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# YOUNG ASTRONOMERS NEWSLETTER

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## **NASA IS PUTTING TOGETHER THE NEXT MARS ROVER SCHEDULED FOR A 2020 LAUNCH**

At the NASA spacecraft assembly facility at Jet Propulsion Laboratory in Pasadena, Calif., a team is putting together the descent stage rocket that will comprise the “sky crane” that will lower the next Mars rover to the surface of the red planet. This method of landing was successfully done to put the Curiosity rover on the surface in 2012.

The next rover will assess the geology of the landing site (which has not yet been announced) and determine if it has ingredients (useable minerals, water) that can help support a future human base.

Samples will be collected and transferred into sealable vials that will be cached for a future retrieval mission. Launch is scheduled for July, 2020. [Space. Com; April 10, 2018]

## **THEORIES ABOUT HOW THE SOLAR SYSTEM EVOLVED INCLUDE CONSIDERABLE JOSLING**

The May issue of Astronomy magazine contains a review of theories about how the early solar system evolved. Given the current state of the system, plus introducing computer simulations of planet orbits and gravitational forces, leads one to suggest that the developing planets moved in and out a lot. Periodic gravitational pushing and pulling and in some cases, gross leaps, are proposed to explain the arrangement we see today.

The developing planets grew in size and mass as they accumulated the gas and dust in their paths. At the same time, they eased inward toward the Sun and then back out again as the interaction between the giants, Jupiter and Saturn influenced the system as a whole.

For example, the Grand Tack model proposes that Jupiter and Saturn migrated inward toward the Sun until the innermost debris exerted an outward force to send the gas giants outward again. But they dragged a lot of the inner matter with them so that less was available to form planets of significant size. So, that leaves us with puny Mercury, Venus, Earth and Mars.

At the outer fringe of the system, we have the ice giants Uranus and Neptune. Most theorists do not think that there would have been enough matter available at that distance for giant planet formation. Thus, Uranus and Neptune likely formed closer to the Sun and then moved outward with encouragement from Jupiter and Saturn. Along with the outermost pair, there could have been another ice giant that got pushed out even farther: Planet nine.

All this speculation is brought on by comparing our solar system to the appearances of numerous exoplanetary systems. The exoplanet systems, studied by the Kepler spacecraft, tend to be much different in having large planets (10 times Earth size) that are close to their star and have short orbital periods (120 days or less). Not like what we see here in our good old solar system. [Astronomy, May, 2018].

## **DARK ENERGY STILL HAS SCIENTISTS BAFLED**

In 1929, Edwin Hubble presented redshift data that showed that the universe was expanding. The farther out we look, we find that the galaxies are moving away faster and faster. Then in 1998, greater accuracy in redshift and distance measurements showed that the expansion rate is even greater than previously thought. It appears that some force is overcoming gravitational attraction and

pushing the galaxies outward at an accelerating rate. For lack of a more definitive term, this unknown force is called “dark energy”.

One theory proposes that dark energy’s origins may be found in spacetime itself. Even a vacuum is not truly empty. Virtual particles burst into and out of existence – producing what is called vacuum energy. There are some actual measurements that show that uncharged plates separated by a vacuum still produce an interacting force between them.

One theory proposes that as the universe expands, vacuum energy particles are released from the “newly exposed” spacetime. These particles bring with them antigravity which is the agent that forces space to expand at an accelerating pace. So, it appears that we have a runaway situation: the expanding universe creates more vacuum energy that produces antigravity which pushes everything outward.

Of course, these are theories that are difficult to prove or verify within our cosmic surroundings. The idea of antigravity may become disproven as some other, more verifiable concept takes its place.

Much of the experimental work related to the problem is centered around the determination of the cosmological constant, which is the ratio of energy pressure and energy density. It was introduced by Einstein into his field equations to counter contraction in the universe. Later, he felt that including the cosmological constant was a mistake. However, it may be that dark energy is doing what Einstein wanted to accomplish with his constant (prevent contraction).

