Brian Swimme: The Cosmos Watching Itself (E35)

A New and Ancient Story Podcast with Charles Eisenstein

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Charles Eisenstein: Hello everybody, Charles Eisenstein here with Brian Swimme, a cosmologist, author and - how else can I introduce you, Brian?

Brian Swimme: I was waiting for the next noun. I guess I'm a professor.

CE: Yes, a professor. Are you at CIIS?

BS: I am.

CE: OK. That's the California Institute of Integral Studies. And in a former incarnation you were a practicing cosmologist, is that right?

BS: Yeah, that's right, yes. And then I got carried away by all this consciousness stuff.

CE: Uh huh. Which has nothing to do with cosmology, right?

BS: Yeah, that's the standard line in science.

CE: That's out there, and there's stuff in here, and the two realms are separate. Yeah.

BS: Yes. Keep them apart.

CS: Yeah. So OK, maybe we'll start with that. What do you think is a way to describe the connection between what's inside here and what's outside there?

BS: My simple way of saying it is, we're discovering that when we look out at the stars, we're looking at that which created the looking. So during the modern period we looked at the stars as objects out there. But now we have this amazing insight that we're looking at that which created the molecules that built our bodies and our minds and that now are looking back. So it's just, for me, such a mind job to be looking at that which is looking. It's such a strange phrase: to look at that which is looking. That's the thing I'm captivated by.

CE: I'm sure there's more to that simply than the elements that compose our bodies were created in stars that were born and died and then whatever solar disc accreted and made planets and that is in our bodies, and is it just a kind of random mechanical process, or do you think there's more to it than that?

BS: You know, of course we have proceeded throughout modern science by assuming that it is a random, mechanical process. The difficulty comes when we realize that this mechanical process created a consciousness that reflects on it. So clearly, our understanding of the process

as mechanical is insufficient. It's something much more complex taking place. It's nothing like a machine, you know. It's a universe giving birth to the power of understanding itself. We were so content just thinking about the way it happened in terms of matter, of mechanism. But when we bring in the idea of mind and consciousness, it becomes fascinating and it's way beyond the paradigm of modern science.

CE: What started you thinking this way? Where was the deviation from conventional scientific thinking? What happened to you?

BS: I love it. What happened to me? [laughs] That's perfect. I wonder about that. Thomas Berry and I wrote this book, called The Universe Story. And when we were introducing it in Berkeley, there was this amazing moment and it relates exactly to your question. So in the audience at the book release was Huston Smith. And I'm going on and on about how fantastic the universe is, and he stands up afterwards and says, "Brian," (we know each other) "Brian, Steven Weinberg knows, apparently, everything you're talking about, and yet his conclusion is that the universe is pointless, it's meaningless." And then he looked at me and he said, "What's the difference?" [laughs] And I don't think there's an easy explanation, but there's a biographical one. I went to a Jesuit high school, and one of the things they had me read was the works of the French Jesuit paleontologist Pierre Teilhard de Chardin. That was like a crossover point, you see, because he was speaking from a much deeper place than the standard modern science. He was really an impressive scientist, all sorts of results, but he had a larger vision of reality, and just having that in my mind, his ideas, enabled me to escape the prison of reductionist science, I would say.

CE: Yeah, um….

BS: Charles, let me interrupt to say, is it comparable with you? You started off studying mathematics and so forth. How was it that you didn't end up….

CE: Well, for one thing I was really dissatisfied with the answers to the deep questions that I discovered in mathematics and philosophy too, I studied in college. It didn't satisfy my thirst to know, why are we here? The reason I studied mathematics and philosophy, or one reason, or the reason that sounds good at least, is that I thought that these are the foundations of knowledge. If the answers are anywhere, they've got to be there.

BS: Exactly!

CE: So then you know, I didn't get anything satisfying, and then I went to Taiwan, and began having experiences that were flagrantly in violation of what I had been told was real. So that those became the ally of my dissatisfaction, and I began asking bigger questions.
BS: So in a certain sense you left the scientific tradition and explored the Asian wisdom of meditation and consciousness?

CE: Oh....yeah, I was a very very poor practitioner, but the cultural context there….I had these experiences with Chinese medicine and qi gong. Things that would be considered supernatural

in our society were quite commonplace and unremarkable. They weren't psychiatrized or pathologized, but they were….

