

Not 42: The Real Meaning of Life, the Universe and Everything!

Intro: What is the true nature of reality? What matters, and why? In Douglas Adam's wickedly funny book, *The Hitchhikers' Guide to the Galaxy*. The answer to the question of the meaning of life, the universe and everything is... 42. In this series of podcasts, we are going to discover the real meaning of Life, the Universe and Everything.

Episode One: The Ultimate Truth

If you're an old cynic like me, you might feel there is good reason for doubting grandiose claims like "this podcast will change your life", or, as in my case, "this podcast will explain the meaning of the universe, and what it means to be human". You might reasonably think that the opening you've just heard is a trick to lure you in and get more hits or reviews or whatever it is podcasters want from their work – I have written other things, but this is the first time I've written a podcast. Or maybe you think that no one knows the meaning of life so I can't possibly explain it, and who knows what it means to be human anyway. We'll discuss the origin of meaning in the universe in Episode Three when you will meet the intriguing, and mysterious creature I've called Nova, an animal I'm going to claim was the most important ever to have lived, and in Episode Five you'll find out about a meeting, a meeting that took place between David and Jane, which I want to say was the most important in human history, because it led to a deeper understanding of what it is to be human, including the fact that human beings have not one but two sex drives. We'll find out about this surprising revelation in Episode Seven. When you've listened to them you can decide for yourself whether you think I've achieved what I have claimed.

At this point you might be wondering why it is that if Nova, and that mysterious meeting were so fantastically important, you don't know about them already, why doesn't everyone know? It's a very good question, and the answer is... Well don't ask me, I don't know. The best answer I've been able to come up with is that we think we know things are true because it's what we are taught at school and because there are things that everyone knows. In other words, there are assumptions that are embedded in our culture, and while most of those assumptions might be true, some of them may not.

Historically, cultures have had built in assumptions that were obviously wrong. When the Ancient Egyptians mummified their leaders, they scooped out their brains and discarded them while the much more precious hearts, which they believed contained the soul, were left in the body and other organs were preserved in special receptacles called canopic jars where they were protected with magical spells. They had no idea that they had thrown away the important bit. Some South American cultures thought that in order to guarantee good weather and harvests they would have to pacify their gods by sacrificing their children to them. Strangely, or not, we can now forecast the weather with a reasonably high degree of accuracy without ever bothering to tot up the number of sacrificed kids. All cultures make false assumptions about reality, and it would be very odd if ours was the only one that didn't. I have a degree in philosophy, but I can't claim to be a professional scientist or philosopher, that said, I have spent most of my adult life trying to disentangle myself from our own cultural assumptions so that I can get as near as I can to the ultimate truth. That's all; that's that's driving this. All I've ever wanted to know is just what's true.

This series of Eight podcasts will take you on a journey to the best possible explanation of meaning in the universe, and what it means to be human. For reasons that will become clear, the engine powering this journey will be science, and the path we will follow will be determined by reason and evidence. The path will not be easy, and for some it might be controversial, for others perhaps, controversial will be an understatement, but science has developed to a level where a clear path has emerged, and its direction is clear.

At turns along the path, different visions of the universe, and what it means to be human will appear, like grand vistas opening before us, although it must be said that the path fades at one particular point, because science does not yet have all the answers we need. We'll consider that problem in Episode Four. When we get to Episodes Six and Seven we will discover why that mysterious meeting was so important, and finally, in Episode Eight, we will know enough about what matters in the universe to be able to ask what really should matter.

The destination of this journey may, or may not, be the one that you, or I, would like it to be. But none of this has anything to do with me, or what I want, or believe. If it is, then I have failed completely in everything I have set out to do. My aim has been to base the ideas on those that any moderately intelligent, rational agent like you or me, *would* find when they judge the case on the evidence before them. Whatever your beliefs, hopes, and understandings might be, I hope you will find your journey stimulating and enlightening and that the visions revealed along the path will make your journey worthwhile.

