

# YOUNG ASTRONOMERS NEWSLETTER

## CHINA PUTS LANDER AND ROVER ON THE FAR SIDE OF THE MOON

China has made an historic accomplishment by carrying out a soft landing of the lander Chang'e 4 and its passenger rover Yutu 2 onto the far side of the Moon. This was accomplished on January 3 while messages to and from the intrepid machines were relayed by the hovering spacecraft, Queqiao.

The duo scientific package was launched on December 7, and on Jan. 3 settled into its target, the southern hemisphere's Von Ka'rama'n Crater. Queqiao, was sent earlier: May, 2018.

Since the mission crafts are located on the Moon's far side, direct line messages could not take place. So, it was necessary to use the relay method.

Both the lander and the rover are powered by solar panels. Contrary to popular assumptions, the far side of the Moon is not dark. It receives essentially the same amount of sunlight as the side facing the Earth. But the light-dark periods are long: roughly two weeks of steady sunlight alternating with two weeks of darkness. The two crafts carry several instruments that were developed by various countries, including Germany and Sweden.

The most unique on-board cargo includes plants and animals. A "bio-sphere" cylinder containing potato, rock cress and cotton seeds plus silkworm eggs was set up with a supply of air and light. The intention was to create an experimental self-contained eco-system. Apparently, all seeds sprouted and grew for several days. However, the plants died when the lander was overtaken by the Moon's dark and cold nighttime period. [Space.com; Jan. 3, 2019; Newsciencetist.com; Jan. 15].

## TWO MISSIONS TO ASTEROIDS AIM TO HELP US LEARN ABOUT THE FORMATION OF THE SOLAR SYSTEM

**[A]** Japan's Hayabusa 2 spacecraft placed its rover MASCOT on the surface of asteroid Ryugu in October. After 17 Earth hours of data collection, MASCOT's batteries gave out, as expected.

Hayabusa 2 will continue to orbit the asteroid and collect data and take photos until 2020, when it will drop down near to the asteroid's surface and snatch up a sample to bring back to Earth. [Astronomy, Feb. 2019].

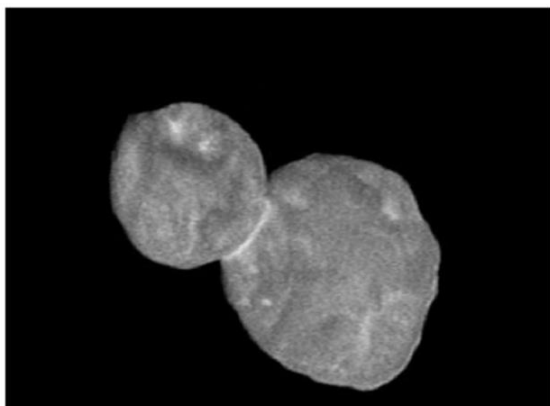
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**[B]** NASA's OSIRIS-REx probe reached the asteroid Bennu on December 3 and is in a close-in, 1 mile high orbit above the boulder-strewn surface. OSIRIS-REx will dip down to the asteroid's surface in 2020 and take a sample for return to Earth in 2023. [Space.com; Jan. 10, 2019].

## SPACECRAFT NEW HORIZONS FLIES BY A SECOND KUIPER BELT OBJECT

The intrepid space traveler, New Horizons has done it again. It has made it out beyond Pluto, which it visited in 2015, and now it has buzzed by the Kuiper Belt Object called Ultima Thule. This is at a distance of about 4 billion miles from Earth. New Horizons passed within 2,200 miles of the tiny, double-lobed object on Jan 1. Photos have been taken of a reddish, snowman-looking body. It is about 21 miles in length. Additional photos, video and other flyby data will be transmitted over the next 20 months. (see photo page 2)

New Horizon's earth-based team says that the spacecraft is still in good shape and has enough fuel left to visit yet another deep-space object. [Space.com, Jan. 17, 2019]



NASA's New Horizons spacecraft captured this image of Ultima Thule just before closest approach shortly after midnight on Jan. 1, 2019

### **NEW STARS FORMING IN THE MILKY WAY CLUSTER AROUND A SMALL, CONSISTENT AVERAGE SIZE**

Astronomers have estimated that the Milky Way galaxy contains around 15,000 stellar nurseries. These are regions where young stars are gaining mass as they pull in matter from their surrounding molecular clouds (molecular clouds consist mostly of molecular hydrogen,  $H_2$ ). The remarkable thing about these clusters of young stars is that they all seem to have nearly the same average mass, called the initial mass function (IMF). The IMF, which peaks at about one-tenth the Sun's mass turns out to be barely large enough for individual stars to initiate and maintain hydrogen fusion (hydrogen fuses to form helium plus energy). Astronomers are trying to figure out why these IMF values are so similar and so small. Of the roughly 400 billion stars in the Milky Way, some 300 billion appear to be red dwarfs (also known as M dwarfs). [Astronomy, Feb. 2019].

### **2019 DECLARED THE YEAR OF THE PERIODIC TABLE**

It is 150 years since the Russian, Dmitri Mendeleev proposed his organization of the elements in a chart of rows and columns that

we now call the Periodic Table. The chart grouped the elements in families based on similarity of physical and chemical properties. Mendeleev also used atomic weight to fit the elements in their unique places. Mendeleev's arrangement has stood the test of time, although, there have been suggested modifications. It was so meticulously prepared that it could be used to predict the properties of undiscovered elements. Its make up is consistent with what we know now about subatomic particles. It is invaluable to workers in all the physical and biological sciences. It is even a popular T-shirt novelty worn by the non-science public.

The United Nations General Assembly and U.N. Educational, Scientific, and Cultural Organization have proclaimed 2019 the International Year of the Periodic Table of Chemical Elements.

Readers are likely to see news and programs about the Periodic Table throughout the year. [C&E News, January 7, 2019; Sci. News Jan. 19, 2019].

### **ROTATIONS OF NEIGHBORING GALAXIES IS FOUND TO BE LINKED**

Korean astronomers have examined the angular velocities of numerous neighboring galaxies and found a consistent coherence between close neighbors. It appears that the rotation of a galaxy is significantly influenced by interaction with neighbors. This matching of rotation rate is found to hold out to 800 kpc (kpc is a kilo parsec, a parsec is equal to 3.26 light years). The study looked at galaxies that had line-of-sight alignment. [Astrophys. J., Jan. 2019; arXiv.1901.02151].

### **LUNAR ECLIPSE VIEWERS WITH TELESCOPES SEE A BONUS METEOR STRIKE**

Just as the lunar eclipse totality began right before midnight on January 20, viewers with telescopes could see a bright flash caused by a meteor strike on the Moon. How lucky can you get? [Space.com; Jan. 22, 2019]

