Exploring Space: The Optimism of an Infinite Universe

Rudolph Biérent

Rudolph Biérent, a young researcher from the French Aerospace Lab ONERA, gave this speech to the Schiller Institute conference in Berlin, Feb. 26.

I want to thank Helga Zepp-LaRouche very much for having invited me to speak to this Schiller Institute international conference.

I have been asked to talk about space exploration. But above all, I would like to remind you of something quite obvious, quite common, which seems to be forgotten today, even though it determines the future we can imagine for our societies. We live in an infinite world. It seems like this doesn't have any real consequence; but let's imagine the opposite. Let's imagine the world is finite. Then we have to admit right away that the resources available are also finite, as well as the territory to be shared. Then, population growth becomes a problem, given that resources are diminished. If this is the case, then we can consider the future only with a growing feeling of fear.

The false belief in a finite world leads to viewing human beings as animals, without reason, Biérent said. "What a sad story, while in reality life is much more beautiful!"

Progress in technology makes life easier, but by improving the well-being of the population, it also leads people to live longer and to become more numerous. Then we become suspicious about progress and about people's welfare, and prefer to allow the existence of poverty, and thus war and famine, in order to reduce human population, as if humans were animals which are not endowed with Reason. We then end up rejoicing about those terrible things, having become convinced that they are indispensable to the wellbeing of the happy few, who have the right to a dignified life. Such is the logic of that very pragmatic "finite" world. We end up hating man, and seeing in him nothing but smallness and egoism.

What a sad story, while in reality life is much more beautiful! What a ridiculous hypothesis, that of a finite world! We need only look above—to the heavens—to be convinced of the contrary. And if we do so, I can promise you an era of great optimism and love for life, an era which will certainly beat any scenario of managing of a world of finite resources.

We have difficulties believing it today, but that optimism has already existed. And, by the way, we owe a lot of it to two great German scientists who are certainly not unknown to you. More than 40 years ago, humanity proved that it was capable of accessing other worlds. More than 40 years ago, man walked on the Moon, realizing what just 20 years before was nothing but a utopian scenario.

We owe this to Wernher von Braun, who convinced President Kennedy to launch the Apollo program with the perspective of setting foot on the Moon in only 10 years. Then came Krafft Ehricke, who made significant progress in the use of liquid propellant and proposed to separate the transport of cargo from the transport of men, leading to improved efficiency for both those types of very different missions.

The Unconditional Duty To Extend Human Life

Foremost, Krafft Ehricke developed a philosophy of space exploration for the greatest good of mankind, in which he demonstrated the unconditional duty we have to extend human life, precisely to avoid the scenario of the terrible fable I told you in the beginning. Because the stagnation of our species can only lead to its extinction, and I will not be among those who will do nothing about it, because overcoming the challenges ahead of us is also a pleasure and gives sense to our existence. That's what our power of Reason is made for, and it is using it that makes us really human.

And at the moment when humanity met the challenge of extracting itself from the Earth to reach another celestial body, what a wave of optimism moved all minds! I was not there, but I know it. Some among you here had the luck to witness that. And I wish that the young generation will also demand its own share of the infinity which surrounds us. That was the long term plan of von Braun and Krafft Ehricke. Their intention was not to set foot on the Moon and then leave. They had a plan reaching out over some 50 years. They projected that by the 1990s, man would have already established a permanent base on the Moon.

Why, some of you might ask? For many reasons. First, the Moon harbors enormous resources for use on Earth, including titan, aluminium, and iron. Also, the Moon has a decisive advantage relative to the Earth, in the purification of those metals, which are always found in raw minerals that contain a lot of oxygen. On Earth, the molten metal must be placed in a vaccum to

We owe a great deal to two great German scientists: Wernher von Braun (left), who convinced President Kennedy to launch the Apollo program; and Krafft Ehricke, who developed a philosophy of space exploration for the greatest good of mankind.

achieve oxygen extraction, thereby obtaining the best mechanical and anti-corrosive qualities possible. But to create that vacuum is very costly. Because the Moon has no atmosphere, the vacuum is free, and of a much better quality than anything we have been able to create on Earth. With a perfectly purified lunar titan, we could build bridges on Earth which would last forever. All this is possible only if the metal purification is achieved on the Moon.

But the advantage of setting up a lunar base is not solely industrial. The scientific potential is equally enormous. On Earth, space observation is of poor quality because of atmospheric turbulence. To remedy that problem, the best solution was to extract ourselves from that atmospheric turbulence by sending telescopes into space, such as the Hubble telescope. The results of those observations enabled us to realize a revolution in the comprehension of the universe. But Hubble is just a small telescope. Indeed, we cannot carry large mirrors in a rocket, and the mechanical constraints during the rocket takeoff degrade the optical qualities of the mirror, and it is very difficult to repair a telescope in space.