This first episode is about truth. But is there such a thing as truth? And if there is, can we know what it is? At this point you might be forgiven for thinking that there are things we can all know. I know what my name is, what the year is, where I live etc. but what can we know that is absolutely true without any and all doubt? This question was explored by the 17thC French mathematician and philosopher Rene Descartes. He observed that sometimes when he was dreaming, his dreams felt real. Was his dream world real, or the one in which he thought he really was living in? He went on to imagine that there could be an evil demon that was deceiving him about the existence of everything around him, even his own body. If I follow Descartes' reasoning and the universe is effectively a figment of my imagination, how can we answer the question of the meaning of life, the universe and everything? I mean, if he was right, and everything might be a dream, how can we even know we exist?

Fortunately, Descartes had an answer to the question of whether he existed. And, for me, what he did was a stroke of genius, and one of the greatest philosophical insights of all time. Because Descartes knew he was thinking, he realised it would be impossible for the evil demon to be tricking him about that, because if he didn't exist who was the evil demon tricking? This argument, in Latin, "Cogito ergo sum", or in English "I think therefore I am" is probably the most famous aphorism in philosophy.

Here I need to say that, there are philosophers who have argued that Descartes was wrong, because if he was thinking in words, and words are part of language, then, because language could only exist for the purposes of communication between people, and because Descartes would have needed to learn a language before he could have even proposed his idea, then he could not have existed in isolation in the way he thought he did, but it was a worthy effort, and because it is such a well known idea, I'm going to use it as a useful starting point, even if it couldn't have worked quite in the way he thought.

There are a couple of similar tropes that philosophers trot out that cast doubt about what we can truly know, for example it is possible my brain is in a vat with wires attached to it, and all my thoughts and experiences are being manipulated by a bunch of mad scientists.

You might think this sounds completely ridiculous, and I might agree, but try and prove it wrong. Another idea was proposed by an 18th Century Irish bishop called George Berkeley who - if I've interpreted him correctly - thought that all that truly existed was him and God. His idea was that the universe was created in his mind by God so that He could communicate with him, presumably part of the reason for this was so that his creator could examine his personal qualities, to determine whether he was good or bad, and to test his faith, in a slightly more sophisticated parallel to Santa's naughty and nice list.

The problem with all these proposals is of course that they are a trap. They block all knowledge beyond my knowing that I exist. Descartes thought that he had escaped the trap because he reasoned that he had a clear impression of a perfect being, and because he knew he wasn't perfect, he thought this impression must be coming from outside of him. And any perfect being would be less than perfect if he didn't even exist, so the perfect being must exist. Hmm, how did he know that the evil demon hadn't planted that idea in his mind? In any case, I might be able to conceive of a perfect football team, but would that mean that it must necessarily exist? This idea: that there must be a perfect being who must by definition must exist, is a version of the Ontological Argument for God, first proposed by another cleric, an 11th century Archbishop of Canterbury, called Anselm. Most philosophers of his period were clerics, partly because then there wouldn't have been many other people who could read and write. I think we can say that despite his intuitions about what is true, Descartes did not find a convincing way out of the trap. In later episodes I'll show why human intuition isn't always the best way of finding truth.

So what can we say that is absolutely and indubitably true? Descartes may not have shown that he existed in isolation, but he did show that something exists, and I know some kind of reality exists, even if it consists only in my thoughts, so let's give this whatever-it-is it a name, I'm going to call it the Omnitruth: the description of all and everything that exists, has ever existed, and will ever exist. The true nature of reality. Anything that is true is part of the Omnitruth. The Omnitruth could be little more than the thoughts in my head, or it could be so immeasurably vast and overwhelming that no human mind could ever begin to comprehend it, and we can't really say which or to what extent either of these possibilities are true.