In 2005, a team of researchers formed the Dark Energy Task Force to consolidate efforts to more accurately measure the universe expansion rate and the distribution of matter

throughout the universe. More data may help to pin down the workings of dark energy. [Sky & Tel., May, 2018]

#### **REHEARSING VEGETABLE GARDENING ON DISTANT WORLDS**

Engineers from the German Aerospace Center (GAC) have built a high-tech greenhouse in Antarctica to develop techniques for raising fruits and vegetables in harsh climates. The growing unit is called the Eden-ISS and is located at the Neumayer III polar station on the Ekstrom Ice Shelf. It is basically a very sophisticated, climate-controlled shipping container. Its purpose is to be able to produce fruits and vegetables all year-round, as the outside temperatures hover in the vicinity of -30 to -100°F and sunlight is minimal.

The project produced its first full crop in April, and once techniques are perfected, it is hoped that nine to 11 pounds of fruits and vegetables can be produced per week.

Plant growth is encouraged by using a soilless medium, LED lights tuned to the optimum red and blue wavelengths, providing extra carbon dioxide and giving the growing plants a spritz of nutrient-rich mist every few minutes.

The objective is to develop techniques that allow astronauts to grow food in space or on distant planets or moons. [Time, April 23; Business Insider, April 6, 2018].

#### **PLANETARY SCIENTISTS BEGIN TO STUDY DATA FROM THE CASSINI SATURN MISSION**

Last September, NASA had the Cassini Saturn probe take a suicidal nosedive into the ringed planet. Now, the enormous amount of data that was generated during the mission has to be analyzed.

One unique finding is that considerable amount of organic compounds were detected in the rings. [Science News, April 14, 2018].

**BIRTHDAYS IN MAY: Antony Hewish** (Brit.). b. May 11, 1924. Radio astronomer. Nobel Prize 1974. Mentor of Jocelyn Bell Burnell, who first detected pulsars.

**Theodore von Kármán** (Hung. – Amer.) b. May 11, 1881; d. May 6, 1963. Mathematician, aerospace engineer. Specialty in supersonic and hypersonic air flow. One of the founders of Jet Propulsion Laboratories.

**Willem deSitter** (Neth.). b. May 6, 1872, d. Nov. 6, 1934. Dutch mathematician, physicist and astronomer. Collaborated with Einstein in describing the shape of the universe. Used celestial mechanics to analyze the motions of the four Galilean moons.

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**MOON PHASES IN MAY:** Last Qtr.: Tues. the 8<sup>th</sup>; New: Tues. the 15<sup>th</sup>; First Qtr.: Tues. the 22<sup>nd</sup>; Full: Tues. the 29<sup>th</sup>.  
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**ETA AQUARIID METEORS:** This meteor shower peaks around May 6. Unfortunately the sky will be bleached out somewhat by the waning gibbous Moon. The meteor shower is said to be caused by the Earth passing through remnants of Halley's Comet. As usual, meteors are best spotted in the wee hours of the night. Look for the Eta Aquariids in the east, in the vicinity of Pegasus.

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**THE PLANETS DURING MAY:** **Jupiter** dominates the sky all month; rising around 8:30 p.m. in the east as the Sun sets in the west. It shines boldly all night long at magnitude -2.5 in Libra. **Venus** dominates the west. You can't miss it at mag. -3.9. Look for it after the Sun goes below the western horizon. It will be visible all summer. **Saturn** rises in the east shortly after midnight. It follows Sagittarius at a magnitude of +0.2 and reaches maximum elevation around 5 a.m. Nearby, is **Mars**, which pops up in the east around 1:30 a.m. at the beginning of the month and then a little after midnight by the 31<sup>st</sup>. Look for Mars to get brighter during the month as its magnitude grows from -0.4 to -1.2 and the planet moves to its maximum size and brightness when it reaches opposition in late July. **Mercury**, unfortunately, hovers near the morning Sun, and is not easily spotted.  
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**FORSYTH ASTRONOMICAL SOCIETY** monthly meetings are the second Wednesday of the month. Meetings take place at Kaleideum North (400 W.Hanes Mill Road) at 7:30 p.m. Visitors are welcome. To obtain information about FAS events, contact the Kaleideum front desk: 336-767-6730, ext. 1000.

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**ASTROLOGICAL SYMBOLS FOR THE PLANETS:**

**MERCURY** ☿

**VENUS** ♀

**EARTH** ⊕

**MARS** ♂

**JUPITER** ♃

**SATURN** ♄

**URANUS** ♅

**NEPTUNE** ♆