BS: It was similar for me, even though I didn't go to Asia. In other words my encounter with this French Jesuit Teilhard, it was similar in that he lived in a different culture, and for him, the universe was suffused with a divine presence, so that he just took that as the foundation of reality. Of course, that throws him out of the reductionist, materialist, scientific point of view. But I guess in a certain sense, for me, Teilhard thought of science as an absolutely crucial pathway into the deepest understanding of things, so long as one didn't collapse into a reductionist interpretation. I've really been riding on that wave my whole life.

CE: That would almost be an example of one of these anomalous data points that I was talking about, because you read the guy, the guy's got a powerful intellect, and writing, what was it, like, early twentieth century, right?

BS: Yes, exactly.

CE: So you read that, and you can't just dismiss it on the grounds of well, he must not fully understand science and how powerful an explanatory framework it offers. [inaudible] And so what are you going to do with that? What are you going to do with that whole body of thought? In order to maintain a reductionistic worldview, you have to pretty much denigrate it, dismiss it, and not really take it fully on its own terms, because what are you going to think? Oh, he just squandered his entire career chasing rainbows. One thing I realized is that to maintain the orthodox view of reality that I had grown up in, it wasn't only an intellectual position, but it was also an emotional-psychological stance that held me as more rational, more sane, a better observer of reality than these superstitious idiots who had no capacity for introspection or self-reflection. They're just intellectually sloppy and irresponsible. Like, I had to hold myself apart from and above basically everybody who disagreed with me.

BS: Yeah. Yeah, the arrogance of the modern scientific tradition is something to behold. I guess the way I think about it is that, for what it's worth…..we really captured the scientific method with Galileo especially. It was so amazing! We were learning things that just were never known before and it just went to our head, sort of like an adolescent response. We thought we had everything, and we overdid it. We just rejected all the other forms of knowledge, but one of the exciting things about our time, and I know you share in this, is that that scientific, reductionist arrogance is breaking apart. I mean, I'm not saying it's over, but I'm saying wow, we live in a time when we're exploring an integration of the Western scientific point of view and these deep insights coming from ancient spiritual traditions, as well as contemporary spiritual traditions, from all over the planet. At least that's how I see my own work, and yours, and others that are involved with this. It's just an exciting time of synthesis. Would you agree?

CE: Yeah, I mean, very few scientists will come out and say that they are reductionists now. It's definitely fallen out of vogue. For me, when I think about what reductionism actually is, it's not to deny that the analytic reductionistic method can offer powerful insights and that it's a powerful

tool. But I think that reductionism gives primacy to that way of explaining things. Like it says, out of all the different ways, all the different causes of something - what did Aristotle call it? [inaudible] The efficient cause, yeah. Of all the different causes, the one that's real is the reductionistic cause, that basically comes down to, it happened because a force was exerted on something. So it's this downward causal structure that says the only valid, legitimate reason why something happened is force that acted on it. And basically says that the upward causes, the teleological causes, the purpose for things, that is kind of an illusion; that's just the result of a summation of lots of reductionistic causes. So it's a story about reality that is really limited and limiting, but not in itself wrong.

BS: Very well said. Exactly, it's not wrong, but it isn't the whole picture. When we take it to be the whole picture, then we're missing huge dimensions of reality.

CE: Right. And one of the most trippy experiences I've ever had was when I was 22 and I was in Taiwan already, and this is exclusive of my actual trippy experiences. Someone gave me a book by Ilya Prigogine -

BS: Oh, one of my heroes.

CE: Order Out of Chaos. Did you ever read that book?

BS: Oh, I love that book. Absolutely.

CE: Oh my God, that was - that just blew my little mind at the time. Because here was an impeccable scientist -

BS: Yeah. Nobel Prize winner.

CE: Nobel Prize winner, yeah. Just basically demonstrating that meaningful things happen that cannot be explained by the reductionistic causes.

BS: Yeah. Right.

CE: You can say that the hexagonal convection cells in a beaker - well, those are nothing but these individual molecules bumping against each other and expanding, etc. etc. But to say that they're hexagonal because this molecule, this molecule, this molecule all did that - it doesn't explain it at all.

BS: Yeah. It's such a great demonstration of the reality of, as you were mentioning Aristotle, what Aristotle called formal causation. It's just so fantastic to think that we live in a universe where these patterns emerge and participate in the organization of structure. Just because I so love this new scientific theory, and some of your listeners might want to explore it, the person who has really carried Ilya Prigogine's theory forward is Terrence Deacon at the University of California, Berkeley. He was the head of the anthropology department. Anyway, his book

Incomplete Nature does exactly what you are speaking of. He's showing that there's a way in which we can understand, from the orientation of thermodynamics, the way in which purpose is part of the universe. There's been many centuries when scientists have thrown out the idea of purpose, as you were saying, teleology. But now it's finding a way back in within the very structures of science. So, Incomplete Nature by Terrence Deacon. If you haven't read that yet, Charles, I know you'll love it. It's just terrific.

