
Living and Caring for Spaceship Earth – Part 1 and Part 2

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Note: Unclear words are marked unclear and time-stamped.

I thought with this that maybe we can break up the talk a little bit and you can have a break in the middle, because maybe some of these ideas will be new. I'm not sure. Just to have a cup of tea. It also gives people a chance just to digest a few ideas. And we'd come back and continue on and then have questions. Is that alright? Okay.

The topic, Caring for Spaceship Earth, came from a conversation I had with a group of year six children in my diocese about 18 months ago, about why we should look after the Earth. What's the big deal? As kids do, they challenge you, you see. I had to think quickly, in a sense, that to come up with some kind of parable or an idea or an image that could help them to appreciate what's going on or why we should take some responsibility ourselves.

And I said imagine being able to see the Earth from space. The astronauts on the moon, when they look back at the Earth, were struck by two things. One was its beauty. Actually, there were three things. One was its great beauty. And I'll talk a little bit more about their experiences, because I've actually spoken to some of them who were on the moon. They did go to the moon, by the way. They really did. That was one thing was just how incredibly beautiful it is. The second thing that struck them was how fragile it looks. Oftentimes, very beautiful things look very fragile. In fact, we tend to put them in cotton wool, in a sense, or protect them in a cabinet or behind a frame, when they're very precious. And the Earth looks like it needs that kind of protection, as it sits in space.

And the third thing was that it was in space. Well like John Young said to me, everything I knew and loved was there. There were two of us standing on the surface of the moon. He said our buddy was going around, waiting for us in the orbiter. And then over there, in those days, 3.5 billion people, on that little ball. And that was everything we knew and loved. And he said That's an experience you won't forget.

But he said it all just sat there in space, like a bigger version of what they had been in, on their way to the moon. He said we were in a little capsule, called the Command Module. And it was attached to a part of the Apollo Saturn Rocket called the Service Module. In that module, there was their oxygen and their air, their water and so on, the things that they need to keep them alive for the journey. He said the only difference between the spacecraft that took us to the moon and the one that was standing up there, in the glory of the stars, was their size. One was big enough to hold 3.5 billion people at the time. Ours, he said, held three people.

And I thought of that when I was talking to this year six class. And I said imagine if you were in a spacecraft, with three people, or in the case of the space shuttle, there are seven, and you tell the other people in the spacecraft that you want to smoke cigarettes. You're going to pollute the air inside the spacecraft, whether they like it or not. That you are going to drink more water than the rations. So someone else in the spacecraft is going to have to go without. And you are going to eat more food than anybody else in the spacecraft and they will have to go without. Or that you're just going to throw rubbish around, let it float around in there and dirty the place for someone else to clean up. I said how do you think the other astronauts would feel about you? And the kids are really funny. They said, well, they'd be very angry and they'd bash you up.

But on Earth, when you think about it, we have 20 per cent of the world's people consuming 80 per cent of the world's goods. How sustainable is that? We are doing things to our atmosphere, in this spacecraft. How sustainable is that? That's the question that you need to ask. How long can the Earth support that? How long can this spacecraft hold us there, you see? Because outside of that is a hostile environment. We cannot survive in space, unless we bring some of the Earth with us. We just won't live for much more than 12 seconds in the vacuum of space, because there's no pressure. Our blood would boil in our veins and [claps] we'd be dead.

I don't think many people actually think of the Earth as a spaceship, but the astronauts did when they looked back at it, from the great distant, on the journey to the moon. I also said to the kids that you all have a spacesuit. I have a spacesuit.

Everybody in the room has a spacesuit. Can you guess what it's called? And one bright spark actually got it. He said the atmosphere. That's quite correct. The air pressure in the atmosphere has to be duplicated inside a spacesuit. If you go for a spacewalk, if you're going to walk on the moon where there's no air, you need the air pressure for your cardiovascular system to function. In space, you would freeze to death. So the atmosphere actually is like a blanket for us. At night time, it holds some of the warmth, so that we don't literally freeze to death. On the cold side of the moon, I think it's minus 200 something degrees at night. There's no air there. There's no blanket.

It's an amazingly benign gentle planet. And we need to take some of that gentleness with us into space, because space is such a harsh environment. The radiation of highly charged particles from the nuclear furnace of the sun would cause us to die. The spacesuit that the astronauts use has to protect them from harmful radiation. The atmosphere does it for us. That and the Earth's iron core, which produces a magnetic field that protects us from ionised particles from the sun. It produces the beautiful auroras in the south and the north polar regions of the Earth. That's these particles, very highly charged particles hitting in the Earth's atmosphere and exciting the molecules in the upper atmosphere, to cause the auroras, the northern and the southern lights. What an extraordinary thing? The atmosphere and the Earth's magnetic field.

We know, from studies now of the other planets in the solar system, of just how benign this one is. On the surface of Mercury, lead would be a liquid. On the surface of Venus, not only is it hot, but the atmosphere is crushingly heavy, would crush our bodies in a matter of about 30 seconds. The Russian spacecraft, Venera, that landed on the surface of Mars, had to be the strongest thing ever built by man. And it didn't last much more than half an hour on the surface of Venus. Mars is a nasty place. It has no magnetic sphere. So the very, very toxic radiation from the sun bombards it, cooks the surface literally. It's geologically dead. Very, very cold on the night side. It's reasonably liveable on the sunny side. But it's still quite cold by our standards. The atmosphere is poisonous. It's carbon-dioxide basically. Very, very inhospitable. And again, if we were to live on Mars, we'd need the protection of a spacesuit.

Jupiter is so massive that, if we fell over, would never stand up again. In fact, the gravity on Jupiter is so strong that it would rip our bodies apart. Because the gravity attached to our feet would be so much stronger than that attached to our head, the forces would literally tear our bodies apart. Jupiter's the most massive planet in the solar system and all the other objects in the solar system, apart from the sun, fit into

Jupiter. It's out there right now actually. We should go out and have a look. When you see it, it just looks like a bright star. Just remember that everything, except the sun, everything else in the solar system will fit inside that little point in the sky. It's not much.

