



“Houston, Apollo 8... Please be informed there is a Santa Claus.”

Editor's Notes

The quotation at the head of our last number was from the end of Chapter 10 of **Rockets : the Future of Travel Beyond the Stratosphere**. This seminal 1944 work went through many ‘printings with additional material’, editions, and titles (**Rockets and Space Travel ; Rockets, Missiles, and Space Travel ; Rockets, Missiles, and Men in Space**) before the most untimely death of its author, the great science popularizer (and one of the founders of the VfR) Willy Ley, mere weeks before the launch of *Apollo 11*.

Your editor can only plead, in regard to the late appearance of this number (a far cry from the hoped-for two weeks!), that he has at least not been idle. Notably, he spent much time involved with the production of a documentary motion picture entitled **Lunarcy!**, in the hope that it would bring attention to the Project. This made its world premiere at the 2012 *Toronto International Film Festival*, and its US premiere at *South by Southwest 2013*, at both of which — along with a theatrical screening in Toronto in February, and the *True/False Film Festival's* ‘Boone Dawdle’ in Columbia, Missouri in July — he made well-received appearances. In addition to other festival screenings, it was broadcast on the *Epix* cable channel in March, and is now available on *Amazon* and *Netflix* streaming services. Composer Scott Giles saw it, and was inspired

Moon Phases

Last Quarter	25 November 19:30 GMT
New	3 December 00:22 GMT
First Quarter	9 December 15:13 GMT
Full	17 December 09:29 GMT
Last Quarter	25 December 13:50 GMT
New	1 January 11:15 GMT

Yutu and Us, Too

At 13:11:18 Universal Time, 14 December 2013, an unmanned spacecraft from the People's Republic of China made a successful landing on the Mare Imbrium, deploying a rover less than eight hours later. This is a genuine achievement, not only the first lunar touchdown for that country, but the first by anyone since 1976.

We do not fear diminishing this accomplishment, or belittling the Chinese themselves, by observing that it is precisely what the Google Lunar X-Prize competitors are seeking to do. But it is both natural and relevant to wonder how many months of lead a space agency supported by the government of one of the most populous and economically powerful nations of our day actually has over these small groups with their limited resources. That is doubly true because of recent changes in the GLXP structure, providing intermediate prizes which can be won Earthside, practically advancing the most successful teams part of the all-important cost of launch.

What has come to be called crowdsourcing (and crowdfunding) has been integral to the Luna Project from the outset. And the reason can be summarized in the one word *commitment*.

We can be sure that the human future in space has its true believers within the Chinese power structure. What pays for the current level of activity, however, is the desire of the political leaders there for international prestige. The cautious pace and consistent success of their program are best understood in this light. For China and India, as for the United States and the Soviet Union fifty years ago, space is a way to demonstrate national competence, but there are other ways available. Continued support demands continued performance, but is never guaranteed.

The United States government still has, by many measures, the foremost space establishment in the world. But successive administrations have failed to provide consistent or coherent direction, while successive Congresses have thrown what policies were formulated into chaos, by descending into an orgy of patronage, and in recent years, failing to pass a budget at all. A major-party candidate in the most recent Presidential election used “Moon colony” as a laugh line, and NASA has seen its resources diverted to building a rocket designed in the Senate.

Some suppose that private industry will save us. The gains from anything

truly new are as uncertain as they are great, and simple profit-motive rarely suffices to ensure investment in the future. Finance has come to be dominated by hedge-fund managers and high-frequency traders, masters of milliseconds incapable of even understanding the opportunities presented by the development of planetary space over a period of centuries. The ‘new’ space industry firms, Space-X being the standout example, depend on investors and workers (many of them the same people) for whom space is a cause, not merely a business.

The lesson is that, no matter who claims credit for the conquest of space, we — the people who are committed to breaking the shackles which bind Man to one planet, and to the vision of cosmic humanity — will be the ones who accomplish it. The time has come to repose our confidence where we know it will be rewarded. Nobody will do for us what we will not do for ourselves.

Industry Update

Space Exploration Technologies continues to go from triumph to triumph, with its *Falcon 9* rocket and *Dragon* capsule now performing Cargo Resupply Services revenue missions to ISS after a condensed flight test program, *Falcon 9/ Dragon* selected as one of the Commercial Crew Integrated Capability contenders, successful roll-out of the updated *Falcon 9* (‘v1.1’), launch of a geosynchronous satellite, a vertical-landing development program which bids fair to result in the first-ever ‘flyback’ recovery of a large launch vehicle booster stage within the coming few months, and a prospective lease on historic Pad 39A at Kennedy Space Center.

After demonstrating its *Antares/ Cygnus* combination, **Orbital Sciences** is preparing its first CRS flight, of eight planned. CCIcap awards have been made to **Boeing** for its *CST-100*, and **Sierra Nevada** for *Dream Chaser*, both of which are supposed to launch on the **United Launch Alliance Atlas V**. A *Dream Chaser* prototype delivered to NASA for drop tests was recently damaged when its landing gear collapsed.

The Spaceship Company has begun flight tests of the **Virgin Galactic SpaceShip Two** at Mojave, California, while **XCOR Aerospace** has announced plans to move research and development from there to Midland, Texas.