CE: Yeah, I have not read it yet, and I will. But what really blew my mind also was the emergence that comes from non-linear thermodynamics. [inaudible] What really blew my mind is that was the first time I saw the Mandelbrot set.

BS: [laughs] That's a mind job. That's a riot.

CE: We'll have to put this in the show notes, so people know what we're talking about. But here's this mathematical object - this isn't even physics, this is pure mathematics - where you have incredible beauty and structure, organization, that you cannot explain, because the equation that generates this endlessly, infinitely complex, ordered object is literally one line long. It's the simplest possible formula. And it's not just like a bunch of random complexity, you know, mathematical fuzz, as they call it. It's all these spirals and whirls and cell-like things, and you zoom in and some parts of it get more and more and more complicated as you zoom in.

BS: And just keeps coming and coming and coming, as you go penetrating down. Oh it's just amazing. There are friends of mine - I don't use psychedelics, I'm not against it, it's great, but some of my friends do and they will say just watching the images of the Mandelbrot set [inaudible] very much like being on a psychedelic journey. Just the infinities within infinities in this universe. Wow.

CE: And you can't explain it. If you say, why? the only reason you can give is to quote the definition, quote the formula. It's like, wow. So here is design without a designer. Beauty without an artist. It's built into reality itself. [inaudible]

BS: Built into reality. We had that sense, again going back to the unfortunate arrogance of 19th century modern science, we had the sense that we were real close to finally understanding everything in our simple little models. And the Mandelbrot set, even though it's pure mathematics, it captures in a way that the universe is complex beyond our imagination.

CE: Yeah. [sighs]

BS: [laughs] I love that that made a big impact on you.

CE: In a way, I still can't wrap my mind around it.

BS: But you're the first person that has said that a spiritual awakening came from the Mandelbrot set. I think that is fantastic.

CE: I may be the first person who said it, but I bet I'm not the first person who's had that experience.

BS: I bet, yeah. For sure.

CE: I was primed for it because I'd studied recursive function theory a bit in college and I understood the significance of something that had some kind of organization or beauty to it that was not a recursively innumerable set, like there's no way to reduce it to something smaller than itself.

BS: Yes. It's a great example of irreducibility. The word recursive, and recursion, the way in which the universe folds back on itself - these are all related to what I was trying to say earlier, that looking out at the stars is looking at that which created the looking. So it's the universe folding back on itself. There's an illusion of separation, an illusion of the other, but it's the case that we're all folded back into each other in these profound ways. So I just want to make that connection between the recursion in the Mandelbrot set, and the recursion in contemporary cosmology.

CE: This also reminds me of holographic universe theories. Holograms are very similar to fractals in that way. Have you developed any thinking around holographic universe theories?

BS: No, I haven't. You know, it's funny, it's only because of an early prejudice on my part, because the holographic images weren't including time, and I was so captivated by the way in which the universe evolves through time. I'm sure there are tremendous insights in there that I have not really appreciated. I would love to hear you reflect on it.

CE: Well, maybe I'll take this path. You were talking before about the miracle of conscious matter looking back at itself. And one way to look at it is, that if you are positing kind of a random universe, then to explain something as highly organized as brain tissue, or a microchip - I mean, if you just had a random gas of various elements, the chances of them coming together in that way are -

BS: Pretty much zero.

CE: Or basically zero. The number that you would have to write to express the chances of that would not even be possible to write with all the ink in the world.

BS: A lot of exponents.

CE: Right. It's just crazy, right? So there's this kind of bootstrapping process toward more and more complexity. OK, so if your only way of looking at the world is these kind of generic forces - gravity, especially - it's just hard to understand how so much complexity could arise from that. And I wanted to ask you - and even if you're not going to the level of brain tissue, that level of

complexity, actually, outside of what we call living systems, there is way more complexity than most people realize in, for example, the sun. Ordinarily people think of the sun as this big ball of fusing hydrogen gas. But actually it has incredibly intricate structure. And a lot of it comes from electromagnetism and not gravity. Gravity doesn't make for very interesting structure, but electromagnetism is much more nonlinear because you get, say, some structure of plasma, some jet of plasma, and that creates its own electromagnetic field, which then orders other things, and it kind of creates this nonlinearity. So I'm obviously not a cosmologist, but I've been suspicious for a while of dark matter. It looks to me that they invented it so their equations would work, and the galaxies wouldn't spin apart and so on, and dark energy to make the expansion theory. So there's this - I'm not sure how familiar you are with it, but these heterodox cosmologists who talk about an electric universe. And organization, structure and emergent organization seem much more at home in some of these electric universe theories. I wonder if you have anything to say about all that.