I was actually looking at Jupiter last night in the telescope. Beautiful to see in the telescope. And there it was. And I actually was looking at it, a reasonable amount of magnification, and I was studying the cloud formations on the planet. And then I took that eyepiece out and just went for a big wide field and let Jupiter sit there in the blackness of space. And I just remembered I must tell the people tomorrow night that the whole solar system will fit into that little ball. It's not solid [knocks] like this. It's a liquid gas planet. So we couldn't stand up there. Wind's 600 miles per hour. Storms large enough to swallow up the Earth. Forget it. Just forget it. It actually is quite hot in its middle. It gives off more heat than it receives from the sun. It's kind of wanting to be a star, but just didn't quite make it.

Saturn is colder still. Again, a gas giant. A little bit more calm than Jupiter, but still wind forces that are just beyond our comprehension, gravity that's mind-bogglingly strong for us. But a very nasty place. Very beautiful to look at. But nasty to be in. Sometimes it reminds me of some cities. Then of course you go out to Uranus and Neptune, which are just absolutely freezing cold. Methane balls of not much more. And Pluto, well forget it. Pluto's just a rock, about the size of the moon. It's not even a planet anymore, they tell me. Poor Pluto.

And then you come back to this one, to this Earth, this gorgeous blue green ball. One of the smallest of the planets. With its moon, which is unusual. Some people describe this as a double planet, because of the size of our moon relative to the size of the planet itself. That's very unusual. But it's crucial for survival of life on the Earth. We are virtually certain now that the collision that caused the moon gave us the tilt which gave us our seasons and gave us a kind of thermostat control of the Earth's temperatures over the course of a year, in one revolution around the sun. So that the heat of the sun is spread through both hemispheres. Oh, it's extraordinary. There are other things that the moon does for us too that are important for the sustenance of life on this Earth.

We didn't ask for it. I didn't ask to be born. I didn't apply for the job. I just popped out. Actually, I said that to Mum once, around about the time I turned 40. I was studying in Rome at the time. She said you didn't pop out. She said you were a very big baby. She said he was like a little Michelin Man. And she said that was not easy. Actually, she said you were a big baby then and nothing changed. But none of us

asked for it, did we? We just were one day – I don't know at what point – but one day, we can somehow remember being consciously alive. It was just a gift.

Nobody can manufacture the Earth. As I said, if we want to survive in space, we have to take some of it with us. It's a gift to us. It's a donation, if you like, from the author of the whole universe. Very important to get our heads around that truth. Because to remember it – this is what I was telling these year six kids – makes us feel a little bit responsible. Because when somebody gives you something on trust, you are required, under legislation, to respect the wishes of the donor.

I remember talking to politicians in New South Wales parliament about precisely this, with respect to the whole idea of protecting this Earth. That is was a gift to us. We didn't manufacture this place. I said, as politicians, you receive money all the time from the taxpayer and sometimes from donors, from benevolent societies and so on. If you misappropriate that money, you suffer penalty of imprisonment. The same with myself as a bishop. We receive donations. People give us money every Sunday on the plate, luckily. We receive money from Caritas. We receive money for Caritas, by the way, too, and Project Compassion. And imagine if I was to take the money that the people of Wilcannia-Forbes gave to Project Compassion and said, gee, this is good. I've got about \$300,000 here. I can buy a big car. That's very nice. But unfortunately, I'd end up in court. Because that's not why they gave me the money.

And when we look at the Earth in the same – from that legal perspective, if from no other reason, what was the wishes of the donor when the human race was given this planet? Now we go to the book of Genesis now to somehow get our religious sense around this. And I like, in my own personal life, and it is my work as a bishop to marry somehow my scientific interest, as an astronomer, with my faith as a Christian in the Catholic Church. And when you look at the book of Genesis, there's a wonderful relationship forged there between the Creator we refer to as God and the human species, referred to as Adam and Eve. There are two Creation accounts. One in which God creates the universe on day one through to day six and then rests on day seven. And the other one is very much centred on that relationship between Adam and Eve in the garden. And then there's the story of the fall and so on, the original sin.

And when I reflect on this scriptural content, there's a lot there that can help me to understand what my responsibilities are, as a human being, alive on this Earth. Firstly, who made the world? And we say that – do you remember the old catechism? Who made? God. I didn't. God did. That's number one. The book of Genesis has a wonderful phrase which I contemplate a lot and I speak even to the kids about this one.

And they really – you can see them really thinking, when I talk about this. There's the phrase, 'In the beginning'. That's how it starts. Isn't that great? What a phrase. In the beginning. It conjures up a time when there was no time, when there was only God. There was no universe. Just God.

For us to imagine a being who never, ever began, just always was, is very hard. I have to go to some quiet place, with no distractions, and just sit there, with that notion that we have a being who never began. And that's important because, unless God is the explanation of his own existence, he can't create the universe. Someone must have created God. You can't give what you haven't got. God can't give existence to the universe unless God has existence of himself. That's a philosophical point of view or a theological one too. But it makes sense. You can't give what you haven't got.

The universe needed somebody to pre-exist it. And not only to pre-exist it, but to just simply exist and never begin. Do you find that rather difficult to get into your skull? That's why I want to have a cup of tea before too much longer, just to let it seep in a little bit, you know. Then the book of Genesis, and God said 'Let there be light and there was light'. Now, this is rather beautiful, because I was at a lecture at the radio telescope at Parkes. I often go there. It's in my diocese and it's only about half an hour from where I live. And this guy said, 'In the beginning'. I thought, my goodness. I thought of the book of Genesis straightaway. He said the first thing that happened in the universe is that it began to glow in the dark. Book of Genesis.

See what happens is that molecules crash into one another and fuse together under immense pressure and that gives off energy. It's what happens inside the sun. At the beginning, the universe was basically just a great big ball of hydrogen. And from that molecule came the stuff that's in your bodies and mine. How about that? And in the chair you're sitting on and so on. Isn't that incredible? But before it could produce those molecules, it has to glow in the dark.