But on the Moon, there is no atmosphere, and observations, especially on its hidden face, would be excellent. It would be possible to build much larger telescopes there than those in orbit, and of even better quality, since they would be built with lunar silicon dioxide. Once again, in the absence of atmosphere, the optical components built on the Moon would be much better. Another advantage: Gravity on the Moon is one-sixth of that on Earth; therefore, an immense mirror is much less subjected to the constraints of its own weight. It is possible therefore to build mirrors there which are much larger than those on Earth.

We could also respond to other fundamental questions, such as the detection of other planets of the size of the Earth (thanks to interferometer techniques), at a reasonable distance from their stars, and to know if the Earth is an exceptional object of its galaxy or not. One could search for traces of life in the atmospheres of those planets. Such a telescope would be a revolution in our comprehension of the universe, and the Moon is our best hope to get answers to those questions.

One can also add the possibility to build particle accelerators in space, while at the particle accelerator of the CERN [European Organization for Nuclear Research] in Geneva, it takes hard work to to create a vacuum, over many kilometers of tunnels.

The Moon harbors important reserves of Helium 3, very rare on Earth, which is the ideal element to realize nuclear fusion, the very same source of energy of the stars, and of the light we receive on Earth every day. From a very small amount of matter can thus come an inconceivably abundant and non-polluting source of energy.

Numerous other applications can be conceived on the Moon, such as the utilization of the phenomenon of free superconductivity, available due to the cold conditions that reign on our satellite.

A Medical Revolution

We can also envisage a medical revolution as a result of experiments we can conduct on the Moon. On this, I refer to the work of the Basement [Go online to for more info: http://larouchepac.com/basement], which demonstrates the influence of the electromagnetic environment on living processes, and more precisely, on the communications among living cells. On the Moon, we would be out of reach of the Earth's electromagnetic field, and one could study the communication among cells. The real cure for cancer is probably in that direction, because it's a typical problem

of a cell which no longer responds to the organism. All we are able to do at this point is to apply chemical treatments to destroy the cells, but one could imagine the possibility of simply rallying them back to Reason!

I hope that you are now able to see humanity's potential to inhabit the Moon. Not much is missing to carry out that type of project. First of all, we need a rocket capable of delivering a very heavy cargo to the Moon: the first components of a base to be occupied later by astronauts. As of today, there is no operational heavy launcher in the world. Before, we had the Russian Energia, and the Saturn rocket of the American Apollo mission. Those rockets were able to deliver up to 100 tons to low Earth orbit. In comparison, the Arianne rocket today can only deliver 20 tons to low orbit.

Because of the lack of such projects, we are losing the competency of engineers; and since the Space Shuttle was abandoned, the Americans are not even capable today of sending men to space! Only satellites are being launched; that's not what we can call space exploration!

Having the vision of a lunar base, we need to develop new launchers. The Russians had called on us, the Europeans, to work with them on the Clipper project for a reusable shuttle. Having no vision for the future, however, the Europeans refused. We also need to develop a shuttle used exclusively for travelling between low Earth orbit and low Moon orbit, and we need a Moon lander for landing on non-flat areas at the poles of the Moon, areas where one can find water at the bottom of craters which are never exposed to the sunlight.

It's *Not* Too Expensive

All those who promote space exploration know what policy must be applied, but they are always told: "It's too expensive." So, for the first time in this speech, I will speak like a pragmatist. Space exploration is a source of a lot of income, more than any other investment. With the Apollo space program, it is estimated that for each dollar invested, the U.S.A.'s gross national product rose $2.50; personal income by $2; and consumer outlays, $1.50. All three increases led to a Federal tax return of $0.50 on every space dollar invested. You can't imagine a better business. And you must understand why.

All the new technologies of information, electronics, and materials for space resulted in massive spin-offs for civilian industry. Without the exploration of space as a catalyzer, as a long-term objective, we never would have imagined all those solutions which today feed our progress, our economy, and our well-being. That's the real economy: a will, a vision of the future. And it is only afterwards, without really looking for it, that purely material benefits will occur, such as would never have been possible with a short-term perspective.

Some years ago, I met several German students at the European Space Agency. They came, for the most part, from the University of Stuttgart. I think, in fact, that it is in this university that one finds the best training in space engineering of all of Europe. Very recently, I heard some news about them. They are developing a system to refuel rockets in space. Indeed, most of the propellant is burnt just to reach low Earth orbit, and we don't want to carry more propellant, because then, you have to burn more propellant just to lift propellant. And those students showed us a new path for space exploration.

Because of the lack of projects such as Apollo, we are losing engineering capabilities, and since the Space Shuttle was abandoned, Americans are no longer capable of sending men into space. Shown: Liftoff of Apollo 11, July 20, 1969, which landed the first men on the Moon.

With the heavy launcher, we must develop this refueling in space, and we can expect to carry more than 100 tons of cargo to the Moon. Without refueling in space, the same heavy launcher only carries several tons to the Moon! Those students are working on a project which can greatly facilitate Space exploration. These young people illustrate perfectly how space exploration can give a creative impetus to the young generation, and help them to express their maximum potential for projects that will uplift us all.