BS: I do. And I guess the way I'd start off is to say that, in keeping with the theme of our conversation, there is an impulse in the scientific tradition to keep things as simple as possible. There's that great phrase: we try for simplicity, but we distrust it. You don't want to cave into a simplistic understanding, but you want an ultimately simple one. Simple in the sense of a bird flying across the sky - there's a simplicity to the movement, even though it's only possible because of the highly complex organism that the bird is. There's this relationship between deep simplicity and deep complexity. But that is an overall theme. We have this - and I'm just talking about cosmologists in particular - we have this horrendous discovery. It still just blows my mind when I think about it. We have the universe expanding. That alone, to discover the universe expanding is - it's hard to even - in the 20th century we went from the idea that the universe consisted of one galaxy to the observed, empirical datum that the universe consists of at least a trillion galaxies. So that is an unbelievably massive expansion of our view of the universe. There's no parallel in the history of humanity. So we're just blinking like deer in the headlights, trying to make sense of this and it's just overwhelming. And one of the first things that was discovered by Edwin Hubble, in the 20's, is that the universe is expanding. But then Stephen Hawking did a calculation. He was simply looking at the rate of the expansion, and what he discovered is that that rate [inaudible] couldn't have been different. So if you modify the rate of expansion just by the slightest amount - if you made it a little bit faster, the universe would never have had life in it. So trying to understand that has been a central challenge for the entire scientific community, but especially mathematical and observational cosmologists. Now, the current so-called explanation, which would be favored by the majority of mathematical cosmologists, is to imagine that there are an infinite number of universes. And in every one of those universes, the universe is expanding at all different kinds of rates. But there's just a tiny number of universes where the expansion leads to life. And as Stephen Hawking - he liked that explanation, by the way - so Stephen Hawking said, well, you see, there's nothing marvelous about our universe. Now, I object so violently to this -

CE: That's the anthropic principle, right?

BS: It's one version of it. But the common phrase, it's just called the multiverse. I have such an emotional reaction, because we don't have evidence of any of these universes. None. And yet, we're happy to think that they exist. Why? I think actually -

CE: Just to make ours not special. The only reason to invent them is to make ours not special.

BS: Exactly. That's exactly it.

CE: It's to deny the miracle of it.

BS: To deny the miracle of it! So we have a deep psychological need to think of this universe as just being ordinary. And it's not. It's a miracle! It's like an infinite miracle. So we're incapable of understanding - at this point - we do not know how it is that the universe has this elegance, from the very beginning, as you were saying. The complexity - it starts early, early on. I'm not saying that I have an explanation. I don't think there is an explanation. I don't think the electrical version of the universe is an explanation. I really think that the deeper understanding is yet to come. My orientation is that we are awakening to an elegance, and a mind, and a consciousness, that pervades the universe, that we don't yet know how to map out. We don't. And so I think we have to live - I'm talking now from the point of view of the scientific community - we have to live with the ambiguity of not knowing. And that's not easy. We so want to have the answer. I want it, but I don't know what it is. But one last thing, to connect it to Ilya Prigogine. Prigogine, his insight is that in some deep way the universe is suffused with these self-organizing dynamics. There's something like a form of intelligence. And they're everywhere. It's so fantastic that he had this orientation, he's dead now, but we're moving into the 21st century exploring these self-organizing dynamics, as a form of mind or consciousness. That's a long response, Charles, but I get passionate about this.

CE: Yeah. I like the invocation of mystery and humility that you're offering here.

BS: Humility, yeah.

CE: Because the impression that you get from reading the public relations, like for example from CERN, the kind of physics news, at least on the popular level is, we've almost got this thing.

BS: Yeah, right. We're real close. We thought that in the early 20th century, then we discovered quantum mechanics.

CE: Right.

BS: By the way, I have attacked mainstream cosmologists here, but I don't just want to be negative. I want to point to a cosmologist that I think is creative and humble at the same time, and he's presenting a new theory of the universe that has promise, and his name is Lee Smolin. He's someone that your listeners will really enjoy.

