LaRouche Basement Team in Dialogue with NASA Scientists

by Creighton Jones

April 27—If mankind is to extend his existence beyond the bounds of the protective womb of Earth, it will require some fundamental breakthroughs in our understanding of how life expresses itself, and what its requirements are for thriving. This is the understanding that members of Lyndon LaRouche's scientific research team brought with them to the five-day NASA-sponsored Astrobiology conference in Atlanta, Ga., during the third week of April. The conference brought together a scientifically eclectic group of researchers, students, professors, and administrators, both government and private, from around the world, spanning the gamut of space-related researches, from microbiology, to extraterrestrial life, to cosmic radiation and asteroid defense.

Two members of the team had been invited to present material at the conference, Meghan Rouillard to present a poster during a session titled "Emerging Technologies and Strategies for Prospecting for the Signs of Life on Other Worlds," while Creighton Jones was invited to give a presentation as part of a panel titled, "Thermodynamics, Equilibrium, and Evolution."

In both cases, questions of revolutionary consequence were presented. Rouillard introduced the ideas of Vladimir Vernadsky, who developed a fundamental conception of life as a distinct state of space, that cannot be reduced to simple chemical reactions operating according to the simple laws of thermodynamics. For Vernadsky the question was not "what is life," but rather "What does life uniquely do?" In other words, what kind of effects are produced as a result of the action of life, that otherwise are absent when life is absent? From this perspective, life is recognized as a universal principle of action, such that life and its effects can only come from life.

This distinction becomes fundamental, particularly when attempting to identify life in other parts of the universe, or when determining what constitutes a habitable zone for future life. The quest to identify planets that are orbiting stars, and which are in the habitable zone, is a major focus of the astrobiology community, but unfortunately, the parameters that are used are woefully minimal and reductionist. It is for this reason that the introduction of Vernadsky's work into the discussion is so imperative, because it introduces a much more rigorous and universal concept of life, and opens up a whole new avenue for investigating where life might currently be found, and for determining zones that future human beings may one day wish to inhabit.

Similarly, the question of what constitutes the state of space for life was at the center of Jones's presentation, titled "Understanding the Dynamic Relationship of Electromagnetism and Life as an Evolutionary Process, and as a Baseline for Supporting Life in an Extra-Terrestrial Environment."

Here the challenge was posed of going beyond the simple chemical/material view of living processes, and taking account of the entire spectrum of electromagnetic (EM) radiation as it is connected to living processes. Evidence was presented to demonstrate that the electromagnetic environment of Earth has changed as a function of, and in connection with, the evolution of life; that there is a dynamic interaction between the chemical and electromagnetic processes which constitute the living space.

Again, these considerations become imperative when considering the potential for supporting life, particularly human life, outside the biosphere of Earth. For example, it was shown that life evolved on land under conditions of a very particular interaction of extremely-low-frequency (ELF) standing wave radiation, which itself is generated by life-fostered lightning strikes, interacting with our global magnetic field; as a result, many biological functions have been shaped and tuned by that environment.

Thus, the question becomes, "Must we compensate for that EM interaction, in addition to the chemical needs such as water and oxygen, when we move to colonize such a place as Mars that has no global magnetic field, and no ELF field as we have on Earth?"

Many of the people who were met throughout the week were struck and provoked by the fundamental nature of the questions and paradoxes that we presented, to the extent that one fellow from an Australian institution exclaimed, "What you're saying means a revolution." In general, what we were able to do, due to the unique universal perspective which we brought to the table, as a function of our several years of work with the LaRouche-Riemann method, was to bring a higher unification to a diverse array of specialized investigations, and in so doing, perhaps provoke those specialists to ask questions in their own fields that they otherwise would have overlooked.

We also intersected a number of people who are collaborators of scientists whose work we were familiar with, and had incorporated into our own studies, particularly those in the field of cosmic radiation and its relation to our position in the galaxy, as well as the role of cosmic processes in driving Earth's climate, as opposed to man-made CO_2.