LCROSS Update

The discouraging effect of ‘figures’ on the casual reader is well-known, but in response to requests, we offer the following to inaugurate a regular feature of more technical material.

The Lunar Crater Observation and Sensing Satellite mission generated an impact event on the lunar surface, 9 October 2009. The principal results were reported in *Science*, 22 October 2010. In the same journal, 23 September 2011, a major correction appeared to the paper titled *LRO–LAMP Observations of the LCROSS Impact Plume*. The authors announced that their original figures for ejecta-column and soil abundances were improperly calculated and substantially in error. We believe we are the first to present abundance values corrected by the supplied factors.

In the table below, the left-hand column gives the chemical symbol for each element or compound. The center column shows the abundance of the species in the vapour plume, in units of cm^{-2} , which appears to mean atoms or molecules per square centimeter of plume cross-section viewed with the spectrograph. The right-hand column shows the equivalent soil abundance, in per centum by mass, assuming that the total mass of soil heated by the impact was 10 000 kg (certainly a very crude approximation).

Rows in boldface appeared in the original with error estimates ; all other values are maxima. Species with corrected soil abundances of less than 0.01% have been omitted.

S	2.74×10^{10}	0.01
C	1.13×10^{11}	0.02
Sc	3.11×10^{10}	0.02
Cl	8.59×10^{10}	0.04
Mg	2.38×10^{11}	0.07
Fe	1.39×10^{11}	0.09
Co	2.74×10^{11}	0.18
Hg	9.14×10^{10}	0.22
Mn	3.47×10^{11}	0.24
Ca	6.03×10^{11}	0.29
Au	1.24×10^{11}	0.29
V	7.31×10^{11}	0.44
Zn	7.31×10^{11}	0.57
CO	2.20×10^{12}	0.70
N	7.13×10^{12}	1.21
H₂	5.80×10^{13}	1.40

The headline, of course, was the hydrogen, equivalent (when combined with mineral oxygen) to 12.6% of water. Suggestions that the carbon monoxide came at least in part from geologically recent emissions from the lunar interior make our hopes of drilling for carbonaceous gas at the sites of so-called Transient Lunar Phenomena appear more reasonable. Anticipations of a lunar gold rush, however, are premature. Recovering anything from these ‘cold trap’ deposits is very much an unsolved problem.

Editorial Response

To the question, what is the purpose of **Luna!**, we may reply that it is twofold. Firstly, to exhibit not only the economic but the human development of the Solar world to receptive minds, and that as no distant prospect, but a thing definite, wanting only their involvement to make it the most concrete of realities ; secondly, to persuade those already thinking along such lines that the Luna Project presents the best approach. *Space is open to us now, and the Lunar Settlement Plan is the path to take* : that is the message.

Considering our difficulties getting this publication out in a timely fashion, we do not feel able to take on the suggested **Solar System News**, which should do more than aggregate items appearing elsewhere. The weekly **Space News**, although mostly a ‘trade rag’, does publish a certain amount of actual space news. We may recommend **Spaceflight** (monthly), **Moon Miners’ Manifesto** (ten months a year), and **The Planetary Report** and **Ad Astra** (both quarterly), which are benefits of membership in, respectively, the British Interplanetary Society, Moon Society, Planetary Society, and National Space Society (of which your Editor is now serving as a Director).

It is a principle of the Project to minimize duplication of effort. There are plenty of organizations for the space-minded, and we should only waste our time creating another. None of them, however, is very active or effective in propagandizing even the most receptive segments of the public with the message of space settlement. NSS, for example, shies from criticizing any funded Federal program, no matter how ill-conceived. We wish to see them adopt the Lunar Settlement Plan, and their membership swell with those who wish to put it into action. Twenty new NSS chapters, or ten of the Moon Society, would practically serve to take over those bodies.

Donations

We have decided to end the fund drives mentioned in our last number, for lack of response, and due to some difficulties in supplying the final few promised T-shirts. Money contributions toward the Publications Fund are invited, by PayPal to publius@lunarcc.org, or by cheque or money order (made payable to “Christopher Carson”) at the editorial address. Each gift of at least five dollars (US value) will be acknowledged with a Certificate of Appreciation, printed by hand from a wood block. While they last, Certificates for contributions of at least \$10 will be mailed in one of the hologram envelopes mentioned in our last number. A packet of ten posters will be sent on request when at least \$5 (\$10 outside US) is given.

to write and perform a piece entitled *The Lunar City*, now available from the Project Web site.

Improvements to the appearance and function of the site have been another project for your editor, along with exploring revenue and promotion opportunities, leading to an attempt to fund extending the Medalet Program through a Kickstarter™ campaign, alas without success. Another direction has been a study entitled **Boots on the Ground**, aimed at identifying a viable minimum-time (no more than two years), minimum-cost (considerably less than one billion dollars) path for a lunar pioneering expedition. Last but not least, in September 2012 he was elected to a two-year term as a Director of the National Space Society, and has been active in that role.

A revulsion in the collectibles market has made it possible to buy valid US postage stamps of old series in bulk at a discount from face value. We have obtained a good quantity of space stamps in this way, helping to keep our mailings economical and distinctive.

Offers of editorial assistance, with **Luna!**, the **Papers**, the **Data Book**, or other Project publications, will be gratefully received, as will any submissions of material.

— C.D. Carson
(*publius*)

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