And the book of Genesis then describes, step by step, the formation of the Earth and it's actually pretty good. It's pretty much what we thought happened, step by step. Of course, Genesis describes it day one, two, three and so on. I'd say step one, two, three, four and so on. The person who wrote that book was not a scientist. In any case, we knew very little about the universe in terms of its workings until around about 1925, 1925. That's not long ago.

Four hundred years ago, Galileo pointed his telescope at Jupiter, found four things not orbiting the Earth and that created a stir. Four hundred years. That's not

long. That's about the lifetime of, what, six or seven people? One after the other. Just put one, back to back, you're back to Galileo. Six or seven, maybe less. Us humans are on a voyage of discovery and part of that is to learn about just how amazing and how precious is this gift of the Earth to us.

A couple of weeks ago, I was in England, talking to a lady who, just until very recently, was a producer at the natural history unit at the BBC in Bristol, with Attenborough and those guys, you know. Incredible person. She said do you know what, Chris? I think the malaise today, if not entirely, but at least substantially, is caused by the fact that we've forgotten to be grateful. We have forgotten to be grateful. And it's probably a general - well it is a generalisation. She actually wrote a piece for me. She emailed it to me. It's on my computer at home. I think I'll put it on the Earthcare website. It's just absolutely brilliant. She wrote it in the car. Just from her own reflections. We have forgotten to be grateful.

I just want to -- by the way, the same person lent me this book. I've got to send it back to her. She might be lucky. *Rare Earth*. I had heard of it before and I've heard of a lot of the science in this before. It's just that this book collects a lot of science from a lot of disciplines to describe this planet in its uniqueness. It's rather - it's quite a read. It goes through what they refer to as rare Earth factors. And I just thought I'd read them for you first and just to see what you make of this. And I might have to put a little addendum or two of my own in here first, so that I can fill these out a little bit. But I'll just list them.

They list here, firstly, the right mass of stars. So we've got to have the right star for an Earth-like planet to exist. It can't be too big, otherwise it'll pull us in or give us too much radiation. It can't be too small, otherwise we'd freeze to death or it would lose us altogether. And it also has to be a long in its own lifetime. It has to be stable for a long period of time. Because life on Earth, we know, from geological history and the evidence of fossils and so on, takes time. Or at least in our perspective. It takes time. The Earth needs to be in a stable environment for life to exist. And that's true for you and for me, isn't it? We need a stable environment.

One of the things that freaks people about climate change is the big C word, change. We don't like that. We like things to be settled. Okay. We have temperature gradients and so on. We're used to dealing with hot days and cold days. But we operate within -- in terms of the solar system, we operate within a very narrow temperature band, okay. So the sun needs to be very stable and long-lived, within that band. And from our study of the stars, that is not always the case with stars.

We need to be the right distance from the star. We need, within the context of that distance, to be able to sustain liquid water on the surface. Too close to the star, the water would boil off. Too far from the star, it becomes as hard as concrete. So we need to be just at the right distance.

We need to be far enough away from the star so that the planet can spin on its axis freely to have our day spread light over the whole surface. If we're too close to the star, the gravitational pull of the star will mean that the planet will always present the same face to the star. And that side of the planet would cook and the other side of the planet would freeze. That's exactly what happens, for example, on Mercury. It's exactly also what happens to the moon, as it orbits us. We always see the same face, because the gravitational pull of the Earth won't let the moon spin any faster than it rotates around us. Do you know what I mean? That's really important for life on Earth, that we've got to be the right distance from the star, from that point of view. Just so that we can turn on our axis.

We have the right planetary mass. We can't be like Jupiter and we can't be like Mercury. We have to have enough mass to retain an atmosphere with oxygen in it, which is a really light molecule. So we've got to have just the right mass to do that. And we've got to have enough mass, enough gravitational force, because gravity and mass go together, to actually retain an ocean. We think that once there was water on Mars. There seems to be good evidence for that. But not anymore. Because Mars doesn't have the mass that the Earth has.

There has to be enough heat within the planet, which is partly due to its mass, but partly due to other things too, for the plates to move around, the continental shelves to be able to move around and create cracks in the Earth's surface, where the molten material can come up and vent carbon-dioxide into the air, which is a greenhouse gas, which helps to keep us warm. It's like a sort of a natural thermostat. Which is why we've got to be careful not to get the balance wrong by shoving more of it ourselves into the atmosphere. The Earth knows how to keep the right balance of carbon-dioxide in the atmosphere.

And we have to have a molten core of metal in order to create the magnetic field that allows us to be protected from those nasty molecules from the sun. The plate tectonics, which we've only known about in relatively recent time, builds biodiversity on the planet, because the plates move around, bump into one other. Animal life migrates over the plates and so on. Then the plates separate and different kind of evolutionary

processes take place, which we don't fully understand. But the movement of the continental shelves is crucial to the diversity of life on Earth.

We have to have other planets in the solar system that are massive enough to protect us from rather nasty great big rocks that would enter the solar system. They crash into Jupiter instead. Some people refer to Jupiter as the vacuum cleaner of the solar system. But we don't want to be too close to it, for obvious reasons. And we don't want to be too far from it either. It's in just the right spot for us.

Our ocean needs not to be too much. We don't want the whole Earth covered in water. That won't sustain life on the planet. If we have too little, that's no good either. We've just got the right amount. Refer to the book of Genesis. And God caused the oceans and the lands to separate. Life on Earth. Hah! Isn't that great?

We need to be very stable in our orbit around the sun. In other words, you don't want to vacillate between cold and hot in an overly eccentric orbit, like Pluto. And that's where our friend the moon comes in. It helps to shepherd our orbit, keep us in the right spot. We wobble a little bit around the sun, as the moon goes around us. It pulls us this way and pulls us that way. Just holds us in the right spot, thank you very much.