Another aspect which we brought to the discussions with various people, which proved provocative, was that we couched all the scientific work in the context of physical economy and economic policy. For many, the idea that economic policymakers would also be revolutionary scientific thinkers was a paradox, largely due to their lack of recognition that at its core economics is the science of furthering the aims of mankind towards a future in the stars.

One person who does resonate with this idea is Dr. Claudio Maccone, who gave a presentation on space-based Earth defense, and gave an interview to LPAC which took us out to Alpha Centauri (see below).

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Protecting Mankind from Extra-Terrestrial Threats

From the Astrobiology Science Conference 2012, "Exploring Life: Past and Present, Near and Far," in Atlanta on April 18, Oyang Teng of the LPAC Basement Research Team interviewed Dr. Claudio Maccone, Technical Director of the International Academy of Astronautics, on humanity's current vulnerability to extraterrestrial threats such as asteroids, comets, and supernovas, and the needed international collaboration to overcome such dangers. Dr. Maccone is the author of "Deep Space Flight and Communications" (2009).

The interview took place following Dr. Maccone's presentation at the conference on humanity's lack of preparedness for an asteroid or cometary impact. A video of the interview can be seen at http://larouchepac.com/basement.

Oyang Teng: Dr. Maccone, I wanted to start by asking you to summarize—you started your presentation saying, the punchline is, we're not prepared—but maybe you could say briefly what the nature of, first the short-term threat, or maybe the immediate threat as you see it, as you discussed it, of an impact event on the Earth.

Claudio Maccone: Well, the situation is pretty clear nowadays. We know that there are about over 300,000 rocks in the Solar System, basically asteroids, but also big, dead comets, or comets, or whatever. And the vast majority are rocks smaller than 1 kilometer [in diameter]. Now, this means that it is not easy to see them with telescopes. Nowadays, we can see them because we have automatic systems of telescopes taking care of the orbits immediately—as soon as they take the digital picture of the part of the sky with the asteroid—they can immediately compute the orbit, and find out whether these are old, known objects, or new, unknown objects.

Anyway, there are so many small rocks, that really hoping that none will ever hit the Earth is crazy. So, we must be prepared for that. And actually, there is a JPL [Jet Propulsion Laboratory] website that everybody can see—it's public access, not secret—listing a set of asteroids or near-Earth objects that have a certain, higher-than-zero probability of hitting the Earth sometime in the future, or anyway coming close to the Earth, sometime in the future, in a century or so.

So this is the first basic fact that I would like to point out.

There is a second fact. The orbits of these bodies are not precisely known. Just to put it in simple terms, students at university learn that if you have an ellipse, which is the orbit of an asteroid around the Sun, you must specify *six* parameters in order to have this ellipse precisely located in time and space.

Now, these parameters are totally arbitrary because there are the so-called integration constants of three differential equations of the second order—a Newtonian equation. So there are six parameters for each asteroid. Absolutely arbitrary.

Now, the point is that, we do not know *exactly* what the numbers that speak to these parameters are. Actually, we derive likely values of these numbers from the orbits of some 30 bodies or so, the most massive bodies in the Solar System.

So, let me put it in clear terms. The 30 most massive bodies in the Solar System have orbits that can be computed by today's computers, but all the rest, which means 300,000, 400,000, have to be, so to say, described on the basis of the first 30 bodies; and so there are certainly uncertainties in the values of these parameters.

Now, this is a really serious problem, because we do not know exactly whether any one of these bodies is going to hit the Earth or not.

We Need a Real Leap Forward

Teng: Is it a question then of getting more ground-based or space-based instrumentation to track these objects, or can we do it with the existing tracking that we have, but we just need to put more resources behind it?

U.S. Department of Energy

“We need to make a real leap forward,” Dr. Maccone said, to defend the Earth from an impact by an asteroid or comet, “that would cause millions, if not billions, of casualties.”