So, what can we say about it? Well, we have already shown that it exists, and we know it is complex because my thoughts are complex and if the Omnitruth was simple, complex thoughts could not exist, because my thoughts are part of the Omnitruth. But the Omnitruth has a special kind of complexity. Every time I go out my front door it is green, unless of course I decide to paint it; it always opens onto the same street, and if I go to the end of my street, I find it connected to the same street as it did every other time I walked up it. If my thoughts and experienced perceptions are organised, so must the Omnitruth. If you think about it, it is conceivable that all that exists is a jumble of particles that have no order, but if all that exists is a random grey scatter, then I couldn't be thinking because there would be nothing to think about.

And it follows that if the Omnitruth is organised or ordered, there must be something that organised it, whether that something is an evil demon, God or natural forces like gravity. There is an argument that Gods and evil demons need to be organised entities too and they need an explanation for their organisation, but I'll put that to one side. The Omnitruth therefore has an organising principle, or principles. Of course, it might be that the Universe popped into existence already fully organised, but

then the reason that it had to be like that would be its organising principle. We can also say that it is dynamic, because my thoughts change over time. Oops there goes another one: time. But we do need to be careful here, because according to Albert Einstein's theory of general relativity, time and space are two aspects of the same thing, and there is no clear consensus among theoretical physicists – the people who know about this stuff – about what time is anyway, but I'm getting way, way ahead of myself. All I can say at this point, is that it must be omnitrue, absolutely true that I understand myself as experiencing something *like* time.

And that, guys, is that. Sorry, but we simply can't know anything more about the Omnitruth – at least not with complete certainty – than that. It is still possible that I have in some way fundamentally misunderstood something or that I am being deceived in some way about the nature of my existence, and even the existence of you: the listeners of this podcast. I mean I know I exist, but I don't know about you lot, so should I stop now and throw my thought generated hands in the air that I've imagined around me and give up? Well as I don't even know you exist, I could, but then I'd have to say I don't know about Life, the Universe and everything and accept that the answer might indeed be 42.

To move forward from here I need to take a giant leap of imagination and assume that what I am experiencing is real. Except, of course this is not such a giant leap, but a step over a pavement crack. Far and away the most likely explanation for what I'm experiencing is that it has some foundation in reality. What seems to be real just is real. While I can't prove I'm not in the middle of a dream someone's created for me, it seems to me that the idea that my thoughts are being manipulated is pretty ridiculous whether that's by evil demons, mad scientists or erm, God. So we need to make the assumption that what looks real just is real and move on. There just is no way out of the trap. The Omnitruth then, apart from the truths about it that we have already discovered is ultimately unknowable at least in the absolute sense.

It's worth pausing here to think about what we have just done. We have proved there is an Omnitruth and discovered some things that are not merely true about it, they are more than that, they are omnitrue. But we also know that there is much more to learn. Because we have reached this point, using our reason, and the evidence from our thoughts and experience. This seems to be the most profitable way of going forward. Using evidence and reason we can develop a way of thinking that will provide us with the most likely explanation for what is true and therefore the most likely, best match with the Omnitruth. I think that the best solution to any problem will be found by any intelligent rational agent like you or me when they judge the case on the evidence, and this will always provide the most likely answer to what is omnitrue, as long as there is enough of the right kind of evidence available. Let's call this method of thinking Best Guess Reasoning. For those who know something about philosophy, Best Guess reasoning conforms to an idea proposed by a Medieval philosopher, William of Ockham, another cleric who thought that the best solution to any problem is the simplest explanation possible, as long as it isn't too simple to explain it. This way of thinking is called Ockham's razor, because it cuts through to the most likely solution to any problem.

There are those who think that they can find what they call their "truths" through belief, tradition, authority or the wise counsel of great thinkers. The problem with belief is that it often provides contradictory answers to important questions: Was Jesus the son of God, as Christians believe, another prophet, as Muslims think, or a false Messiah as Judaism seems to imply? Traditional ideas might seem comforting especially if they are held by those dear to us, but that does not really imply "truth", as people belonging to other traditions might have completely different "truths". Some might think this a simplistic argument, and it has to be said that many people believe deeply and

profoundly that the universe must have some deeper meaning, which they often associate with God. We'll look at this question in more detail in the final episode, Episode Eight.