I already referred to the moon as giving us our tilt. And the tilt itself needs to be carefully adjusted. If it's too severe, one part of the Earth will freeze, the other part will cook. And then alternatively freeze and cook. We think that the seasons, summer, winter and autumn and so on, and spring, have their extremes. But that's relatively within the band of temperature that we need for life on Earth. Imagine if the tilt was more so, of the axis of the Earth. The seasons would be completely different.

The atmosphere needs to be able to maintain an adequate temperature. As I said, it's kind of like a blanket. It has to be of the right composition for plants to breathe and the right composition for animals to breathe. And there has to be a balance in that. Luckily, it exists on this Earth. The ability to hold liquid water in the right proportion and the gases in the atmosphere in the right proportion, for millions and millions of years, is extraordinary. I don't think, despite the fact that we know something more now than we did a while ago, we still haven't completely come to terms with how bizarre this planet really is, in being so stable as to have an ocean and an atmosphere of this composition for so long.

We have to have the right kind of galaxy, believe it or not. Not too many heavy elements. Not small or elliptical or irregular. Ours is a relatively nice spiral galaxy. Because we can't survive -- hang on, I'm going to get -- this is too complicated. But

take it from me that we do not want to be in galaxies where there are really big massive stars that are really old. In where we are in our galaxy is between the spiral arms, where it's relatively unpopulated and the stars are a reasonable distance from us not to create too many problems. That's a whole science in itself. Fancy that. It's not only a case of being in the right galaxy, it's being in the right part of the galaxy.

There has to be the right amount of carbon too, enough for life, but not so much that we have a runaway greenhouse effect, as you would on Venus. Carbon's in everything. I say to the kids, get the stove out and overcook anything, whether it's bread or a pea or a piece of steak or an egg and eventually it goes black, turns to carbon. Because everything else is cooked away and you're just left with the carbon. And that's crucial for us.

There are other things which I won't go into now, because the talk is really not so much a piece of astrobiology. But I only mention these things because to repeat them is highly unlikely anywhere in the universe. I'm not saying that there's no life anywhere else in the universe. The basic thesis is that life probably does exist, on the balance of things, because life, in microbial form, in simple cells and so on, can live in very extreme circumstances. But life of complex variety, like ours, whether they've got four heads or ten or those creatures you see in science-fiction movies, that requires what we have and what we have is virtually, on the basis of our knowledge at the moment, probably not repeated. So there could be life elsewhere in the universe, but not complex life.

Now if that's true, that's got to tell you something as well, hasn't it? And now, before we have the break, I'll just take you to another book of the bible that starts with the words 'In the beginning'. Do you know where I'm referring to? The prologue of St John, the fourth gospel. In the beginning. I think it was quite deliberate. I can't imagine the evangelist just trying to come up with those words. It's a Greek phrase, $\alpha \nu \alpha \rho \chi \eta$ $\alpha \nu \alpha \lambda \omicron \gamma \omicron \varsigma$, which means - we get archaic from that very ancient word. In the beginning.

He takes the creation for granted. It's already covered in the book of Genesis. But he says 'In the beginning was the Word and the Word was with God and the Word was God.' You see. Isn't that wonderful? It's there again. That's me sitting in the corner, trying to imagine a being who just was. I'll continue on. And he says 'And everything that exists has existence through Him, the Word.' What a statement. And now the next one I find even more amazing, in one way. And everything that exists, exists through Him and for Him.' Now just imagine the whole universe existing for you,

for you. It's yours, your possession. You own it. And St John goes to emphasise, like a good teacher. He says 'And nothing that exists has existence except through Him.' And he goes on 'And the Word became flesh and dwelt amongst us.' What an outrageous statement. But of course, it's true. We know, in our faith, that that is exactly what happened.

But we live at a time when we are starting to get a handle on the universe that the author of the fourth gospel didn't have. And when we say it was through Him that the whole universe came into existence, we are describing a person of immense power, immense power.

You know, in the sun, at the moment, while we were sort of sitting here and talking away, every second it consumes three million tonnes of hydrogen, every second. And the gravity of the sun holds it in. It's like a slow release hydrogen bomb. Luckily for us, as I've tried to explain, it doesn't let its energy off too quickly, otherwise we'd cook. Too slowly or we'd freeze. It's just the right mass. And that mass of the sun holds the energy in for seven million years before it can reach the edge through a process of convection, rising and falling circles, rising and falling. So it's getting pushed further and further out, until it gets away from the edge and radiates into space. And then it only takes eight minutes to get to us from there. If you can remember tomorrow, if you feel the warmth of the sun on your face, say my God, that was made seven million years ago. Seven million years and eight minutes.

Now that's one star. In the Milky Way Galaxy we think there is about 200 billion stars. In the universe, conservatively, in 2005, an estimation was made that there are as many stars in the universe as grains of sand on all the beaches of the world, plus the deserts, multiplied by ten. And it blows your brain. These sort of things just -- don't they? They just sort of freak you out or they do me.

And yet, within all of that vast reality, this benign beautiful planet spins around, every 24 hours and a few minutes. And the author of this vast universe stood here amongst us. You can't beat that. Anybody who thinks that our Christian faith is boring, bland, hasn't woken up yet to the great mystery that it contains. And I like to put that within the framework of our care for this planet. It is a sacred place because the author of the universe lived here for a while.

If the Queen of England or the Pope or the president of the United States, God love him, came to your house, you might say one day 'The Pope sat in this chair.' I've actually been into a situation where that actually happened. And they said to me, 'John

Paul sat right here.' I'm not there, but you know what I mean? In this particular chair in their house. John XXIII visited this particular cell in this particular jail. I've had that experience too. He sat in this chair and used to look through the telescope at the sky. This was his favourite chair.

And yet here we have not John Paul II or John XXIII or Queen Elizabeth, we have the author of the universe has stood here on this ball and this orb in the blackness of space. I think you can't beat that.

I was at a talk when Captain John Young of Apollo 16 talked about his experience on the moon. And somebody asked him what he thought when he saw it out there. He stretched out his arm and he said, from the moon, the Earth's about that big. If you stretch your arm out full-length and touch the north and the south pole with your thumb and forefinger, it's about that big. He described the beauty of it and everything else. But he said it felt like he could just go pwhoo, like that, and the whole thing would just turn to powder.