Maccone: Well, certainly, the tracking must be done. There is no question about it. And also, the discovery of more objects that we still don’t know about has to be done. But this is not enough. We need better computers, and I’m hoping that when the quantum computer will become effective, it can solve the problem. But this is not the case yet.

But apart from all this, which is essentially a mathematical game, we need to make a real leap forward. And this is to prepare space missions capable of going out into space, away from the Earth, as much away as possible, hitting the asteroid, moving that body away from its collision course against the Earth, and so, really, literally, rescue the Earth from an impact that would cause *millions*, if not *billions*, of casualties.

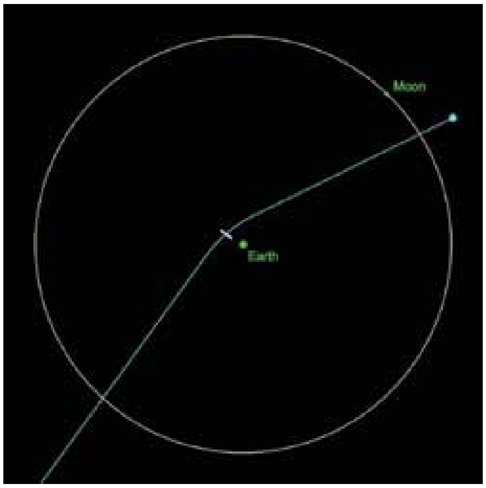
Teng: If it weren’t an issue of budgetary constraints right now, what, in your view, would be the next step, that would have to be taken, concrete steps, to do exactly that? What sorts of missions are we talking about?

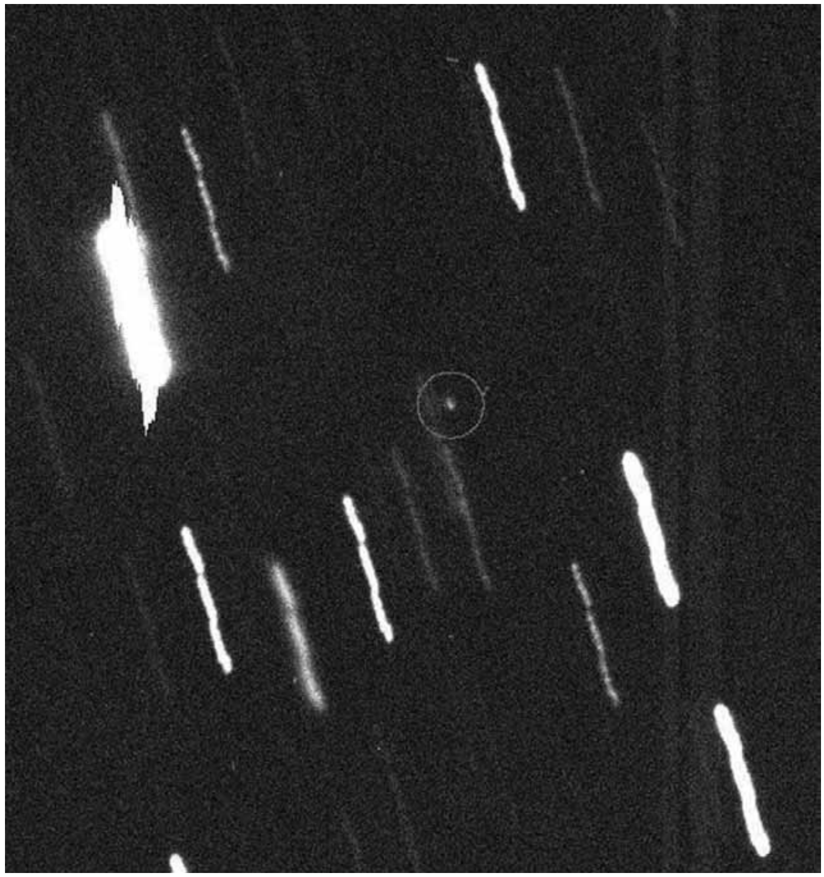
Maccone: Okay, now let me first refer to the United States, since we are in the United States. But of course, this is a problem that affects the whole of humanity. Well, in the United States, before 2011, which is one year ago, NASA was planning to build two launchers, called Ares I and Ares V. And I was part of a study in 2007, led by NASA, about this thing; essentially, we had to make an assumption, just to give you an idea about what we did.

