EPISODE 39

THIS CAMBRIAN MOMENT

Hi there. Welcome to the end of the world. My name is Michael Folz. And this is Episode lucky number 39 of my podcast Dial It Back Or Die. Okay. By now we're four or five episodes into the Science part. And we will be going a lot further. On and on into that human condition.

But I thought that this would be a good time for us to step aside for a moment from science fact and to engage in a little science speculation. To my mind it is well founded speculation. Even mental outlook changing and paradigm changing speculation. In fact, I would go so far as saying that this qualifies as a Big Idea. But I'm not going to break my own rule and be like those 18th Century philosophes and think that my presentation of a possible hypothesis in and of itself somehow makes it right. Because if I've gotten anything across by now, I hope that it includes the understanding that science only happens after the hypothesis has been actually proven.

Hypothesis. That critical link in the chain of the scientific method. Ideally it's what happens when you take all the available evidence and then come up with a framework which is more coherent, more intellectually satisfying, and more elegant than whatever framework existed before. But it's always important to remember that you can't pick and choose among your evidence. Even more important, as I keep harping on, you always have to be on guard lest your hypothesis is simply a projection of your preexisting ideological, religious, or philosophical beliefs.

Anyway, sort of as a preamble to me setting the stage for my hypothesis, let's go back to the story of Copernicus and his hypothesis about the Sun being the center of the Universe. And I know that I've already referenced the story a couple of times. But I think that there are several lessons from it which are germane to this episode.

The first of these lessons is to remind you once again how so many people, even people with PhD's, can—due to their ideological imprinting—get something like the story of Copernicus so wrong. And then how these presenters never go back to try to find out the reality for themselves. Not to mention all the millions of people who listen to them.

Again: The short fairy tale version is that the brave Copernicus, fighting the superstitious darkness of the Middle Ages, independently came up with a brilliant, and scientifically accurate, heliocentric theory. But that then the Church, citing Scripture and convinced that the Earth, being the oh so special possession of God, just *had* to be at the center of everything, mercilessly persecuted the poor man. Which led to his theory being banned, and dumb, Old Testament Religion becoming once more triumphant.

And, again, if you remember those earlier episodes, you'll also remember that nothing about this story is remotely true. That in point of fact, Copernicus—who in reality had a warm lifelong relationship with the Church—had merely dusted off an old theory developed by Aristarchus of Samos back in 250 BC. That in point of fact when Copernicus did circulate his theory, all of the learned people in Europe, including the Pope, were quite intrigued and interested by it. And that in point of fact the objections to it, even from the Church, had nothing to do with philosophy or religion, but rather had to do with the facts that 1) Copernicus hadn't really proved anything, and 2) given the state of scientific knowledge at the time, there were all sorts of *scientific* reasons not to believe it.

And I don't want to go into the weeds on this again. But the two most obvious arguments were these:

First, at the time everyone, including Copernicus, had only the foggiest ideas about how motion worked. Which meant that, if the Earth was motionless at the center of the Universe, then one could still explain the motion of the Sun, the Moon, and the planets by, say, hypothesizing that they were made of different materials than the Earth. And/or thinking that they existed in different outer spheres from the Earth, which then operated under a different sort of Physics than the Earth did. But if the Sun was at the center, this meant that the Earth would necessarily have to be in motion in two completely different ways. First, of course, it would have to go around the Sun. Second, since they knew that the Earth was about 24,000 miles in circumference, this meant that the Earth would have to be spinning at around 1,000 miles an hour for the Sun to appear to rise every morning.

Now no one knew the real size or distance of the Sun or the planets. But they did know the size of the Earth. Which to them was about as gigantic an object as something could get. So where does the force come from that could spin such a huge object around so inconceivably fast? Further, assuming that this were the case, then why wouldn't everything on Earth which was not nailed down fly off into space?

To these questions Copernicus couldn't even supply a hint of an answer. And it wasn't until Isaac Newton in 1687, with his description of gravity and of centrifugal force, that a plausible solution was suggested.

The other main objection, of course, was that circle/ellipse problem which I explained in that earlier podcast. Because it so happened that everyone, from the pagan Greeks onward, had just assumed that planetary orbits *had* to be circular. And this assumption was so deeply ingrained that it never occurred to anyone to question it. And if your Cosmic model had the Earth stationary you could kind of solve the problem geometrically by using cycles and epicycles. But a Copernican system, which used only one circle—what we now call an orbit—just didn't line up with the observed positions of the planets. And it wasn't until 1608, when Johannes Kepler had the insight of making orbits elliptical, that this problem was solved.