As Krafft Ehricke said so well: "The idea of travelling to other celestial bodies reflects to the highest degree the independence and agility of the human mind. It lends ultimate dignity to man's technical and scientific endeavors. Above all, it touches on the philosophy of his very existence."

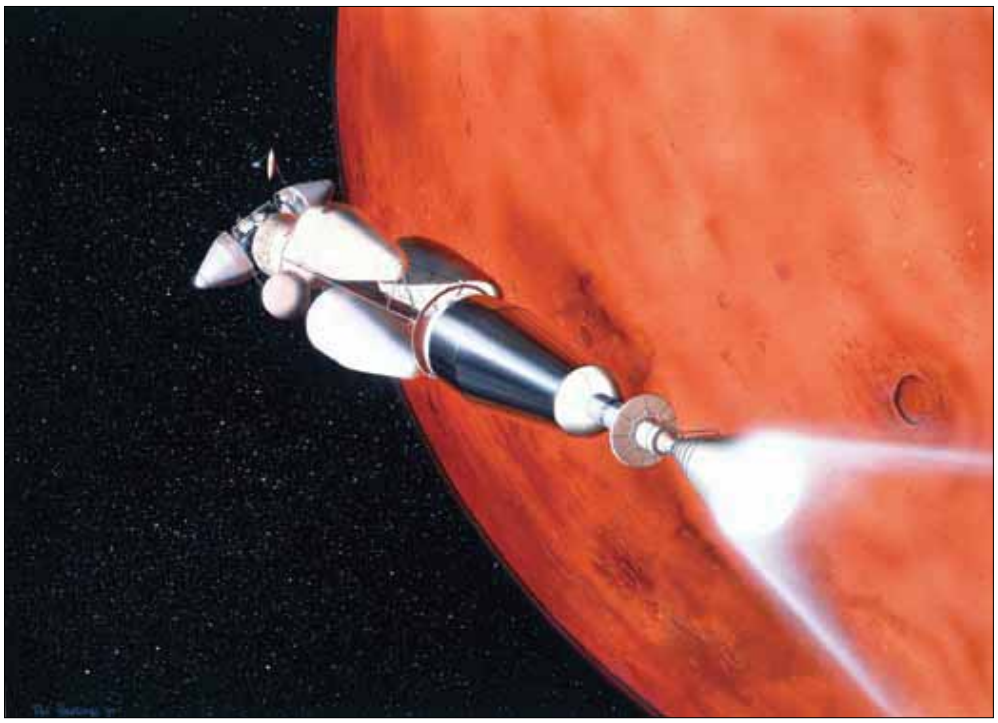
I know that those students are endowed with creativity, and I am happy that youth still have the possibility

of investing their energy in that type of project.

The Next 40 Years

As Ehrike and von Braun did in their time, we have ideas for space exploration for the next 40 years. The Moon is an excellent platform for the pursuit of space endeavors. Once again, because of the much weaker gravity, it is easier to launch rockets from there. Propellant would be produced on the site, from lunar resources.

But to reach an objective like Mars, we will need higher orders of technological breakthroughs, in order to reduce the travelling time of one year allowed by chemical propulsion. We will need to develop ionic propulsion. In fact, in space, there is no support for generating an upward thrust. Thus, the only means for a rocket to move is to eject matter, causing a thrust in the opposite direction. The faster the ejection of gas, the bigger the thrust will be.



To reach Mars, we will need higher orders of technological breakthroughs, to reduce the travel time of one year allowed by chemical propulsion. We will need to develop ionic propulsion. Shown: an artist's concept of a nuclear thermal rocket arriving in the vicinity of Mars.

Today, what is ejected is the product of the chemical combustion of hydrogen and oxygen. But the chemical combustion does not eject matter at very fast speed. Ionic propulsion first ionizes a gas. An ion is a particle with an electrical charge. One can apply a force to this charge, and accelerate it by way of an electrical field. But this process—the ionization and the acceleration of particles—consumes a lot of electrical energy; this is why the rocket must be fuelled by a nuclear reactor. With a lighter gas, one could produce a more efficient thrust and reduce the travel time to Mars to some 30 days!

It is thanks to the principle of increase of the energy-flux density in the rocket that we can solve the challenge of making a planet like Mars accessible. Chemical propulsion suffices for the Moon, which would be within three days' reach with that mode of propulsion.

I shared with you my views about our imperative to explore space, I have tried to convince you that we need it in the near future, but I can't prove to you that we have to do it. It is faith, the same faith which pushes every scientist to investigate: the faith that there are physical laws in nature; the faith that man is able to understand the laws of nature; and the faith that man has to use these laws for his own benefit.

Everything in science starts with faith, intuition. It is the way Planck or Leibniz thought about science. You can only demonstrate that your intuition was correct afterwards, once you have made a discovery. This is the same with space exploration. I have faith that expansion in space is our future, and some day, we will laugh about the fact that we believed we were bound to stay on Earth, the same way we once believed the Earth is flat.

We must believe in our ability to create the future we dream of. Space is a natural step for the future of mankind. And the new generation is ready for it!