And, in respect of valuing the work of great thinkers of the past, many may have been geniuses in providing insights into the way they thought the world worked, but they could not have had access to the scientific knowledge that we have today. While no one thinks science has all the answers, in the rest of these podcasts I will use reason, science and evidence to provide the best guess to that mystery of all mysteries, the true nature of reality: the Omnitruith.

We are now only one step from meeting Nova, and in the next podcast I am going to try to convince you of something that you already know, but perhaps didn't know that you knew.

Thanks for listening.

Episode 2. What you didn't know you knew.

So, where are we? In Episode One, I talked about how we can know what truth is and we showed conclusively that there was an ultimate truth: the Omnitruth, and that we were able to establish a limited number of absolutely certain, if quite generalised facts about it. But we decided that beyond these few facts that the Omnitruth is ultimately unknowable. However, that does not mean that we can't know a great deal about what is true if we first assume that the reality we see around really is real, and if we use what I called Best Guess Reasoning to look at the evidence around us and determine the most likely explanation for what is true. In Episode Three, where we will meet this mysterious being I have called Nova, I said I would begin to explain where meaning came in the universe, and we are nearly there, but first, I want to persuade you of something you perhaps didn't know that you knew.

This episode is about evolution. Now it is possible already know that evolution happened and you won't need persuading, in which case I must apologise in advance for labouring the point. But because the point is key to the case I'm going to make in the podcasts, it is essential for me to establish the extent to which we can say it is true, so I'll try to do it in a sufficiently novel and interesting way, to make it worth your while listening, whether you already knew it was true or not.

If you are near a window, take a look outside. Can you see some grass? Maybe some flowering plants? Both the grass and the flowering plants are likely to have stems and leaves which are green. Both kind of plant will have roots; they grow; and if in favourable conditions they will propagate: they will spread their seed and grow somewhere else as well. Starve them of light or water they will die. In fact, it is obvious that the grass is just a kind of plant that has very narrow leaves and doesn't bother with the extravagance of producing fancy, coloured flowers. Maybe you can see some bigger plants, from your window, some of them might be shrubby, with thicker woody stems. Some of these might be taller and difficult to distinguish from a small tree. Then, perhaps in the distance you might see true trees. They might have broad leaves, like oaks, or needle leaves like pine trees, or maybe scaly leaves like cypresses. But generally, all these trees will have green leaves, all the trees have will have a mechanism for reproducing themselves they'll have roots, bark, and branches and if we looked at them through a microscope, and studied their structure and biochemistry, we would see many more similarities. In other words, there is a clear pattern visible in all plant species, there is a continuum connecting a blade of grass with the great oak tree, and this is obvious to us in our everyday lives.

In the 19th Century the biologist Carolus Linnaeus, systematised the order he saw around him in nature. He gave each different species a Latin name, because Latin was the international language of science. Then Linnaeus put very closely related animals, plants and geological specimens into what he called genera, singular genus. For example, the lion was named, in Latin, "Leo" and grouped together with the tiger, called "tigris" in the genus panthera. He then attached the generic and species names together, so the lion became *Panthera leo* and the tiger, *Panthera tigris*. Other big cats like the jaguar and the two species of leopard were then included into the same genus. Then he created other genera for the other species of cat and included them all in what he called a "family": the cat family: "Felidae". Then he noticed that there were similarities between the cat family the bears, the dog family and the weasel family, so he included all of these families into what he called an order: "Carnivora" the meat eaters. But it didn't end there. All these animals gave birth to live young (they didn't lay eggs) and they nursed their young from a mammary gland, on the ventral part of the torso of their adult females. In other words they were mammals, and like most other

