Houston Philosophical Society Dinner and Lecture

Cohen House, Rice University

January 16, 2020

After cocktails and dinner, President Browning had champagne dispensed to those attending, and proposed a toast to the 100th meeting of the Houston Philosophical Society. He then introduced the guests, announced that two new members have been approved (Nicola Fuentes Toubla and Joel L. Laser), and thanked the staff of Cohen House for the excellent work they have done for the Society.

The program, **"Leading Houston: from Earth to the Moon and Mars,"** was presented by **David Alexander** and **Kirsten Siebach.**

The speakers first discussed the current NASA project to return humans to the moon. This is the fiftieth anniversary of the Apollo moon landing. For the past twenty years there has been a continuous human presence in space, and intensive research has been conducted on the effects on the human body of time in space. Humans need water, which is available on the moon and Mars, once we learn how to use it.

NASA means to have humans on the moon by 2024 (or maybe 2028). A recent graduating class at NASA included 7 men and 6 women.

The project is broken into three segments in space, plus land-based work. The first, Artemis I, is to create a livable human spacecraft, but without humans. Artemis II is to have humans in the spacecraft, orbiting the moon. The third segment, the Support Mission, will need solar electric propulsion ("SEP"), a gateway in orbit, and a human landing system. They intend to have someone on the station for twenty years, which will require new understanding and techniques for the astronauts' autonomy, health, ascent and descent, resistance to radiation, and access to resources. There is a lot of frozen water on the moon, which may possibly be usable for refueling.

As to Mars, we have 82 years' worth of data from orbiting. Ninety-seven percent of Mars has been imaged, and about 2.5% has been imaged in high resolution. There are polar ice caps, and traces of ancient water in rocks all over the planet, but for the past 3 billion years Mars has been very dry. There are traces of volcanos and floods in the distant past. Mars once had a magnetic field, about 4.5 million years ago, but solar winds blasted away its atmosphere.

Mars shows what Earth was like before life arose here. There is mudstone, formed in lakes and habitable for life. Three billion years ago, there was organic carbon on Mars. Near the poles now there is nots of ice; near the equator, there are gullies. Methane is released in summer and autumn.

NASA's plan is to bring soil and rocks back from Mars, perhaps by 2030. It is vital to manage to sterilize the spacecrafts to avoid contamination of Mars by human activity. NASA is working on this.

Many nations are working on these projects with NASA; but Houston is the premier space place in the world. Under the Outer Space Treaty, no one nation can own any part of the heavens; but there are four flags on the moon: NASA, Russia, China—and Rice.