We hoped that we could have a ten-year lead time, meaning we would come to know ten years in advance whether an asteroid was going to hit or not. So, on the basis of this, then we would have planned two different space missions. The first mission to be carried forward by Ares I was a survey mission, sending the probe around the asteroid, picking up pictures, finding the mass, the shape, rotation, whatever. After that, the second mission would have arrived, launched by Ares V, and that would have been a much more effective thing, shooting six projectiles, 1.5 tons each, against the asteroid, in order to move it away from the collision course.

If this was not enough, then, we also considered the possiblity of using nuclear weapons. Now I am completely aware that nuclear weapons in space are not loved by anyone, but especially not by the ecologists. I am quite aware of this. But the point is simply that, if the body is too massive, and the six projectiles that I just mentioned are not enough to move it away, there is no other way than using a nuclear explosion, not on the body itself, but at an optimal distance from the body, so that the gamma rays produced during the explosion, *push* the asteroid away, because of the momentum of the radio waves, of the gamma rays, and so on. So this is the technique, basically.

Now, the point is that, just one year ago, your President Obama decided to give up these two missiles, Ares I and Ares V, and replace them with a single transportation system. So this, in plain words, means that we have to redo a whole lot of calculations, because we are using different missiles. And, at the moment, no such system is in existence at all, so if we discover that there is something on a collision course with the Earth, at the moment, we are unable to do anything against it.





NASA/JPL

The danger to humanity posed by an asteroid or comet, is "a really serious problem," Maccone stated. Shown: a schematic of the possible trajectory of the near-Earth asteroid Apophis in 2029; a NASA image of Apophis (circled) in space (right).

Russia's Strategic Defense of Earth

Teng: You mentioned the importance of the role, in this case, of three major players. One, is the international scientific community; two, is the space agencies, such as NASA, ESA [European Space Agency], etc.; and three, is the military, because of their organizational capabilities, and their access to weapons. So I'm wondering, as we mentioned there, the one proposal that's come out in the last year from the Russian government, by the name of the Strategic Defense of Earth, is a transformation of what was once a military defense project for missile defense on Earth, to a defense against these extra-terrestrial impacts. Do you think that that is a useful model for the kind of program approach to deal with this?

Maccone: It is a useful model, and at least it is something better than we have in the West—because we have *nothing* at the moment. So, we should really pay careful attention to what the Russians are doing, because they were good enough—let me use these words—to convert a system that had been designed during the Cold War times, from a defense against American missiles, to defense against asteroids and comets. So they are setting an example. And this means that international cooperation in this field is absolutely useful, not to say, indispensable.

Now apart from the Russians, of course, the Europeans are considering the problem seriously. I am aware that a few years ago, a new group of people taking care of planetary defense in Europe was created. But of course, we also expect other contributions, for instance, from China; for instance, from India; for instance, from Japan, and so on.

So, the bottom line is that the organization to which I belong, and of which I am a director, the International Academy of Astronautics, organizes worldwide conferences about planetary defense, once every two years. Last year, it was held in Romania, with attendees from all over the world. Next year, it will be hosted by NASA in Flagstaff [Arizona], with a visit, of course, to the meteor crater nearby.

And so, I would encourage young people, who have no idea about planetary defense, or anyway, want to get involved with this kind of problem, for the benefit of the whole of humankind, to attend this conference. Because in these meetings, you really meet, not only the experts, but also the decision-makers, those who have the power to transform projects into reality. So, my suggestion is that if you are interested in that, you should show up there.