CE: He's not very popular among cosmologists, that's my impression. Didn't he write the book The Problem With Physics?

BS: Well, he wrote a book attacking the multiverse theory. But I think the title was Not Even Wrong. Like, the ultimate condemnation of a theory is that it's not even wrong. And you can't disprove the multiverse, because it's about universes that are imagined to exist without any proof. So he would be one of the most creative cosmologists out there.

CE: Yeah. Well, I certainly don't know either. I have a feeling, though, or I would like to believe that consciousness is involved somehow. What you were talking about, the expansion being precisely what is needed for there to be life - something similar blew my mind almost as much as the Mandelbrot set. When I discovered that the fundamental constants - if they were a little, tiny bit different, you know, if the strong force were a little stronger or a little weaker, then you would have either runaway fusion in stars and they'd just blow up in seconds, or you would have no fusion at all, or it wouldn't reach critical mass, and you'd have no stars either. And it's within - I can't remember but it's not even a few percent, it's within hundredths or thousandths of a percent precision.

BS: And there are many of these, as you were pointing out. The expansion would just be one. The strong nuclear, the weak nuclear, the relationship between the electromagnetic and the gravitational. All of them have this elegance. And I love the way you've connected it to the Mandelbrot set. So that the more we look at this, the more amazed we can become.

CE: Right. We would like to have an explanation for it. There's a comfort and a kind of control in being able to reduce this mystery to something that we can calculate and predict. And the idea that you just mentioned, that there isn't an explanation, that is really philosophically troubling even to me. But I also find it tantalizing.

BS: [laughs] I know! Just imagine what we've learned! We have these pictures of how people thought about the universe a couple thousand years ago. One of my favorites is, in the time of Lucretius, again, a couple thousand years ago, there was a belief among really intelligent people, sort of the Einsteins of the time, that if you took an army out at night and you had them all shout at the same time and then got quiet, you would hear their shout echo back from the stars. I mean, we had no idea of the vastness of the universe. So we look back on them and say wow, they just didn't understand. But I think that's the human condition, you see. We understand a lot more than they did, but we are still just as baffled by the ultimate nature. You know, there was a study at Stanford years ago that relates here. It was about trying to understand creative people. They looked at creative mathematicians, scientists, musicians, athletes, and they were looking for what are the commonalities? Is it IQ, is there a racial part to it? They looked at lots of variables. But the number one commonality among all the different groups of creative people was the ability to live with ambiguity. That was number one. And so when I read that I thought, the human condition means to live in between things. We don't really know the details of where we came from, and we don't know the details of where we're going. We're in between, and somehow living there is a way of finding our way into creative energy. So

I feel a frustration about not knowing these aspects, but I actually believe that we will learn more and more about the nature of this elegant, intelligent universe in which we live. But we'll never complete it. Or maybe in some far distant future, but in the near time we have to learn to enjoy not knowing as much as we enjoy knowing. Both are wonderful.

CE: If the Mandelbrot set is any kind of model or even allegory for the universe, then we will never complete it, because the variety of structure is infinite.

BS: Yeah, yeah. I mean, isn't that nice? It makes the universe so interesting!

CE: I like it better that way. Of course, ultimately I guess if you think that the universe is quantized, then it isn't infinite, etc. etc. But what you were saying about these athletes and geniuses etc. etc. who had this quality of being comfortable with ambiguity - I've noticed, just really practically, that when I become convinced of being right, then I start using that template to understand everything I see. I become comfortable with a certain world story, with a certain intellectual framework or template, and I start to use it more and more, and then I become unable to see things that don't fit into it, and unable to put it down - because I'm attached to it now, because it works so well - put it down and apply other ways of seeing. And it actually makes me stupider. And I wonder what kind of cultural stupidity have we conjured by looking so rigidly or so single-mindedly through this one - it's not just a theoretical lens, but it's an epistemological lens too, it's saying the way to knowledge is you interrogate an external universe through experiment, with the assumption that the question you ask does not affect the reality that you are probing. That's a metaphysical assumption. That is not testable in physics. All these metaphysical assumptions that combine to create the framework of science itself.

