



Surviving the 21st Century

Dr Stephen Sargeant:

What is the future of the human race and what role should science play. I'm Dr Stephen Sargeant of the Open University and with me is a man who once said the human race has only a 50% chance of surviving the end of the 21st century. Professor Martin Rees is well known for his views on the challenges facing our own and future generations, from natural disasters to biological terrorism. He's currently President of the Royal Society. Martin, we all know investment in science is hugely expensive and so why in a time of financial crisis should the public fund astronomy?

Professor Martin Rees:

The public is fascinated by astronomy and it's one of our frontier sciences. We learn about nature by doing experiments. We learn it by looking up in the sky when nature's done experiments for us that we couldn't go underground. But it's also part of our culture because everyone in all parts of the world throughout history have gazed up at the sky and wondered about it. So it's important for cultural reasons. And also the other reason for pursuing it about its fascination is that, it's one of the subjects which enthuse young people and help to engage with the rest of science.

Dr Stephen Sargeant:

Now the UK has just formed its own space agency. Do you think we should be sending humans into space?

Professor Martin Rees:

Well I think first of all it's good that we have an institution called the British Space Agency because everyone's heard of NASA, a lot have heard of the European Space Agency, no one had heard of an outfit called the BNSC which was the organisation that ran UK Space. And UK Space science is very strong. We've been involved in many of the big projects over the last 20 or 30 years. And also we have a very strong industrial base in space. The world's best programme for making micro satellites for instance. And it's very important to co-ordinate this and increase its profile. So I welcome the fact that there is now a UK space agency which will have the label of space on it and I hope a high profile director that we've had in the past. So that's very good news.

As to what our balance should be between manned and unmanned it's clear that our big projects all have to be done through the European Space Agency where we collaborate with all the other countries in Europe. Um and er, the European Space Agency is thinking about whether it should get involved in manned space flight.

I personally am against that. The fact is that for reasons which are a legacy of super power rivalry. Even the whole of Europe and the European Space Agency has a budget which is about a third of what the Americans have with NASA. And I therefore think that we should leave the Americans to spend two thirds of their NASA budget on manned space flight and we should try and beat the Americans at unmanned space flight and space science. Just as we have beaten the Americans in particle physics concern and in ground based astronomy through the European Space Agency. So I believe we should not get involved in manned space flight. If I was an American incidentally I would not support their manned space programmes. I would hope that manned space flight can be left until it can be done at much lower cost with much high risks, perhaps with partial private sponsorship.

Dr Stephen Sargeant:

Leave the Americans to their own folly.

Professor Martin Rees:

Well I think Europe should not follow. I think we can er beat the Americans and beat NASA despite our smaller budget if you focus on er robotics and miniaturisation and space science and applications.

Dr Stephen Sargeant:

Now one area where the robotic machines can do really superb stuff is looking for life in space. Now until we actually find there's life in space do you think we can estimate the chance of life elsewhere in the universe?

Professor Martin Rees:

Well not at all. Actually I think the way in which we'll estimate the chance better is not by anything in space but by understanding how life began here on earth. We understand how life evolved from simple beginnings but er we don't know how the very first life got started on earth. And that's a fundamental problem which even the most earth bound biologist wants to know the answer to. If we knew that we would know whether it was a rare fluke or if it would have happened in any other environment. So I think that's the most important way we learn.

But nonetheless I think we should look by all possible techniques for evidence of life. We should look for such evidence on Mars may be under the ocean of er Europa. But of course also now that we are able to look at planets around other stars we may, 20 years from now if not before, be able to learn enough about the atmospheres of some of those planets to know if there is a biosphere there. So I think we should look by all possible techniques and study the origin of life on earth as much as we can.

Dr Stephen Sargeant:

It is an extraordinary thing that within our lifetimes we may discover life elsewhere in the universe.

Professor Martin Rees:

We might and I'm sure we'd understand more about how life began on earth.

Dr Stephen Sargeant:

Now many countries particularly the US are funding Blue Sky Science in the hope that it will generate new ways out of the financial crisis. Now the UK is not doing this. Why do you think that is?

Professor Martin Rees:

Well the United States has had a big stimulus package which is partly for Blue Sky Science but even more for energy research, etc. And other countries like Germany, France and Canada have had some. It's been a disappointment that the UK did not have such a stimulus package. But having said that I think we should pay tribute to the previous government for increasing the support for science in real terms consistently over ten year periods. So I think the UK science is very healthy owing to the successes of the previous labour government. And I think it's crucially important that we don't jeopardise that and if we don't lose our competitiveness compared to other countries. Because given the investment other countries are making er attracting us to mobile talent will decrease unless we make some response.

Dr Stephen Sargeant:

Mmm, absolutely. Now the funding for pure, purest science of particle physics and astronomy, in the UK has taken some serious knocks of late and I've met many young people, say GCSE students, 14 years old who are considering careers in science but are worried about this collapse in science funding. What advice would you give to young people considering a career in science?