So what ultimately held people back from grasping heliocentricity was indeed their belief system. But it wasn't their religious belief system. No, it was their simplistic philosophical belief system which held that the Universe had to conform to simple circles.

And here's the final insight to gain from all this. Because if we keep in mind that Copernicus did no more than make a lucky guess which turned out to be right over a century later, and if we remember that the belief that we were at the center of a very small Universe had nothing to do with religious convictions and everything to do with the limitations of scientific understanding at the time, and that the final scientific objections to the Copernican model weren't really nailed down until the 19th Century, then in the end the so-called Copernican Revolution really was revolutionary. Because the fact that the physical Universe turned out to be orders of magnitude larger than we could have possibly conceived really was a big deal. And in the end the Cosmos did turn out to be a lot more cosmic than we had imagined.

Oh, and by the way, this would be a good time for me to explain to you the term 'order of magnitude'. Because it doesn't just mean something vague, like 'bigger' or 'a lot bigger'. Rather it has a specific mathematical meaning. Which for our purposes we can approximate to 'ten times bigger'. Further, it is also exponential. Which mean that one order of magnitude is 'ten times' more, two orders of magnitude are 'a hundred times' more, and so on.

So that when I say that the Cosmos became orders of magnitude more Cosmic, I am saying something quite specific and something also quite profound.

And that, in a certain sense, is what I am also hoping to do with my hypothesis.

So now let's present the presentation.

In Episode 35 I attempted to show just how large and bizarre and improbable the Universe is. Because, first of all, by all rights said Universe should have either canceled itself out or collapsed upon itself moments after the Big Bang. But it didn't.

But it's not just the strange, and still entirely unexplained, fact of its existence. It's also the miracle of fine tuning. That 1 in 10^{50} or 1 in 10^{100} or whatever chance that the multiple parameters of Physics would work out so precisely that, for instance, any elements heavier and more complex than Hydrogen and Helium would even have a prayer of existing. And while I'm on that, let me also point out that if these parameters were tweaked ever, ever so slightly, then the strange fact that Carbon can easily form all of those bonds with all of those other elements would no longer be true. And that then not even simple organic molecules, let alone anything approximating life, could exist.

Anyway, I then went on to explain how the various constraints of Physics and Astronomy and Geology conspire to make it extremely improbable that a life supporting planet such as Earth could exist. And here, just to remind you, is a short list of those constraints: 1) For large sections of this and other galaxies, gamma rays and other high intensity radiation make the presence of life impossible. 2) For other large sections, there are not enough of the heavier elements in the interstellar dust which could produce terrestrial style planets. 3) Stable yellow stars like our Sun make up only 3% of the total; relatively cold red dwarfs make up 70%, and most of the rest are either cold brown dwarfs or large and very short lived stars. 4) More than half of all stars are in multiple star systems, which then create problematic gravity dynamics. 5) Although exoplanets now appear to be relatively common in our small part of the galaxy, the vast majority are in systems so bizarre as to raise more questions than they answer.

And then there are all the unique circumstances which we know are specific to the Earth: 1) It has a clear Nitrogen atmosphere, with just enough Carbon Dioxide to provide the essential ingredient to kick start life, but not enough to create a runaway green house effect. 2) A magnetic field strong enough to deflect cosmic rays, but not so strong as to poison life all on its own. 3) Plate tectonics, which serve to both provide possible heat for the initial creation of life, and stable continental shelves for life to ultimately crawl out on to. 4) A moon that is big enough to both stabilize the Earth's wobble and prevent it from only facing one side towards the Sun, yet not so big that its gravity produces too many tidal effects, etc.

And the lists can go on and on. And that's not including all of the possible constraining parameters that we're not even aware of yet. After all, just a few short years ago we didn't know how critically important the Moon was.

So that, in a truly Cosmic sense, the odds are overwhelming that the Earth really is special.

Then in Episode 36 I went over all of the biological constraints which argue against the notion that Life is somehow quick and easy and therefore likely to be found all over the Universe.

First, I pointed out that although life did appear on Earth some 3.8 billion years ago, we still don't have a clear semi-realistic idea of how this happened. A zap from a lightning bolt doesn't do it. Hydrothermal vents are almost definitely way too hot and way too unstable. And the fact that in the present day certain microbes have evolved to survive in all kinds of extreme environments doesn't at all make it remotely follow that the original kick start for life could therefore have happened in an extreme environment.

