BBC

“Where is everybody?”

Transcript: Professor Brian Cox, Professor Matthew Cobb, Professor Richard Battye and Dr Susanne Shultz

PROF BRIAN COX:

The question ‘Are we alone in the universe?’ is not a particularly good or well posed scientific question. The answer is that if the universe is infinite then no we’re not. And what the people at Search for Extra-Terrestrial Intelligence do is to restrict that question to the Milky Way galaxy. Then you’ve got a well posed question and you can say “what is the probability of life, an intelligent life, civilisations let’s say – what is the probability of civilisations occurring, appearing the in the Milky Way galaxy?” We know there’s one at the current time. The question is ‘How many others are there?’

So with me to chat through these ideas are Professor Matthew Cobb, Professor Richard Battye and Dr Susanne Shultz. And what struck me, when I speak to astronomers, the astronomers will say the current estimate for the data is for 20 billion Earth-like planets probably. So it’s rocky planets in habitable zones around stars. And as Richard said with the cosmology that’s based on data from the Kepler space telescope and doing statistics on that data. So as an astronomer you’ll say there are loads of homes for life. But what struck me when I began learning a bit of biology is, from an evolutionary biology perspective, that the torturous route to complexity on Earth looks problematic. It took a long time to get to anything we regard as complex.

DR SUSANNE SHULTZ:

And evolution is so idiosyncratic. It’s a bunch of accidents that sometimes work and sometimes don’t and I think that one of the interesting questions is about whether we’re alone or not is ‘What is the probability of life as we know it occurring?’ and I think we know it has but we don’t know what the probability of it occurring somewhere else is.

PROF BRIAN COX:

The argument often advanced is that life began, as far as we can tell, pretty much as soon as it could.

PROF MATTHEW COBB:

I'm still completely agnostic and all I know if that life happened on our planet, but the numbers do start to be quite persuasive. Because, as you say, there are an awful lot of planets out there and basically as soon as our planet got ready – was in the appropriate conditions – stuff seems to have popped up. And we now know that you can get RNA... we think that before the DNA world - the DNA protein world that we live in, we're made up of, all life is made up of – life was composed simply of RNA which was both genetic information and action. It was also the enzymes they did the same thing they copied each other. And one of our ex-colleagues at the University of Manchester John Sutherland was able to show you can basically get RNA largely forming itself spontaneously.

DR SUSANNE SHULTZ:

But I guess I should clarify because what I said is life as we know it and that's not limited to very simple single-celled organisms. So I don't mean that life in any form but life as we know it. So if life emerges then is it a necessary that it becomes more complex in the way that we've seen, or is it a series of accidents?

PROF MATTHEW COBB:

No it's not. A series of accidents.

DR SUSANNE SHULTZ:

A series of accidents.

PROF BRIAN COX:

That's the mistake I first made when I started talking to Matthew about biology – "well there's this march to complexity isn't there?" And you say "well no, not necessarily".

PROF MATTHEW COBB:

You expect there to be underlying rules and order and we know that it's just a mess.

PROF RICHARD BATTYE:

I mean the probability is at least one in 20…

DR SUSANNE SHULTZ:

Do we know that?

PROF RICHARD BATTYE:

Well, I don't suppose we do but that's definitely an attitude I could take with some reason.

DR SUSANNE SHULTZ:

No but I think we can say for sure that it is least one in, however many, 20 billion because it has occurred, whether it's two, five, 150 or…

PROF RICHARD BATTYE:

But the probability in then being exactly one in 20 billion seems to be…

PROF BRIAN COX:

Well it could be one in 100 billion but it still could pop up on one of the 20 billion planets.

PROF RICHARD BATTYE:

It just seems more reasonable to me that it's actually much larger than…

DR SUSANNE SHULTZ:

I think that probably for life to emerge, yes, but for our life to emerge I think that's a totally different question.

PROF BRIAN COX:

I mean when we spoke to Frank Drake in the programme he's quite optimistic of course – the Drake Equation is named after him. But the estimate for the number of intelligent civilisations is defined as civilisations that can do astronomy. That's the definition of intelligence. Now that's a good definition because what he's actually saying is 'Can we communicate?' so you need something with radio telescopes or some kind of… So it's life forms capable of building radio telescopes, let's say. So if I was to ask you to… knowing what you know as an evolutionary biologist… how could you think of that? Things that can build telescopes.

DR SUSANNE SHULTZ:

Well I think there's a whole question about whether evolution does proceed towards complexity but I think once you start getting some level of complexity emerging then the probability that you get increasingly complex life forms and that you get increasingly intelligent life forms becomes increasingly probable. So once we get to something like a mammal, I don't think it's that improbable that you end up with a human being.

PROF BRIAN COX:

Oh, really?

PROF MATTHEW COBB:

Wow – that's very bold.

PROF BRIAN COX:

That's quite interesting. I'd like to elaborate on it.

DR SUSANNE SHULTZ:

Well I said something like a human being. It doesn't necessarily have to look like us.

PROF MATTHEW COBB:

Well it took an awful long time, that's what you've got to remember.

DR SUSANNE SHULTZ:

Well it didn't from the time mammals arose.

PROF MATTHEW COBB:

Something like a human being. Let's say we go with your 200,000…

PROF BRIAN COX:

Well, it's not mine is it…

PROF MATTHEW COBB:

Assuming that was a human being – or even if it was 100,000 years ago, whatever – that means for most of the time on the planet there was nothing like that. Mammals had been around for an awful long time before we ended up with something that was wandering around on two legs and able to make obsidian flakes.

DR SUSANNE SHULTZ:

But in terms of intelligent life I would argue that dolphins are incredibly intelligent. They unfortunately don't have hands so we don't know what they would have done if they had hands.

PROF BRIAN COX:

They also live in water so they'd have trouble building…

DR SUSANNE SHULTZ:

So I think there are constraints on technology given their body shape and their environment, but I think in a different environment something like a dolphin… I mean they use rudimentary technology, but…

PROF MATTHEW COBB:

So, then you've got to ask yourself: "Well all this has happened since the dinosaurs went so what was happening before then?" And OK, we've got birds and birds are very smart, they can use tools and all sorts of things and maybe Tyrannosaurs Rex is using his little arms for making, I don't know, doing sewing or doing something terribly intelligent. But there's an awful lot of animal history where we weren't about and we've only had civilisation for five, ten thousand years and we've been able to talk to the rest of the universe for 100. So, it's not only a matter of 'Is there stuff out there?' but 'Is it out there at the same time as we are?' – and that seems pretty unlikely to me.

Large image behind question step below: Nasa