Professor Martin Rees:

Well I think it's an exaggeration to say there's been a collapse. I mean there has been a problem due to the inept management within one of the research councils responsible for

these particular areas of science. But I think we should be glad to acclaim that the LAC in Geneva is the world's leading apparatus for particle physics and will remain that way for the next ten years and we are involved in very exciting projects in both ground based astronomy through European Southern Observatory and in space. So I don't think one should be at all pessimistic. I think we in the UK have a very strong record of high potential. I mean, I think we have been harmed by the er incompetence of those in charge of the STFC but I hope that we can recover from that.

Dr Stephen Sargeant:

Mmm, I think it's not widely recognised in the public that the UK is such a world leader in particle physics and astrophysics.

Professor Martin Rees:

Yes, well, I mean er we must exaggerate our achievements but we do have er a fairly strong record in those subjects and the key thing is that we should not jeopardise it. We should build on this momentum.

Dr Stephen Sargeant:

This is as you've said elsewhere a golden age of scientific discovery and a lot of economic growth is based on scientific and technological achievements. But golden ages don't last forever. Do you think that this age of scientific discovery will come to an end at some point?

Professor Martin Rees:

Not at all. I think the nature of science is that as the findings advance their periphery gets longer and so there are more new challenges. So I think science is an unending progression and er there's no reason to believe that the pace won't continue and even accelerate in the future.

Dr Stephen Sargeant:

What if the particle accelerators that you need to build become too expensive?

Professor Martin Rees:

Well I think that obviously there are some particular areas of science er, which er will come to a stop but then new ones take over, every particular problem eventually gets solved. But then we move on to other areas.

Dr Stephen Sargeant:

Mmm, that's my hope too. Now we live in a tremendous age of scientific discoveries and yet we have astrology, homeopathy and lots of things getting wide currency. And also it seems that evidence is not enough in climate science at the moment. Do you think that the old enlightenment ideals of the importance of reason are under assault?

Professor Martin Rees:

Well I don't think we should look back to any kind of golden age. I think the er the level of education and information is higher now than it ever was. And it is though anomalous that in the United States which has some of the best scientists in the world, it has the larger proportion of er anti-science and obscurantists from various kinds so there's a sociological er interest in how there is a reaction against er science in some areas. But I think nonetheless we should er not be too pessimistic. We should welcome the fact that the public is interested even in rather arcane sciences like astronomy. And also that we should er do all we can to explain that more and better directed science is needed if we are to cope with the challenges of the 21st century.

Dr Stephen Sargeant:

Are natural disasters a risk to the long term survival of the human race?

Professor Martin Rees:

I don't think so because natural disasters are no worse intrinsically than they were in the time of the Neanderthals. So there's no tremendous risk of wiping ourselves out. But of course they do have different impacts now because for instance an earthquake has more impact if you have a, a very er, heavily populated city. And of course as we've seen recently a volcano of a modest size does disrupt modern life because we depend on aircraft and I think that recent episode has been interesting because it has showed the importance of ensuring that er we get together the best scientific advice to government. Because what happened there was that er an event happened and it was necessary to assess the risk and er we needed to know about volcanoes. We needed to know about meteorology and er upper atmosphere currents and also about the vulnerability of jet engines to different kinds of volcanic dust. All these things were scientific questions and they had to be matched together. And also it was necessary to get some consensus on what was an acceptable level of risk. Because er we can't live in a risk free environment and er if we avoid any risk then we don't do anything but it was something that had not been worked out in advance. What were the acceptable levels of dust density? And now that's been done but that wasn't done in advance. And that's just an example of how we have to er cope with er new threats and do new balances between er risks and convenience.

Dr Stephen Sargeant:

Would, would you say the probability is that the human race will survive, let's say to the end of this millennium?

Professor Martin Rees:

Well I don't know. I, I think er it's very unlikely that it would be wiped out. Because if you look at a thousand years ahead then technology could be such that er humans will be genetically very different from what they are now. Because I think one of the things that we should realise if we look a thousand years ahead, and that's many, many generations and of course evolution is not going to happen on the slow timescale of Darwinian selection. It may happen on a much more rapid technological timescale. So it could be that from a thousand years from now there would be people ascended from us, not just on earth but far beyond. And some of them may almost be diverging into new species. So looking that far ahead I think we can't er really foresee what's going to happen. But er there are very exciting possibilities.

But I think the key thing is to get through this next 100 years which I think we shall but er there may be set backs if we don't handle the er advances of science optimally and don't cope with the problems of er growing world population, growing demand on resources and food, etc.

Dr Stephen Sargeant:

Do you think there is er another danger also with the easier availability of weapons, say biological weapons?

Professor Martin Rees:

Well that's going to be a new threat just as it's a new threat if er nuclear weapons get into the hands of subnational groups. And er I think er there is going to be a problem ensuring that er very small dissident groups or weirdoes empowered by the latest technology don't cause too much disruption in our ever more interconnected world.

Dr Stephen Sargeant:

Of course if we're wrong about the human race surviving then there's going to be no one around to argue so these are very good answers.

Martin Rees, Lord Rees thank you very much.

Professor Martin Rees:

Good, thank you very much.