Second, I pointed out that for at least the next two billion years, life was quite 'happy' to stay in its microbial state, lazing in the sun and able to convert all that sunlight into life supporting energy. Oh, and by the way, the thought that photosynthesis should be able to exist as a chemical process—in other words, that the energy of a certain wavelength of light could be chemically converted to biological energy so that it could support life—that's another one of those bizarre one off improbabilities that you wouldn't guess at from just looking at a Periodic Table.

And the overwhelming, overwhelming probability is that life should have never progressed beyond the microbial. But at some point, on some fine day, one microbe found itself inside of another microbe. And somehow the two microbes then symbiotically co-evolved. And that's how the much, much largercomplex cell was formed. Further, because of the genetic evidence biologists now know for certain that out of all the gazillions and gazillions and gazillions of microbes which existed for those billions of years, this freakish co-evolution must have only happened exactly once.

But once it did happen, those new much larger, much more energetic complex cells, they just sat around for about a billion years. And once again the overwhelming probability is that life should have never progressed beyond the single cell stage. After all, single cells were perfectly adapted to the environment. We still have zillions of amoebas and paramecia and the like inhabiting the entire biosphere. Just like, for that matter, we still have even untold gazillion more microbes still inhabiting every environmental niche possible.

And although it is easy enough to conceptualize multiple identical single cell organisms banding together to form colonies, try anthropomorphosizing with me for a moment and imagine how weird it would be in a world of single celled, quite sufficient in themselves, organisms to embark on the ridiculously complex journey of differentiating themselves in order to form multicellular animals.

Nonetheless, around 600 million years ago the first multicellular animal, the sponge, did first appear. And I say 'around' because there is still some debate about the date. And, for that matter, whether or not the sponge was indeed the first multicellular animal. Whatever the case, however, the period from around 600 million years ago to around 540 million years ago is now called the Edicarian. And although the sponges just sort of hung around without evolving further, there was kind of a mini-explosion of all sorts of Edicarian creatures. Now these were creatures so strange, resembling tubes, discs, bags, and quilts, that paleontologists still aren't even convinced that they were animals. And at any rate they all died off by around 540 million years ago.

And at that point came the Cambrian Explosion.

Now again I should point out that at the present time there is still a lot of controversy about how explosive this explosion was. And I have to admit that I'm not enough of a paleontologist to know how much of this is a function of 'real' evidence and how much is a function of people whose ideology refuses to let them accept the fact of a true explosion. But even those who pooh pooh the idea of a radical break still have to admit that 540 million years ago a huge expansion of form, function, size, and distribution of the animal kingdom did occur. They still have to admit that as of yet no proposed 'trigger' comes close to explaining how this occurred. And they still have to admit that around twenty million years later the world of life looked utterly different. In other words, a step-change had taken place.

Now 'step-change' is a British term which is usually used in business or politics, and refers to an abrupt change in the way things are done. It derives from 'step function', which is used in math to denote a function whose value changes abruptly. And I am using it here as a more accessible concept than 'punctuated equilibrium', which is the term which the paleontologist Stephen Jay Gould coined in order to explain the Cambrian Explosion and other similar events. And I am also using it more broadly to signify a point at which something new and qualitatively different occurs.

You see, natural selection is all fine and dandy when you are considering regular day to day existence. Random mutations do occur. Most of them do make the organism less fit. A rare few of them make the organism more fit. And at the end of the day each and every organism is up against

each and every other organism. And they are all up against the harsh parameters which the uncaring outside world presents. Hey, we're not living in the Garden of Eden. I get it. The concept is not that difficult to grasp.

The problem, however, is that everyday do-de-do slow and natural natural selection does not in fact explain events like the Cambrian Explosion. It doesn't really say anything about step changes.

And step changes are what I want to talk about. Because we can argue about, given all the astronomical constraints against an Earth-like planet, whether the formation and existence of the Earth itself was a step change in an otherwise cold, dead Universe. But it is hard to argue against the idea that the creation of self-replicating life itself, those 3.8 billion or so years ago, was indeed a dramatic step change.

Similarly, the co-evolution of that first complex cell 1.8 billion years ago, or whenever, was an obvious step change. And of course the Cambrian Explosion 540 million years ago, when highly differentiated multicellular animal life basically burst forth out of nowhere, that was yet another step change.

Okay. So here, finally, is my hypothesis: Right now we are right smack dab in the middle of another step change. And, in a word, that step change is Consciousness.

Now you'll recall that in an earlier episode I pointed out the foolishness of 18th Century people believing that merely by hypothesizing the notion of 'matter that thinks' that this somehow made the notion true. And how at this point in time, over two centuries later, no one has yet to come up with even a semi-plausible model of how such a process could happen. And how nonetheless virtually everyone working in science assumes that this is indeed the case.