BS: I love that. I'm thinking that you've just enunciated a really important research endeavor. I would love to see this funded by the National Science Foundation. What are the intellectual orientations that have made us stupid? I love that. So many of these have served a purpose. But we cling to them, just as you're saying, we cling to them because they worked in the past, but now they're making us stupid. So I think that's part of this moment. We're in the middle of this deep transformation of consciousness, as we're talking about, and it would be really helpful for us to identify those intellectual orientations that truly are making us stupid. By stupid I mean - there's a technical phrase, it's activity that is harmful to both the other and oneself. And we're doing a lot of that. I love that, Charles. That's a great research endeavor.

CE: Yeah, it has a nice cachet too. There's lots of studies on intelligence, what about a study on stupidity?

BS: [laughs] Exactly!

CE: I have another thought here too, about, I guess, these entrenched assumptions. When I thought about the anthropic principle, which you were saying a version of. The universe is this way because it has to be for us to be here. That's not an explanation.

BS: No.

CE: I thought of, perhaps, some way in which the fundamental forces coevolve and only have certain solutions in which they are somehow propping each other up. Like, there's certain attractors if they are evolving somehow in relation to each other, non-linearly. So I thought of things like that, and the other thing was, maybe it's the retrocausal observer effect of ourselves that collapses these many many possibilities into the one that can produce ourselves.

BS: Oh, yeah. That is, as I'm sure you know, one of the kind of radical cutting edges of contemporary physics.

CE: Retrocausality. Talk about trippy.

BS: Yeah. Really.

CE: And, so OK. Two things that I want to say at the same time, but I have to do it linearly, I think. One is, Rupert Sheldrake did this study of the history of the speed of light.

BS: Yeah!

CE: Also the history of the gravitational constant. Did you see that?

BS: Yes, I did. Rupert's amazing. But go into detail, that's great.

CE: So he looked at the increasing precision of measurements of the speed of light, and then, I think it was in 1928 or something, there was a fifteen year period in which the speed of light changed by twenty meters per second. And consistently, in all these different measurements. And this was way above the margin of error. By then they'd had a precision of much, much less than that. And after, whatever, fifteen years, then it reverted back to where the previous measurements had been converging. So it really looked like it changed for a while.

BS: Yeah.

CE: And he also pointed out changes in the gravitational constant. I actually got him into trouble about this because we were at a TEDx thing and I said, "Oh, you know, that was really interesting, you ought to talk about that." And he did, and then the TED talk got censored by TED, and it led to this whole thing.

BS: I remember! I remember reading about that. It was too much for the assumptions of TED.

CE: And so then, and this is interesting for reasons having to do with the way that paradigms are maintained and protected, because I read a refutation of Rupert's thesis of the change in the speed of light - I don't know if it was Jerry Coyne or somebody like that - refuted it by showing a graph of measurements of the speed of light from 1900 or whatever to the present day, and

showing how in fact, they do converge on the present value. And I was like, oh, yeah, I guess Rupert got this one wrong. Until Rupert pointed out that that data series was missing precisely the period in question.

BS: [laughs]

CE: That slipped by my notice!

BS: Wow.

CE: So I can imagine that if somebody is hostile to the idea that the constants of nature aren't constant that they would dismiss it out of hand, after reading that. Anyway, the idea that the constants aren't constant fed my delightful, trippy imagining that their evolution has something to do with consciousness. It at least opened the door to that, you know.

BS: Yeah. I mean, going into a highly speculative mode here -

CE: Yeah. We won't tell the other cosmologists if you do that.

BS: I don't know what the future holds, but my own intuition, for what it's worth, is that the universe itself is groping - yeah, that's the word, that word comes from Teilhard de Chardin.

CE: Wow.

BS: The universe is groping, and it doesn't begin with the certainty about how to proceed. And so the constants themselves are habits that have become ingrained. And they become ingrained because the universe has found that they're fruitful, so it wants to continue down that line of exploration. And that even here, I need to say that that idea that the constants are ingrained habits comes from one of the most impressive philosophers of Western history, Charles Sanders Peirce. That was his view. So I'm just picking up on that, and I like to think of the universe as suffused with a form of consciousness and mind that isn't just like human minds. It's different. We come out of this. And so I just love thinking about the universe trying to find its way into deeper domains of beauty. And it's done such and amazing job already! But it has an infinite number of domains to explore, just like the Mandelbrot set never ends. It keeps deepening and deepening and deepening.

CE: That just makes every cell of my body ring.

BS: [laughs] Oh, great. That's wonderful! You and I may be causing this from the future, this may be a retrocausative act right here. We're helping ourselves finally see.

CE: The idea of the universe groping toward more beauty, or more life, more complexity - they're related, all these things - it fits in with some of the new biology as well.

BS: How?