But it was the fact that it just sat there among the stars. And he said you've got no idea how dark the sky is on the moon, because there's no atmosphere. It's like a nightclub with no band. It's got no atmosphere there. And the stars don't twinkle. They're just like little searing points of light. The atmosphere makes them twinkle on Earth. And he said it's just so beautiful.

And I thought and its maker stood on it and died on it and rose from the dead on it. In the vastness of the universe, he came here. I think that's incredible. I think we should have looked after the chair, don't you? If for no other reason.

And I'll tell you another little story about the astronauts and we'll have a cup of tea. On Apollo 8, they went to the moon in Christmas 1968 because they thought the Russians were ahead of them. They thought the Russians were actually getting ready to put a man on the moon very soon. The Americans were not that far ahead. Well at least they didn't realise how far ahead they actually were.

So NASA decided to send Apollo 8 around the moon to orbit the moon. That would be a first. At least we could say we've done that. If they beat us to land on it, fair enough. But it was all about national pride and the technology and all those things. So they decided to abandon the original mission for Apollo 8, which was to be in Earth orbit to test the lunar module, to leave the lunar module -- they didn't take the lunar module with them. They just went to the moon to go around it.

And it was a first and they went around it. And they came around to the dark side of the moon, where they have to fire the engine to come home. They're out of radio contact with Earth. And they actually lose the sun completely. And they said that, from that dark side of the moon, it's incredibly dark. It feels like the darkness would swallow you up. Because there's no sun. The sun, in space, it's always there for you, but not on the dark side of the moon.

Anyway, they fired the engine. They said they had a profound sense of the presence of God. I think it was Mike Collins, on Apollo 11, he said 'I turned the lights out inside the command module just to experience the blackness', he said. He said it was incredible. He said 'I felt the finger of God'. Isn't that amazing? God is present in the dark and in the silence, just like he was at the creation.

Anyway, Apollo 8 came from around the back of the moon. And have you ever seen that photo of the Earth rising above the mountains of the moon? It was a very famous photograph. Apollo 8 took that picture. And it was beamed back to Earth and it became something of an icon.

1968 was a horrible year. Martin Luther King was shot. So was Kennedy, Bobby Kennedy. They had that big riots at Wisconsin, in Paris, the student riots, you know, the Vietnam War, the demonstrations against it. Actually civilians lost their lives in the demonstrations at the University of Wisconsin in 1968. Oh, I could go on and on. There was something -- wasn't there the black riots, the civil riots demos in Alabama or somewhere? The lady at the back of the bus, the famous -- all in 1968.

The astronauts were asked by NASA to send a Christmas message to the Earth. And you know what they did? And I'll never forget it. I actually was watching it live on television. You may remember it yourself. They read the Creation story from the book of Genesis. And they took a couple of days each, because there were three astronauts, two days each. And the commander read the last one. And they read it beautifully. They read it with great sense of faith and meaning without being smulchy, if I can put it that way.

And while they were reading it, the camera was pointing out the window of the command module to the Earth. And it was in black and white. It was very grainy. I don't know if you remember this. I was 16 and, I tell you, when I was hearing that read, I had a real sense of something. I think that's where my vocation, when I look back on it, really, really was planted. I didn't do anything about it for another four years or five years. But never mind.

Anyway, when they finished reading the story, they turned the camera on themselves. The commander said -- and the words are slightly different to this, so it's not a direct quote. But it's in substance it's right. And he said 'And from the crew of Apollo 8, we wish everybody on the Earth, on the good Earth, a happy Christmas.' Well I thought my God, you know. From the crew of Apollo 8, we wish everybody on the good Earth a happy Christmas.

I thought gee oh gee, you can't -- how can you top that stuff? Of course, how could the author of the book of Genesis imagine, in his wildest dreams, that one day, from 240,000 miles away, his words would be read in the blackness of space to everybody on the good Earth? Anyway, just to finish the story, a little old lady -- well she wasn't from Pasadena. She was from somewhere else. She sent a telegram to NASA and it's become famous. And she said 'Tell the crew that they just saved 1968.'

Well let's have a little break and a cup of tea. And we'll come back and just talk a little bit more about the planet and I'd open it up then for whatever it is that you'd like to say, okay. Right.

[Part 2]

Alright. I was going to say a few things, but I realised it's twenty to nine. So I think what we might do is just open it up for questions/discussion or whatever.

Question: Bishop Chris, I have always been a little fascinated too with the words 'In the beginning', relating that to God. We have another expression we often use and that is 'seeing is believing'. We apply this to a lot of -- don't we, in everyday life? I've always been fascinated, since I first got some late inkling of the distance the stars were away, and realising that we're looking at something frequently that doesn't exist.

Bishop Christopher Toohey: Or would have changed.

Question: It doesn't exist in its original form or something.

Bishop Christopher Toohey: That's right.

Question: So seeing is believing. But yet we can see the biggest thing we possibly can in the universe that doesn't exist. Have you any thoughts along those lines?

Bishop Christopher Toohey: Yes, okay. That's a really nice question that. I shouldn't get too carried away. If I do, let me know.

Question: I won't.

Bishop Christopher Toohey: I was only reflecting this evening that before Einstein people really basically thought that the Milky Way was it, more or less. In fact, even the great Galaxia Andromeda, which is bigger than the Milky Way galaxy, is actually 2.2 million years away. They thought that that belonged to -- it was just a cloud of gas inside this galaxy, until only until around about 1925.

So what we thought was reality, even from that point of view, wasn't. But Einstein came up with this wonderful insight that said what we're doing is looking at distances, variable distances. Because light travels at a set velocity, it takes time to get here. Therefore what we're looking at in reality is a matrix of space and time. It's not actually the way it is. It's just the way the light is presenting it to us or the radiation is presenting it to us at this particular moment.