NASA/MSFC

President Obama has just eliminated the program for the Ares I and Ares V missiles, that were to be part of a defense of Earth. Now, said Maccone, "if we discover that there is something on a collision course with the Earth, at the moment, we are unable to do anything against it." Shown: an artist's concept of the Ares missiles.

will be literally fried. And there is no way to shield humanity against that, as far as I can see, at least for the moment. So this is certainly a danger.

Next: There are other dangers. For instance, if you have a binary star, that is, two stars revolving around each other, and if you have a planetary system around each of these stars, that is, planets revolving around each of these stars, numeric simulation plainly shows that, if this goes on for ages, millions or billions of years, the planets may, sometimes, jump from orbiting around one star, to orbiting around the other star, because the gravitational pull brings them into such a condition.

Now the point is that, in the end, all planets in such a double system, are going to be ejected. And this is awful! Because it means that, in the galaxy, there are a number of so-called "rogue planets," which are precisely that. Planets that have been ejected by gravitational reason. So they just travel along a straight line until they find some mass that deflects them. And just suppose, unfortunately, that one such rogue planet is coming toward the Solar System. I don't mean it's going to hit the Sun, or something like that. It could pass close enough. Well, that would disrupt the gravitational stability of the Solar System.

So the orbit of the Earth, rather than being nearly a circle, could become an ellipse again. And you can easily imagine the consequences on humanity living on this planet.

So, that is a terrible threat, and again, at the moment, I cannot see any way we can imagine to get rid of that, except for carefully watching the sky as much as possible in advance. And, if such a body arrives, try to disrupt it, you know, to shoot nuclear weapons against that, in order to at least reduce the mass that would deflect the Earth from its orbit.

Galactic Threats

Teng: On the nature of the threats: We know that we are not simply dealing with asteroids and comets, but that we live in a galaxy that is constantly evolving, and we know, still, very little about it. Could you speak to what you think are the broader, longer-term questions in terms of planetary defense, and how we, the human species, self-identity as a species, has to manifest itself in terms of our activity in space?

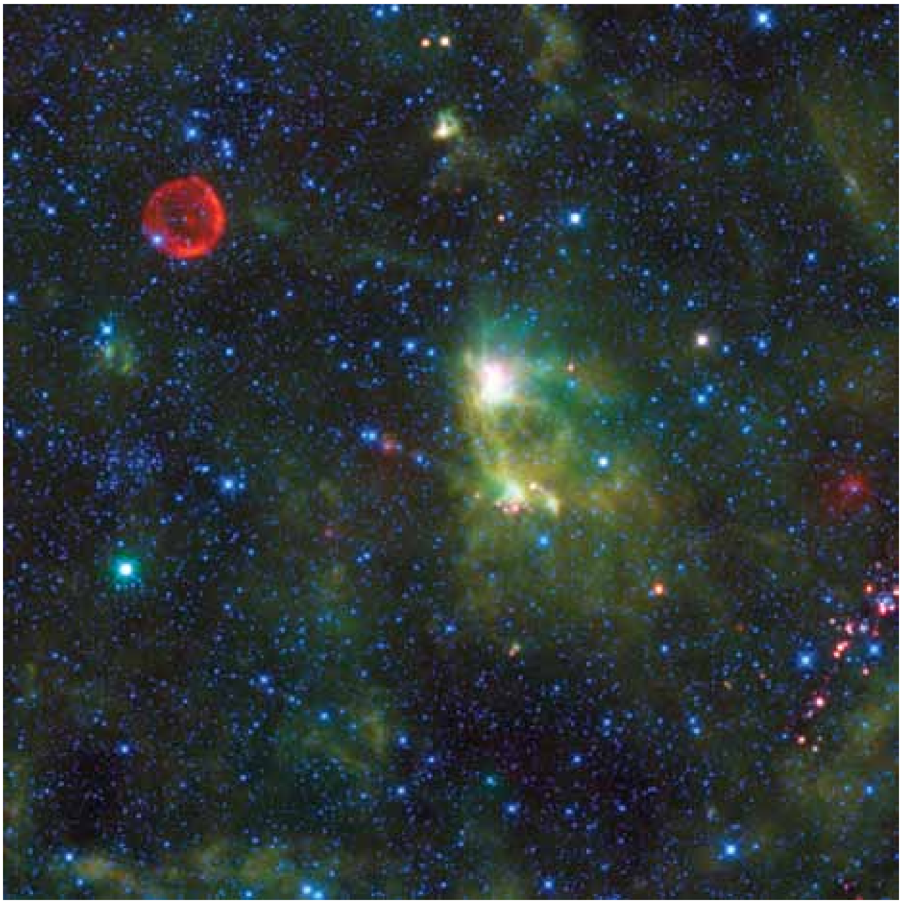
Maccone: Sure. There are certainly other terrible threats to life on a small planet, such as we are. Let me just mention some.