Well, for the purposes of this discussion I don't care if we have spirits or souls, or whether matter can indeed think, or whether or not the Universe is some cold, dead, gigantic blob. No, what I am wanting you to do right now is to acknowledge that human consciousness is a qualitatively different, game changing, brand new, big mother-frigging deal. As we know it now, it was very likely not here twenty thousand years ago. It was definitely not here a million years ago. And, as they say in the geology business, a million years hardly even amounts to a flick of the wrist.

And in case my one word description of the step change—Consciousness—isn't sufficient for you, here, in no particular order, is a list of human traits which are either qualitatively different from and/or at least an order of magnitude different from, all that has come before:

Walking upright. Language. Intelligence. Culture. Teaching others. Hypersocial behavior. Reflection. An appreciation of Truth and Beauty. Art and Music.

And this list doesn't include the various other unique human characteristics which I'll be covering later on. Because of course we are primates, and of course we share a lot of DNA with chimps and gorillas. But what is going on right now is ridiculously different from the world of the great apes. What is going on right now is a mystery that, as far as we know, the Universe has never seen before.

Okay. Now while you're absorbing that concept, let me make the extremely important clarification that I am not saying that we have just gone through a Cambrian moment. No, what I am saying is that right now we are smack dab in the middle of a Cambrian moment. And what does that mean? Well, for one thing it means by definition that I don't have a clue as to where this is going to end up. And neither do you. And neither does anyone else. Partially this is due to the plain fact that we are limited to the intelligence and the consciousness that we have presently attained. I mean, a five year old can't predict or imagine differential algebra. Nor should we limit ourselves to what I call the New Age Fantasy and/or the Techno Utopia Fantasy. And, just to give you an idea of the limitations of our predictive ability, not to mention the state of flux that we are in, let's take a quick trip to the Burgess Shale.

Located 8000 feet up in the Canadian Rockies, the Burgess Shale is a geological formation which is famous for having preserved even the soft body parts of all sorts of strange creatures which lived during the Cambrian Explosion. And the word 'strange' doesn't do this formation justice. In fact, I suggest that you google something like 'weird creatures of Burgess Shale' just to see for yourself. It's fascinating stuff.

And at present scientists argue whether these creatures were in phyla—that is basic categories—which came and went. Or whether they were in some way related to phyla which exist in the present day. Either way, though, the point that I am trying to make here is that if you had witnessed the ocean floors during the Cambrian Period you wouldn't have had the foggiest idea of how everything would

eventually pan out. Or even how the basic morphology of arthropods, chordates, etc., would ultimately look.

So that's one aspect of our profound ignorance of where this is going. And here's the other obvious one: Nothing that is New in Nature has any guarantee of success. In fact, the vast, vast majority of things which are New in Nature end up failing.

Now I know what might well have immediately popped into your brain. Aha! Climate change. Killer robots. Mass pandemics. And, yes, all of those things are possible. But what I'm talking about goes a lot broader and deeper than that. Because, as I've been intimating throughout, the whole reason that I'm doing this podcast is because I am so concerned about how tenuous our grip is as we sit here on the cusp of whatever it is. Because there are many ways in which this little experiment in consciousness can fail. But probably only one way, if that, in which it can succeed. And if there is one thing which is pretty certain, it is that our present course, of childishly wanting more, more, more, and of thinking that fulfilling desires is somehow going to make us happy, besides being just dumb and wrong, it is also a sure fire recipe for extinction.

But here's another, more positive aspect to contemplate: Even more so than those bizarre creatures found in the Burgess Shale, consciousness is an overwhelmingly weird phenomenon. And part of that weirdness is that consciousness also contains within itself the ability to perhaps actually do something about its evolution. And, again, when I say that I am not imagining some airy fairy New Age existence of rainbows and unicorns. Nor am I picturing a science fiction future of conscious computers leading us into the bliss of the inflection or the singularity or whatever. If anything, such visions just show us how unimaginative our thinking is. It reminds me of how around the year 1900 pneumatic tubes—which are still used at the drive up window at your bank—were a new and exciting technology. So that when people back then predicted what they thought the 20th Century would be like, they envisioned giant, vast networks of pneumatic tubes. And, on the other hand, absolutely no one foresaw the mass production of the automobile.

Thus, what I am trying to say with this hypothesis is that something exceedingly strange *is* happening here. And what it is *ain't* exactly clear. Which is all the more reason why we have to be extra careful. Extra slow. And dial it all back.

Or die.

So that's one major takeaway from this hypothesis. But a good hypothesis also sheds light on other questions which weren't necessarily the focus of the original hypothesizing. And this is also true with my Cambrian moment.