mammals they were furry, and had other specific features such as more complex brains and a distinctive arrangement of the inner ear bones, which meant that they belonged in a more expansive group, a class, the Mammalia, which along with Carnivora, included the ungulates, (cows goats and pigs), bats, elephants, rodents and the primates, the family to which we belong, and as we now know the cetaceans (the whales and dolphins). In fact, there are now nineteen recognised orders in the class Mammalia. Another step up and we get to the phylum. The phylum to which we belong, Chordata, includes all animals with a spinal cord including not only the mammals but the reptiles, birds, amphibians (that's frogs, toads and newts) and the fish. But it doesn't stop there either; all the animals belong to a Kingdom. Within the animal kingdom there are a vast number of invertebrate species (these are animals without backbones) and there are many other kingdoms of living things apart from plants and animals, such fungi and bacteria. Linnaeus would not have been able to build his system had the relationships between all living things not been there in the first place.

He was rather less successful in grouping minerals into appropriate categories and his system is no longer used for them, for the rather obvious reason that minerals are not related to each other in the same way that living things are. Now in that last sentence I used the word related. In fact, as we have already discovered, Linnaeus used the word "family" as one of the distinguishing divisions in his hierarchy of life. But we have not yet reached the point at which we can say that the relationship between animals is familial. That is to say that I haven't yet shown that organisms are related to each other in the way that you and I are related to our mothers, fathers and siblings. This is a question which I am going to put to one side for now. What I hope I have been able to satisfy you of is that there is a clear pattern of physical relationships between all living things, and I'm going to illustrate how powerful this idea is, by telling you a story from my own experience: a true story:

It was a still, beautiful evening and the light was dying a slow, gentle death, as the day faded away. I was on my way back from a writer's retreat in South Wales with some uni friends, when I stopped the car to stretch my legs. I was somewhere in the Welsh borders, and I found myself near a small lake surrounded by trees. It was then it happened. I heard something I had never heard before, it was a loud Cronk sound, and I knew immediately what it was. At that moment I knew I was about to see something I had never seen before, and always had wanted to see. But what was it, and how did I know what it was?

My interest in what it is to be a human being, which led me ultimately to the question of what matters in the universe and why, all began with an interest in animals, especially birds. I don't claim to be an expert exactly, but I have always loved observing them, especially their behaviour, and I do know quite a lot about them, especially British birds. For example, I knew about the crow family: the corvids. Carrion crows and rooks are about the same size, they are both black. Crows are glossier compared to rooks which are shaggier and more angular looking with feathery "trousers" that crows lack. Their tails are a different shape too, but the most obvious feature is the bare white skin at the base of the rooks' bill. Because these birds look superficially similar, I can only reliably tell them apart if they are relatively close and in good light. Interestingly these two species make a similar caw sound, and I can't always tell their calls apart either. Jackdaws are much easier to separate from carrion crows, they are also predominantly black, but noticeably smaller and they have grey shoulders, white irises in their eyes and they make a much more distinctive chack sound, which give them their name. There are more distant members of the crow family, but still recognisably crows such as magpies with their piebald plumage and their insolent chatter, and the brightly coloured European jays with their stubby wings and a horrible, discordant cacophony of a call that seems quite unsuitable for such an attractive bird.

While each of the corvid species has their own appearance and call, they are sufficiently similar so that you can easily see the relationships between them.

It was obvious that the call I heard that evening was that of a corvid, but that cronk sound was much deeper than the call of any carrion crow or rook. It could have only come from one bird, the magnificent king of the corvids, the huge, shy, relatively rare, mountain bird: the raven. When I looked up, I saw what I knew I was going to see: my first ever wild ravens. There they were, three of them, circling above the lake set dark against the dim sky like three great black portentous crosses.

