75 countries. This past October Art, perhaps sensing his destiny, approached me and asked me to find him a qualified candidate to carry on as publisher of the Young Astronomer's Newsletter. Art and I both felt that we had found a fine candidate as the new YANL publisher, Robert Patsiga. Bob is a retired college chemistry professor, FAS member, and currently volunteers at Winston-Salem's SciWorks museum operating the planetarium. Art felt good knowing the YANL would continue under capable supervision. Art led a long productive life filled with wonder, a desire to learn, teach, and mentor, a commitment to selfless service for the sake of his passion for astronomy, leaving as his legacy, a host of close friends, and untold thousands of young minds thrilled by a glimpse of the grandness of the cosmos. Such a great man will be sorely missed.



The 4 inch Alvan Clark Refractometer Restored by Art Gormley and on Display in Congdon Hall, High Point University