Because throughout history the answers to the question, 'What is humanity's *real* nature?' have always been all over the place. For instance, are we primarily warlike or are we primarily peace loving? Are we primarily selfish or are we primarily altruistic? Is our basic sexual programming to be loyally monogamous or is it to be wildly promiscuous? And to all such questions one can readily come up with any number of anecdotes to support either side in the debate.

But with this hypothesis, with an understanding that the present era is just humanity making its muddled way through the middle of a paradigm changing step change, then the answers to these essential questions become much easier.

As an example, take the selfishness/altruism argument. Because, as the last episode showed, the evidence before us is pretty clear that we were already hypersocial animals when we were in late Paleolithic villages or tribes of 150. And that the advent of Civilization less that ten thousand years ago moved the hypersocial needle that much further. Now it is difficult to argue against the idea that altruism is an absolutely necessary trait for hypersocial animals to have. On the other hand, throughout the rest of the history of multicellular animal life, for each individual critter out there, it indeed was eat or be eaten. So the biologists are right when they say that 'selfishness' does pretty much describe the animal kingdom. But selfishness is also prima facie counterproductive in a hypersocial animal. And thus it is pretty easy to conclude that for humanity the road that we are traveling on—the trend line, as it were—is clearly pointing from selfish to altruistic.

Likewise, if we want to examine the question as to whether humans are innately warlike or innately peaceable. Because it is difficult to see how a hypersocial superorganism could exist without its inhabitants being peaceable. So that, again, it is pretty obvious which way the arrow is pointing.

But being here in this Cambrian moment also means that we are only semi-evolved. In other words, we are kind of like a baby bird pecking out of its shell. Which means that right here, right now we aren't *innately* either one or the other. And, as I've been kind of intimating throughout, it has been the function of what I have been calling Classical Civilization to help make sure that our altruistic and peaceable natures were maximized and our selfish and warlike natures were minimized.

On the other hand, it's pretty easy to imagine how the needle moves when we are living in a Postmodern culture which both assumes innate selfishness and also glorifies the indulgence of the Self.

Which means that, once you add up and then subtract everything, most of us in practice are sometimes acting selfishly and sometimes acting altruistically. A mix of calm and anger. Clarity and confusion.

And we'll be revisiting this idea as we go through the upcoming episodes which deal with more of the particulars that recent science has found out about the human condition. Because among other things it will also help explain how wildly differing ideologues can all claim that 'science' is proving themselves to be correct.

So that's at least two important insights that you can take away from this hypothesis. And if I may say so, if true this hypothesis certainly does qualify as a Big Idea. And I at least think that there's a lot of circumstantial evidence which is highly suggestive.

But none of that means that I've proved it.

For instance, you could bring up the Bayesian Inference angle. After all, what are the odds that this little moment in time just happens to be a one in 500 million year occurrence? Which is actually a good point. On the other hand, I could turn the anthropic principle around, and point out that, damn straight, the arrival of consciousness out of nowhere *is* a once in 500 million year occurrence. So that of course those first self aware creatures—namely us—would end up noticing it. And that the only reason that it has taken this long for someone to notice it is because of the ideological straitjacket that we have all been in.

Anyway: There, I've presented the hypothesis. You can believe it or not believe it, accept it or reject it. If you accept it, then it pretty much means that something Awe Inspiring and hugely Meaningful is going on. Something much, much bigger than you. Or me. Or politics. Or Lady Gaga. Or even religion. In fact, if true this is probably the Biggest Idea Ever. After all, of all those trillions of stars out there and in all those billions of years, this could plausibly be the first time that Consciousness has burst forth.

Further, the idea that this Cambrian moment has definitely started, but that it is nowhere near finishing, should also be a profoundly paradigm shifting mind bender. Because who of us out there is so far gone that they wouldn't be curious enough to want to keep the experiment going and find out where this is all heading?

But here's the thing. Because even if I haven't proved my case, even if you reject the hypothesis, then that's okay, too. Because your acceptance or rejection of this idea has nothing to do with the truth or falsity of the rest of this podcast.

And to the rest of this podcast we will be going now. For it is now time to pick up the thread where we left off. Namely of our being that hypersocial animal. And so now let's start seeing how this hypersociability has given us certain traits which are entirely opposite from those 18th Century musings about the metaphysical importance of the individual Self.

Including some traits which, superficially at least, and also given our ideological programming, might seem highly disturbing.

But to find out what I'm talking about, you're once again going to have to wait for next time. Because for this time, once again, I'd like to thank you so much for so far having listened.