Now that idea of the time was quite amazingly -- we more or less take it for granted now that there are some stars, especially the ones that you can see in telescopes, that literally have blown up. But we're still seeing them as they were. There's a saying among astronomers that in the telescope you see far away and long ago. I rather like that phrase.

So you're quite right. So seeing is believing. But it beggars the question as to what you are seeing. I suppose, from a philosophical point of view, philosophers have speculated about how human knowing actually works. But it's not what as it appears to be. I think that's a humbling reality, isn't it, in a way? It probably ties in with what the lady in England was saying to me, the importance of being grateful. I suppose attached to being able to say thanks is another way of saying that there's something greater than me in the room.

I think that the -- if we simply limit the universe to what we can perceive and the way we perceive it, it's very arrogant. Of course, that is the sin of Adam and Eve, after

all, isn't it? So I think the saying 'seeing is believing' needs to be somewhat tempered by a dose of humility and gratitude. In any case, I suppose, if we only, shall we say, took what we perceived the universe to be, then this planet would still be in the middle of it. Everything would be going around us and there would only be about 7000 stars. That would be a bit silly.

Yes, mate, yeah.

Question: Yes. The most comforting thing you said for me tonight was that Jupiter was a vacuum cleaner to protect us from all the flying things. My impression of going through school in the '60s and '70s was that mankind was discovering, maybe wrongly, that we weren't so important after all, that we were this tiny little spec in the universe, insignificant and there was nothing special about us.

Bishop Christopher Toohey: Yes.

Question: Would it be right to say that, with advances in technology and the scientific understanding, that that's turning around? We're now starting to think that we are kind of special.

Bishop Christopher Toohey: I think you've got a point, Glen. I think what's happening is that we're seeing that the Earth is probably unique and there are some people in cosmology now who argue that the universe needs to be as large, as old and as complex as it is to create the statistical possibility for the Earth to exist. Now that's a big call, isn't it? Some go even further to say that the laws which govern the molecules of the universe are such that they actually eventually would support life. Or to put it another way, the universe exists for life. And if you attach a very strong principle to that, that this planet is part of that in a unique way, then the whole universe exists for us.

So that's one kind of mode of thinking. And it actually fits in with my religious sense too, when you look at the prologue of St John's gospel where it says the universe exists for Him. And we are now, through our connection and our baptism, we are in Him. And He is in us. We say that, don't we? That the universe in fact does exist

for us. But that's a religious rather than necessarily a scientific statement. But there is science that would back it up, just the same.

And I think parallel to that is this question I often am asked, what about aliens? Have you ever seen aliens? What about life on other planets and things like that? I said, well, the hypothesis pretty strongly that I sort of lean towards is that there probably is life out there, but not life like us, not complex life, very simple, basic life that can exist in extreme circumstances. I think that that could be true. But I don't think we're going to see it like us out there. I think the aliens of science fiction probably don't exist.

I've certainly never seen them anyway, but then that doesn't necessarily mean anything. It just means I've never seen them. I've never seen a UFO and I've studied the stars since I was nine. And I've spent thousands of hours under them with telescopes and things and I've never. No, I don't know any astronomer who has. So there you go. They seem to find a lot in certain parts of the world that I won't name.

But that quest, I think, Glen, for other things being out there is still real. And out of the dish at Parkes, there is a dedicated instrument that listens for radio transmission from alien life. And I said to the director of the dish, 'Do you think you'll find anything?' He said, 'No.' But he said, 'That's just as important as finding something.' You know. Carl Sagen used to say 'It would be amazing to think that there is life out there in the universe like us. But even more amazing to think that there isn't.'

So I think that yeah, I think -- certainly on one level of thinking, we are starting to realise that this Earth is incredibly precious, that it is a gift to us and that we have to look after it. I'm sure we didn't think like that when I was at school. So I think there is some sort of change going on. I do believe that this is directed by the Spirit of God, who's taking us down a certain path of consciousness as a race, as a human race. But there's an awful long way to go.

In fact, if you only had 20 people 100 years old, back to back, you're back to the time of Jesus. Just 20 people, 100 years old each, back to back, one's born the other dies, one's born and dies. You've only got 20 of them and you're back to -- you are actually beyond the time of Christ. That's not that long really. I just think it'll take us a while because the human race is basically pretty thick. It'll take us a while for it to dawn on us just how amazing God is and what God's done for us. But I think it's happening slowly.

Question: Next year marks the 150th anniversary of the publication of *The Origin of Species*, which had perhaps the most profound effect on religion and Christianity in the western world. One of the arguments of course he put up is basically that the evidence in natural selection that is on spaceship Earth shows these great extinctions, great things like...

Bishop Christopher Toohey: Mass extinctions, yes.

Question: Massive [unclear 0:10:22.4] extinctions. So these are [wheels 0:10:23.3]. I might say then the animals and things, all beings that live in that [wheels] was fantastic as anything we could imagine in science fiction. And they'd been and gone and seemingly have no consequence at all. It wasn't as if they had to go. Well certainly [unclear 0:10:40.0] concession. But there was no necessity for them to be. They just came and went.

Now the argument supplied by most recent atheist pamphleteers was this demonstrates that spaceship Earth or what the idea is something that's really there's nobody that controls it all, this idea down the point. I'd like your response to that challenge, because it's getting into the popular press at the moment.

Bishop Christopher Toohey: Well it looks like no-one's in control, because again there's an arrogance. If you just simply take your -- not your personal one. But if one was to take one's take on it as absolute. In other words, the universe is basically what I say it is, from what I perceive it to be. Now there's an arrogance in there somewhere. It looks fairly random. Molecules bump into one another. Things crash into Earth. Species die out. There's an ice age. There's this, that or that. You think well if that's it, well then it's just the whole thing's an accident. Well that is a point of view.

I was actually in the company of a person who has that point of view, whose son came in from school one day when he was 12 years old, this fellow. He said, 'Dad, there was an accident up the street.' Now this is human. This is how we humans are amazing. And he said, 'James, I want to tell you something. Nothing happens by accident. Tell me what happened. Well James, did you see it?' 'Yes, I saw it, yes.' So James described this accident at the roundabout just outside his school. The car came around, didn't see the other one, bang. No-one was badly injured. Cars smashed up.