First of all, I would mention supernova or nova explosions. These are simply explosions of stars that have come to the end of their life because they have nothing to burn any more, no more fuel to burn. Now these we know do occur: for instance, the Kepler supernova in 1604. They explode everywhere in the galaxy, so if there is one exploding next to us, we can only keep our fingers crossed. Because if the distance is something greater than 3,000 light years, we might possibly survive. If it is not, then, I cannot see any hope for us. We

The 'Extraterrestrial Imperative'

Teng: My last question is, you ended your talk saying, at the moment, given where we are, we're really still as good as the dinosaurs. And it is the case that, thinking about this planetary defense, forces you to think about evolutionary times. But if we project forward, there is a term that was coined by a space philospher and scientist, Krafft Ehricke, he called it the "Extraterrestrial Imperative." That humanity has an extraterrestrial imperative which is really an evolutionary imperative to not only leave the Earth, in the same way a baby has to leave the womb, but to develop the Solar System and beyond. And that this is actually a cultural, economic, and scientific imperative.

So, I would like you to speak to your thoughts on this idea, and maybe where you see humanity in the next 50 years, or 100 years.



NASA

Among the "terrible threats to life" on our small planet, are supernova or nova explosions. "They explode everywhere in the galaxy, so if there is one exploding next to us, we can only keep our fingers crossed," Maccone said. Shown: The red circle in the upper left, near the constellation Cassiopeia, is SN 1572, or the Tycho supernova, about 3,500 light years away.

Maccone: Thank you. Well, you are touching a subject that I really love. Actually, I wrote a book called *Deep Space Flight and Communications*. Now, "deep space flight" means what it really is: going to the edge of the Solar System, and possibly, beyond.

Now, at the moment, unfortunately, we do not have the technical capabilities of planning for a starship that would leave the Solar System and reach even the closest stellar system, which is Alpha Centauri, at 4.37 light years away. I am glad to say, that in the last year, DARPA [Defense Advanced Research Projects Agency], the military advanced research project, and NASA, Ames Research Center, organized a conference held in Orlando [Florida] in the last year in the Fall, gathering all the scientists who are trying to solve this problem of how to get to the nearest stars.

We do not have the solution, but at least, we came to know each other. Serious proposals were discussed, for instance, anti-matter proposals—I'm just mentioning one, the one that I like most. But nobody really knows which one could be selected. Anyway, this doesn't really matter.

At the moment, at last, NASA and DARPA realize that this has to be studied, even if we are in financial troubles that we know about.

So, for the future generations, I can only encourage more interest in these kinds of things. The time will come when we will be able to reach at least the nearest stars, and that could mean the rescue of humankind from certain death in case an asteroid or supernova or a rogue planet destroys life on Earth.

Teng: Okay, well, that's a note of optimism!

Maccone: Thank you very much.

Teng: Thank you Dr. Maccone. And I guess we'd better get started.