CE: Fifteen years ago I advocated a neo-Lamarckian understanding of evolution. I called it neo-Lamarckian. I would provocatively tell, if I had an occasion to speak to a biologist, I would say, yeah, I'm a Lamarckian, and they would roll their eyes. For those listening, Lamarck basically advocated the inheritance of acquired characteristics, which has been caricatured as, if you cut the tail of the rat off, then the next generation will grow without a tail. That's not really what he was saying. He was saying that there's a striving, that the giraffes get longer and longer necks because they are striving to reach the higher leaves. So that desire and intention feed back into genetics. And last year I was at some gathering and there was a biologist, and so I decided I would taunt him by saying I was a Lamarckian, and he didn't bat an eye and he said, "Everybody's a Lamarckian now." Because of epigenetics, acquired characteristics can be inherited, and a little less known, it's not only epigenetics, it's also the genes themselves. Organisms have all kinds of enzymes to cut and splice and do genetic engineering on themselves, and thereby pass on genetic changes in the germ line to future generations. So basically, to go back to Lamarck, this idea of evolution being guided by a wanting, by a striving, that's so resonant with the other [inaudible] you were talking about, the groping of the universe trying to align its four forces in a way that works for a while at least, and generates a burst of complexity, and maybe it's not working anymore. Just like us, we have ingrained habits of perception and action, and they work for a while and you become very successful at them and then at some point they stop working. And I wonder if the crisis of humanity mirrors a cosmic crisis where we're maybe experimenting with some different ways of being.

BS: I love that. That's fantastic. I love that. Yeah. And so right in our own struggles to make sense of things, we are this universe, we are this life that's striving. I love that. That's great. I didn't know that about many, many biologists are now considering themselves Lamarckian. That's fabulous.

CE: Yeah. The "selfish gene" paradigm is really becoming obsolete.

BS: A thing of the past. Yeah.I look forward to exploring that. That's wonderful, Charles. I love that.

CE: [sighs]

BS: Isn't it great to be alive?

CE: It is, yeah. It really is. A miracle.

BS: And such a moment. To be part of this is really something.

CE: I guess maybe I'll have other cosmology questions but I think I won't ask them right now. I'm curious just to turn this to your teaching right now, and these ideas about the conscious

universe looking at itself and all that. In what way is this understanding a medicine for our society right now, that you may have discovered as you teach people at a university?

BS: Yeah. Medicine, or I think of it sometimes as a remedy. I mean, there are so many different approaches, and we need all of them, but the one that I myself am fascinated by right now is related to what we've been talking about. But to give it a focus I would say that science at its best has generated incredible insights and concepts. So the things we're talking about, the strong nuclear interaction - that wasn't known in the history of humanity. We didn't even know it existed! And yet here it is, holding all of the nuclei of the atoms of our bodies together. So, wow, that's just as important as anything that's ever happened. So I can live the rest of my life teaching the conceptual knowledge of science and never grow bored, it's just so rich. But I think that another step is required, and that is we need to find ways for experiencing the knowledge, so it's not just knowing this knowledge but also living it. Living it or experiencing it. Certainly this is what happened to you with the Mandelbrot set. There's a way in which you can understand the mathematics conceptually and just stay with that. Or allow it to permeate in, and you just feel yourself transformed. So it's entering into a deep, deep experience. So then what I am currently doing is actually working with the novelist Caroline Cook at the California Institute of Integral Studies. Because in literature, there is that endeavor of rendering human experience, and so we're bringing together this approach of art, of literature, with the understanding of science and cosmology and creating works that are expressions of the experience of the universe, from the perspective of our contemporary scientific understanding. Now, when I say it that way it almost sounds like we're achieving a lot. I hope we are! But I want to emphasize that it's in the exploratory phase, so it's the students that are coming and working with us. We're just inventing this. We have a word that we invented to describe it. We call it autocosmology. Autocosmology. Just as a way of trying to indicate that we're bringing together our own autobiography with the scientific cosmology. How do we experience in our daily lives these incredible truths of the universe? It's a long answer, but that's where I'm at right now in my teaching.

CE: Yeah. I resonate with that. It seems what you're doing is in a way bringing science back around toward its - I'm not sure if I would say its original motivation. Yeah, maybe its original motivation but certainly its, let's just say its true purpose, which is to increase our apprehension of the awe and mystery of this universe, to put us face to face with the miracle.

BS: Face to face, yes.