What is the point of this story? Well, the more you know about nature, the more you can see how obvious the relationships between living things are. The depth and extent of the relationships might elude people who haven't had the time, the interest or education to understand nature in depth. Nature is shot through with these similarities to an extent that most people simply do not realise. How many times have you seen a horse with feathers, or a fish with nipples? In fact, nature seems to be made up of these similarities. I didn't need to use the crow family to illustrate the point; I could have talked about the pigeons and doves, the gulls and terns, the finches or the robins and chats. (If you live in America, by the way, your robin is not a true robin, it belongs to the thrush family.)

So what causes animals and plants to have such a clear organisational structure? Why is it like that? There doesn't seem to be any obviously good reason that fish don't have feathers, or that people don't have antennae like bees. Before Charles Darwin explained how he thought evolution worked, it was believed that these relationships were explained as strands of thought in the Creator's mind. The thought here is that God imagined birds, and then He subdivided His thought into thoughts about crows, pigeons and gulls and so on. But now, with the advent of DNA sequencing we can see that all life on the planet shares similar patterns in its genetic structure. If we can prove paternity in disputed legal cases using DNA profiling and we take this as proof of familial relatedness, we can now prove that the relationships between different species of living things are truly familial. The genetic data has proved that all life on earth evolved from an ancestor shared by all living things.

So case proved, evolution happened, Right? Or maybe not, still not convinced?

You would not be alone, there are those, who do not believe that evolution happened. But it is established scientific theory. *It isn't a belief system.* I might say that I believe my name is Peter D. Fisher, but in that case, I'm using a figure of speech. I know what my name is. While this isn't proof that it is omnitrue: There could in theory be a god who made me, and called me George, and I suppose he is entitled to name me, and despite what I think I know, my actual name might be George, and I can't say that the fact of evolution is omnitrue either, but come on, let's just face it I know I'm Peter Fisher, and by the same token and same standards of evidence, I can say I know evolution happened.

Still not sure? Maybe you think the genetic evidence isn't strong enough on its own. Let's look at this in a bit more detail. Let's think about the fossil record, which I deliberately left out of my evidence for evolution. Unlike the relatedness between living things that could, theoretically, have been the result of different strands of thought in the creator's mind, the fossil record does not avail itself of another explanation of being true. If the universe was created in six days and the creator rested on the seventh, as the Bible says, there wouldn't be a fossil record, at least not one that shows organisms changing over time. The only other way we could deny the Omnitruth of the fact of evolution is that we are being tricked. In Episode One I talked about the philosopher Rene Descartes, who invented an evil demon as a thought experiment to prove that he existed as a thinking thing. Maybe it's time for me to invent my own evil demon, let's call him The Great Deceiver. The Great

Deceiver could have conned us into thinking that evolution happened by planting false evidence. If he has, he is very clever. There isn't time to go into too many details of how they know, but scientists know the age of rocks. New rocks are obviously laid down on top of older ones. Lava from volcanos usually flows out over the rocks below it, forming new rock layers, and sediments always form on top of rocks that are already there, so we can see that rock is laid down in layers, in what scientists call strata, typically the oldest rock will be at the bottom, youngest at the top. The Great Deceiver must have known this because he knew exactly what he was doing, he made sure there were no fossils in the oldest rocks, in slightly newer rocks he put evidence of microbial activity, and newer still he made incredibly detailed fossils of small, simple creatures that are almost always completely different from the creatures alive today. These creatures, from what we call the Cambrian period are so strange that the scientists who named them gave them names like anomalocaris (this animal is an anomaly) and hallucigenia (this animal is like a hallucination) – The Great Deceiver could then have put fossils of increasing complexity in newer and newer rocks, that looked more and more like modern animals until he got to rocks of the Mesozoic Era, which is made up of the Triassic, Jurassic and Cretaceous periods, at this point he seemed to get a creativity burst and made fossils of dinosaurs, but then seemed to get bored with them and abruptly faked the evidence of a massive meteorite impact so that it looked like all the dinosaurs became extinct. All that is except the small feathered beaked dinosaurs we call birds. And get this... He created an impact crater a hundred and thirty miles in diameter, near Chicxulub on the Yucatan Peninsula in Mexico, and buried it in newer rocks and sediments so it looked as if it had been there for over sixty-five million years. The devious old scoundrel must have known that geologists would come along looking for oil in the area, and that they'd find the compacted and pulverised rocks that make up the crater. From then on, he put more fossils in the rocks until the most recent rocks where he made fossils of beings in which it is hard to say whether they are animal or human. If the great deceiver really does exist, he's not just clever he is incredibly industrious too. Most people will have seen pictures of the famous White Cliffs of Dover. These are made of chalk, and something like three hundred feet high. If you look at chalk grains under a microscope you will see... well... grains of chalk. If, however, you look at them at a much higher resolution in an electron microscope, they are revealed as the fossilised remains of tiny shelly sea creatures. The chalk downs of England cover a large part of the south east of the country, and would have spread across into France, until the English Channel opened and cut the French downs off from those here in England; so there must literally be trillions of these tiny fossils across this vast area. I don't know what you think, but I think it is amusing almost to the point of hilarity to think of The Great Deceiver spending all that time making all those tiny little fossils and dropping them into place with a microscopic pair of tweezers.