Headlights broken. This and that. His dad said 'Now I know what happened. Thank you very much.' I felt like saying, 'The universe didn't just happen by accident.'

But what we see in the universe is what appears to be just one whole random mishmash of things going on. But that's the point of saying that the universe needs to be as big, as old, as ancient, as complex as it is in order, over time, to produce what we have, namely this Earth. In other words, the universe operates under certain physical constraints, rules, call them what you like. The laws of motion, the physics and quantum mechanics, not that we understand that very well. But that's how it actually works. Sooner or later, it's going to produce this Earth.

Now, that's randomness with a purpose, if you like. I'm not God. So I'm going to try and imagine God saying, now, well one day -- and for God, time means nothing. I think this is why it's important to have a religious sense in all of this. That one day God said -- time means nothing to God. God sees the whole thing all at once. And that one day I want a planet to exist where human beings can thrive. Yet something went horribly wrong in the case of sin and God decides to come here and live for a while to help us out.

Either God is just going to go whoo, bang, like that, in which it would look like he is in complete and utter control, simply by saying I want the Earth to exist [clicks] instantly. Or God says, 'If I create a huge ball of hydrogen where the molecules will crash under one another under certain rules of physics and of nuclear fusion and so on, that one day a planet like the Earth or the Earth will come into existence.' God would know that. God would see that.

So what looks like a random mishmash of accidents turns out to be, in the mind of God, having a purpose. Now if you juxtapose that in your own life, there's a whole lot of events happen. You wake up in the morning and you go to bed at night. There's things. You go to work or you've got kids or you're retired or you watch a TV program. You read the newspaper. You do all sorts of things that on the face of it just look like a whole lot of particular incidents that have happened to you that day. But not in the mind of God. Everything is going to produce something, namely, in my case, Chris Toohey, for better or for worse. Even my sin produces something.

I remember when I was a hospital chaplain at Bankstown in Sydney, there was a lady there who died clinically, but they got her back. You know what I mean? Like the resuscitation thing. She was in intensive care and I came to anoint her, after the event, which is ironic. But I mean she was still very sick. I said to her -- I was very curious

about these whole death experience things of lights and sounds and music and Jesus coming to meet them at the end of a tunnel. I'd heard all those sorts of stories.

I said to her, 'Did anything happen when you died?' I was so curious. I shouldn't have said that I suppose. She said, 'No, well, sort of.' She said, 'I saw my whole life like a big tapestry, with all the things that had happened in my life.' She said, 'I saw it. It was amazing.' She said, 'I could just see it all there like I was watching it on a big screen, all at once, all at once.' And she said, 'I am not afraid anymore of anything.' And that was good enough for me. I said, 'Thanks very much.'

So it's just that when we're stuck in it, in a particular moment of time, my God, if you lived to be 100, you get a telegram from the queen, which is nice. But just because we feel like 100 years is an awful long while. But it's not really. So for us to demand a certain precision in the way things happen, within timeframes that we can judge as familiar, is a little bit arrogant I think. I think God's timeframes are far more extended. The universe is created in such a way as to produce something of God's making.

St Paul describes it really well, I think, again in the religious sense, where he describes the whole universe as being in one great act of giving birth. But how can we see that from the span of our own life or even from the span of human history? Even from fossil evidence, even from that timeframe of 7, 10, 12, 30 million years, in the scheme of the universe, it's nothing.

And if I can extend the answer to the question a little bit. I did this with kids way back in Cabramatta when I was not long ordained at all. We got a piece of string. In those days we thought the universe was 14 billion years old. It turns out to be maybe 13.7, okay. But on the string I said one millimetre equals a million years. A thousand millimetres is a metre. That's a billion years. So each metre on the string is a billion years. So we had a 14 metre piece of string in the playground. The sun was five metres long on the scheme of things and it was about three metres or five metres past the beginning. It was somewhere in there. And we put the earth then at three and a half metres. Human beings are three millimetres to five millimetres.

We just can't see the whole reality all at once. That's where I say we need to be extremely careful with the knowledge that we have in how we handle it. I can remember, out at Parkes, one astronomer saying to me that it's a bit like getting a movie like *Lord of the Rings* and taking snippets of the film, little cameos, tiny little cameos, here at random, if you like, which are the equivalent of our observations of the

universe through our instruments, and then piecing them onto the table and asking someone to tell us what the whole movie is about.

Now the director of the movie, the person who produced it and filmed it and acted in it, they all knew what it was about. It's just that, when you only get a fragment to review it with, we could come up with all sorts of permutations that have got nothing to do with what the movie is about if we're not careful. And simply to say that my take on the universe is actually what the universe is is fraught with danger.

Question: Hasn't that argument come back [unclear 0:20:14.7]? I mean to say, we...

Bishop Christopher Toohey: Well you could argue that. You could argue til the sun came up. It's not going to change the reality.

Question: No. I mean, we have faith. We know this is truth. But that can also be seen that this is -- that argument, the argument you're raising about looking at a thing in a particularly narrow perspective, in a way, could easily be thrown back at the theist.

Bishop Christopher Toohey: Oh, it could be. It could be except that we're dealing with divine revelation and that the person of Jesus is not like anything else that we've got in terms of authority. To actually claim that the author of the universe spoke to us is a big call. Now you either believe that or you don't, of course. Some people don't. It's very difficult for some people to accept that the author of the universe actually was human and by the way still is. Because you don't take the humanity out of Christ. That's forever now. It's part of who He is. That's an extraordinary thing to say.

So you're right. I mean, if it's not believable, obviously you can throw it back and say well your argument's just as silly as ours, just as absolutist as ours. I suppose in one sense we're arguing from authority that divine revelation is precisely that. It's divine revelation. It's teaching us and telling us by an act of God who God really is. If you don't believe it, you won't accept that. You'll just say well someone made all that up, just like the universe just happened by accident.