CE: I feel that whenever I - well it's like the same feeling of looking at the Mandelbrot set, or looking at cell physiology, and just how endlessly complex and perfect it is. It's a miracle. How can this possibly happen, you know?

BS: [laughs] Yes, exactly. You go into cell physiology and start to understand what's going on there. For me, these are deep spiritual experiences. That's exactly what we're after.

CE: Yeah.

BS: Finding a way to have our minds opened up by the infinite beauty in which we find ourselves. That would be another way of saying it.

CE: Yeah. And then maybe the best result of that would be to stir within us the desire to contribute to that beauty.

BS: Exactly, and to realize that what we are doing, we're touching into the sacred. That word is loaded, but I mean it here now just as something that is so infinitely valuable and requires our respect and reverence, and to walk through life with that orientation is, I think, the challenge of this transformation in consciousness. That would be another way of saying it.

CE: Yeah, and if we did that we wouldn't be stupid anymore by the definition you gave.

BS: There's an example. We've just identified one of the prime orientations of stupidity. It is to consider Earth as just a bunch of stuff that's there for us to use any way we want. There's a pathway into stupidity. As opposed to realizing that we're in the midst of some kind of miracle.

CE: So in a way we can say that the opposite of stupidity is not intelligence, but the opposite of stupidity is reverence.

BS: Beautiful. I love it.

CE: And in reverence and apprehension of the mystery and the miracle, then we can't hold onto the arrogance that stunts our thought.

BS: Beautiful, again. You're articulating a spiritual path right here.

CE: In my recent book I go through the ways in which science is a religion, everything from unquestioned metaphysical principles to a priesthood to official dogmas to evangelists (science writers) to an initiation ordeal (called graduate school) to an arcane language, a system to indoctrinate youth, schisms, heretics, apostates, the whole deal, right. And then I say that to thereby - I'm not saying that science is "just" a religion so don't believe it - to say that would be to adopt science's own definition of religion as a term of dismissal. But instead to say yeah, it is a beautiful religion. Like any religion it has a road to truth: the scientific method, right? So any religion can help us to see what we otherwise could not see and can put us in touch with the sacred, put us in touch with God. You and I have just been describing exactly that.

BS: Yeah, nice. I love that, I absolutely do. And what it brings to mind, I have to tell you, is the thought of my own principal teacher in terms of working with a living person, and that is the cultural historian Thomas Berry, who died ten years ago, but we worked together for many years and what he impressed upon me was that science is a process, it has a history, and he said - this was his view, which I love so much - he said, for the last three or four centuries we've had science in its mechanistic formulation, which you referred to earlier. He said what's taking

place now is that science is entering its wisdom phase. I just love that. So science has been serving technology in good and bad ways, and that will continue for sure, but something else has happened, and that is that science itself is a pathway into, as you said, science can be a pathway into the sacred.

CE: Yes.

BS: And that is - with the Mandelbrot set, with Ilya Prigogine, with Rupert Sheldrake, with these biologists who are realizing that we're all neo-Lamarckians, as you were saying - that's part of the big transformation of our time, I believe.

CE: Yeah.

BS: Do you know the work of Thomas Berry?

CE: Very little firsthand. Yeah, everybody tells me there's a lot of resonance between my work and Thomas Berry's and -

BS: Yeah, let me tell you one of them that you'll love knowing. So the phrase "new story" - that really, when I discovered - he wrote a little essay in 1978, which I read in 1979. The title was "The New Story." And when I read that, somehow I knew, in a sort of dark, intuitive way, not with great clarity, but on some level I knew the whole trajectory of my life. It's amazing how we can discover in certain moments just who we are and what we're about, and in a real sense I've done very little other than carry forward this whole idea of the new story. We ended up writing a book called The Universe Story, but that was simply further development of these ideas in this little essay. So if you ever read him you'll discover a lot of wonderful moments of resonance with your own work.

CE: Well, I think an invocation of Thomas Berry is a good place for us to wrap up for now.

BS: I appreciate that. That's great, Charles. It's been such a delight.

CE: Yeah, this was really fun.

BS: Every ten years we'll get together.

CE: Well, hopefully maybe more often than that, but -

BS: I hope so. The last time was about, I don't know, was it maybe eight years ago?

CE: Mmm, I think it was five years ago, something like that.

BS: Oh, was it five? Good, closer than I thought. I so enjoyed talking with you, Charles.

CE: Yeah, me too. Thank you.

BS: I wish you all the best with your great work.

CE: Thank you so much, thank you for your time, and your [inaudible] and your life.

BS: My pleasure.