

THE YOUNG ASTRONOMERS NEWSLETTER

NAMING THE SUPERHEAVY ELEMENTS

The seventh row of the periodic table is now complete. These elements are collectively known as the Transactinide Elements, and they were created/discovered in the twenty-first century in several international laboratories. It is now time to name the latest four arrivals. They have the atomic numbers: 113, 115, 117 and 118. Number 113 was discovered at the RIKEN Nishina Center in Japan, and the other three were produced by collaborative work in U.S. labs and Russia. The discoverers may suggest element names but the suggestions must be reviewed and approved by IUPAC (International Union of Pure and Applied Chemistry). So far, the suggestions include for element 113: Japonium, and Nipponium; for element 115: Moscovium and Lemmium; for element 117: Ghiorsonine and Schrodingerine; for 118: Oganesson and Moseleyon. These names (and several others that were proposed) are given public review through IUPAC for five months and then finally approved by the IUPAC Council. Superheavy elements like these are very unstable and difficult to produce. Even so, they are located in the nuclear region known as the "Island of Stability", meaning that their lifetimes are several thousand times longer than other nuclei that are nearby in the Periodic Table. But we are still looking at half-lives of a minute or less. (Chem. & Eng. News; Mar. 28, 2016).

LIQUID WATER ON MARS?

There are indications that the appearance of new gullies and channels on the surface of Mars are probably not formed by the flow of liquid water. Continued analysis of Mars surface by NASA's Global Surveyor and Reconnaissance

Orbiter mainly favor the involvement of carbon dioxide. The freezing and evaporation of CO₂ gradually excavates the Martian slopes to produce the illusion of the flow of liquid. These studies were directed by researchers in France and Australia. (Sky & Tel., May, 2016).

U.S AND JAPANESE PROBES TO ASTEROIDS

Two probes are being sent to two different asteroids by NASA and the Japanese Aerospace Exploration Agency (JAXA). The Japanese probe, called Hayabusa-2, is already on its way, having been launched in December, 2014. Its target is the asteroid, 162173 Ryugu. The NASA probe called OSIRIS-REX, is aimed at the asteroid, 101955-Bennu. Launch is scheduled for September, 2016. Both probes are expected to reach their targets in 2018, and will spend about a year and half studying these bodies. Both asteroids are believed to consist of carbonaceous chondritic rock that may also contain water and organic compounds, representative of the chemistry of the early Solar System going back 4.5 billion years. The neat thing about these asteroid probes is that they will put landers down on the asteroid surfaces and pick up samples to bring back to Earth. In fact, the Hayabusa-2 will send down three landers that will fire bullets into the asteroids and in one case, set off an explosive. The first Hayabusa probe sent to the asteroid Itokawa brought back a sample in 2010. But this asteroid had a different past than these two new targets, and had no signs of water nor organic compounds. (Astronomy, April, 2016).

THE EARTH'S MAGNETIC FIELD

The Earth's magnetic field reverses every few hundred thousand years. The north polarity becomes south, and vice versa. During the switching period, which may last a few thousand years, the field disappears altogether. The last polar "flip" took place about 780,000 years ago. No one knows when the next reversal will take place. But it is an ominous portent that our global magnetic field strength has been weakening for thousands of years. When and if it drops to zero, what will be the effect on humanity? The ramifications do not look good. First, we would not be able to rely on a magnetic compass for guidance. That is not too serious an impact since we can now use GPS and other electronic lock signals. Could bird migrations be affected? However, more serious would be the absence of a magnetic field that can deflect cosmic rays and solar flare radiation. The effect on human life, and all life, in general, is hard to predict. Should we consider what preparations might be taken? (Astronomy, April, 2016).

PLUTO UPDATE

Alan Stern, principal investigator for the New Horizons Pluto mission wrote a feature article in the May, 2016 issue of Astronomy magazine.