So it's kind of circular in a way. But we -- and my friends, some of my very best friends are atheists. We could, but we don't, but we could just argue and argue, round

and round in circles, all night until the sun rose. But both of us and all of us realise that, at the end, it won't change the reality one dot. It just changes what we think about it. That's all. Somehow I think human beings argue because they both have a desire to be right. That's why we need some independence there. I mean, that's why I like the idea of God actually telling us who we are. But I believe that. But as I say, if you don't believe that, then you take what you want, I suppose.

Question: Thinking of what we think, may I just slip in a couple of more questions? One is, if you -- Radio National has a program every Wednesday, which I hear is cutting out. It's one of those [unclear 0:23:14.9] on religion. I'm assuming that's going to be chopped. What do you think of that? What do you think of original sin?

Bishop Christopher Toohey: Well what Radio National does is up to Radio National.

Question: Yes. But do you think it's a good idea?

Bishop Christopher Toohey: Well it depends on the quality of the program in the first place, I suppose. If it was really a good program or if you judged it to be that, that would be sad that they chopped it. If the quality was dubious, then maybe that was a good reason to chop it. So I don't know because I don't listen to Radio National much. My brother does all the time. He reckons it's a mixed bag. So I don't know.

Original sin, well something went wrong. Apparently we were created for innocence. I reflected -- I've had to reflect on this quite a bit actually over the time I've been in the priesthood. I think of God as a parent and the love that God has for us. A person in those circumstances who loved their children try to protect them from harm and try to protect them from evil and negative or bad experiences. Isn't that the case?

Of course every parent knows that, sooner or later, the kid's going to go off on their own path. But while ever it's possible, even into adult life, parents will be protective of their children. It's a natural thing. And I think God would be of us too. It would seem that God created us for joy and peace and innocence and something went wrong where we decided we wanted other things, to do it our way. And where that originated is the original sin. So it's original in chronological terms. But it's actually the origin of sin too.

They say that money is the root of all evil. I don't think so. I don't think money is the root of all evil at all. I think it's the desire for independence, where I want to do it my way, thank you very much, regardless of anybody else. There's nothing wrong with being me. That's alright. But where other people and the person who gave me life is not in the frame, then I've got a problem. It's original in that sense. It's the origin of what goes wrong in my life.

I suppose the correlative to the question is how is original sin imputed to a baby who's just born? It's got not much to do with the topic that I started to talk about tonight. That's a theological question, which I think is quite profound. For example, I often find myself apologising for what the Church did to Galileo, even though it was 400 years before I was on the planet. In fact, in some scientific circles, knowing that I'm a bishop, they hold me responsible for what happened to Galileo, even though I wasn't there. I think that is a correlative to the way original sin is imputed to us as well.

It's why John Paul II apologised for the sins of the Catholic Church since the time of Jesus. And it was a pretty big list of stuff. Oh incidentally, next year is the 400th anniversary of Galileo pointing his telescope at Jupiter. It's the International Year of Astronomy. So there you are. I'll give you that. It's also the 40th anniversary of the Apollo moon landing, Apollo 11.

So I think there is a mysterious connecting between the sin of those who go before us. Even though it may not be imputed to us morally, it's still imputed to us because we're human beings. Even sometimes it's even closer than that. I remember an old parish priest at Cabramatta saying to a group of high school kids who were about to go on their holidays for Christmas, 'Be careful of who you walk around with, with your friends, who you pick as friends. Because if you're with a group of kids and someone throws a brick through a paned glass window and you're part of the group, you'll be held responsible even if you don't actually throw the brick yourself.'

And I think what baptism does is cast us into a new relationship with God which sort of restores our dignity. It's a restoration process, in other words. And then we have to spend the rest of our life trying to figure out how to live that way.

It's ten past nine. So -- well I mean, it's your court. Yes, mate, yes.

Question: If you had three points or three matters that you could sort of provide to give a solution to what the problem is currently with our existence on the planet, what would you concentrate on and why?

Bishop Christopher Toohey: That's another talk. Three things. One is our use of natural resources. I'm not saying these are in the right order. But it's the way we use resources, not only in terms of quantity, but in terms of quality. In other words, do we see the resources as something to make a profit from or do we see the Earth's resources as a gift that needs to be nurtured and handed onto the next generation. So that's one.

The other one is water. The way we use water tells me something about an out of control need to consume. To produce gold, for example, takes an enormous amount of water. That's just one example. No wonder it costs 870 bucks an ounce. But then it's only a piece of metal that we decide is worth 870 bucks an ounce. But is it really? It was made in an exploding star, by the way.

The third thing I think relates to the atmosphere itself, because so many other things flow from that. For example, at the moment, the oceans are absorbing an overdose of carbon in the atmosphere so that we don't get too hot. It's a naturally regulated temperature system. But when the oceans absorb more carbon, they become more acidic.

And some of the life that's necessary to produce reefs dies or can't continue to grow shells and the fish that feed off the reefs lose their habitat and the fish that feed off those have no food. And so it goes on. The CSIRO say never mind about the Japanese killing whales. We're doing it on a bigger scale. There will be no whales. And they're already alerting us to the fact that fish may be off the menu unless we can figure out a way of farming them more efficiently. And people think that's just being alarmist.

But I remember, in 2002, I went and spoke to the CSIRO about modelling for rainfall patterns if climate change was a reality. What they told me is what we've got now. And they were being -- no-one took any notice of them back -- well not many took any notice of them back then.

So I think the atmosphere is the big ticket item. So I would say those three, water, resources and the atmosphere. And if we can only get it into our heads that this planet is all we've got and it's been given to us by a loving person who's given it to us on trust. And if we can just listen to what the science is saying, and it's not always easy to get good science I must admit. Non-politically or economically aligned science is a

tricky business to find. I suppose everyone's got an opinion too. But a million opinions don't necessarily add up to one dose of reality.

I think we need to look at what's going on with our planet around those three areas and be very conscientious about what we think, in the best conscience that we've got, of what the heart and mind of God is concerning this planet. That's kind of a very tight answer to a terrifically complex question.

Alright.

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