Being so far from the sun (3.5 billion miles), Pluto is extremely cold and its surface geology and atmosphere are dominated by forces between liquefied or solidified substances. These form flat plains ringed by icy mountains that can rise 2 to 3 miles above the planar surface. Some regions are relatively young, around 10 million years, as indicated by their lack of cratering. Other areas are heavily cratered due to bombardment over nearly all the planet's 4 billion year lifespan. And, other areas seem to suggest an intermediate age. Phase changes give rise to morphological features on the surface, for example, as shown

in the eastern edge of Pluto's heart-shaped region, called Eastern Tombaugh Regio. Here, the region called Sputnik Planum, is pitted like a golf ball. The pits are believed to be caused by sublimation (conversion from solid directly to gas) of nitrogen.

The planet's crust consists of water ice. In fact, the density of Pluto suggests that one-third of the planet's mass is due to water-ice.

Also visible, are long (tens of kilometers) troughs or fissures which show reddish under-layers. There is evidence of former lakes of liquid nitrogen.

New Horizons found Pluto's atmosphere to be tens of degrees colder than expected. Also, the atmospheric pressure varies dramatically as the planet shifts its polar orientation. The atmosphere, going up from the surface to higher than 125 miles shows considerable haze, which may be due to photochemical reactions between the gases, nitrogen, methane, and carbon monoxide that produce suspended particles. These particles scatter sunlight to produce a beautiful blue tint.

The surface of Pluto's moon, Charon, is very rugged and dominated by water ice, rather than by volatile ices (frozen nitrogen, methane and carbon monoxide). Pluto and its five moons lie closely on a single plane and have nearly circular orbits.

New Horizons is expected to function out beyond Pluto to at least 55 Astronomical Units, a distance it should reach in 2022. The next planned target is Kuiper Belt Object designated as 2014MU-69. This KBO is about 44 AU distant, and New Horizons is expected to reach this region by January 2019.

MAY BIRTHDAY

Antony Hewish: British radio astronomer. May 11, 1924. Nobel Prize, 1974. With Jocelyn Bell Burnell, discovered pulsars.

MAY MOON PHASES: New: Friday the 6th; First Qtr.: Friday the 13th; Full: Sat. the 21st; Last Qtr.: Sun. the 29th. **ETA AQUARID METEOR SHOWER:** Peaks around Thursday May 5. These are debris left behind by Hallley's Comet.

SIGNIFICANT PLANET EVENTS: MERCURY WILL TRANSIT THE SUN ON MAY 9. This rare event will be visible (if no clouds) over most of the U.S. and western Europe. Mercury will begin its pass between the Earth and the Sun in the early morning of the 9th, around 7:12 AM. The transit will last about seven and a half hours. **Do not look at this event without proper shielding on telescope or binoculars. You can safely project the image via pinhole onto a white cardboard.**

MARS CLOSEST APPROACH: Mars will be at opposition on May 22 and be at closest approach on May 30, at a distance of 46.8 million miles. Unfortunately the best viewing of Mars is late at night and into the early morning. You can see the red planet at about -2.1 magnitude, near the red star Antares in Scorpius. It will be the brightest it has been since 2005.

SATURN RISES ABOUT A HALF HOUR AFTER MARS (roughly around 11 PM). It is also found in Scorpius, throughout the night moving from the southeast to southwest. Mars, Saturn and the star, Antares form a conspicuous trio in the early morning southern sky.

JUPITER IS EASILY SEEN ALL NIGHT, ALONG THE BELLY OF LEO. The gas giant stands out at a magnitude of -2.3.

VENUS IS OUT OF SIGHT ON THE FAR SIDE OF THE SUN.

WORD SEARCH: SPACE PROBES/INSTRUMENTS

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

CASSINI
CURIOSITY
GALILEO
HUBBLE
JUNO
KEPLER
LUNA
MAGELLAN
MARINER
PIONEER
ROSETTA
SPIRIT
VENERA
VOYAGER

Classroom discussion topic: What is "escape velocity"?

Little known facts: The hydrogen to helium fusion reaction taking place in the Sun occurs in about one percent of the Sun's volume. This energy is equal to 96 billion hydrogen bombs exploding every second. How do you know that the moon is going broke? It's down to its last quarter.

Forsyth Astronomical Society website: <http://www.fas37.org> **SciWorks No.:** 336-767-6730 **Front desk Extension: no. 1000**