Let's get real. With the utter superabundance of evidence written into the fossil record, and other evidence that doesn't come from genetics or the fossil record, which I haven't been able to include in this short podcast, the case is massively beyond overwhelming. Evolution happened. The evidence does not allow any other interpretation, or as the evolutionary biologist Theodosius Dobzhansky put it, "Nothing in nature makes sense except in the light of evolution". Which only leaves two options, people either have to accept that evolution happened or believe in the Great Deceiver.

Why is this important? Well, in his book, with the provocative, but accurate, title of "Darwin's Dangerous Idea", the philosopher, Daniel Dennett, described the idea of evolution by natural selection as "the single best idea anyone ever had." We have known about this for more than a hundred and fifty years, now, but the full implications have not yet filtered into the groupthink of mainstream thought. It's my belief that our cultural assumptions have not yet been fully updated.

Please don't be misled by the term, Best Guess Reasoning. This way of determining truth is nothing to do with any kind of wild guess, or any kind of guess at all. It's just that I couldn't think of a better term. Best guess reasoning can give us truths, such as what my name is, the fact that here on earth heavy things fall downward, and the sun will rise tomorrow morning. Truths like "evolution happened" sit comfortably in that class of knowledge. And I can say it's true, or my name isn't Peter D. Fisher. But then you already knew that it had happened didn't you, because you can see the evidence all around you every day?

There are those who will never accept that evolution happened. Some of them think that if it happened it somehow diminishes us: that we are lessened somehow, that evolutionary theory robs us of something essential and reduces us, because if it happened, they think, we are just mere animals and there is no sense in which humans are special. They are misinformed! In the next episode you will meet Nova and find out how spectacularly wrong that argument is.

See you in the next episode, and thanks for listening.

Episode Three: The Nova Point

Welcome back guys. This is a big one. Ready?

I said that in this episode I would tell you about Nova, and to start with her description might sound, to say the least, a little underwhelming. She would have looked decidedly unprepossessing to human eyes. (She could have been a he, but we might as well stick with she, for the purpose of our story.) Nova would have been a simple little sea creature, at most, probably only a couple of inches long. She might well have been a wormy, squirmy little thing that wriggled in the muddy sediments on the floor of an ancient, primeval ocean. It would have been far from obvious that this unremarkable and distinctly uninspiring creature was far away the most important animal ever to have lived and perhaps will ever live, nor would it have been obvious that she had just profoundly, and fundamentally, changed the Universe.

Nova's appearance in the world was a magical moment, not magical in the sense of it being spooky or supernatural, this was real and on that account so much more impressive. Without Nova nothing could ever, would ever, have been important. Because of her, there would ultimately be love, hate, good, bad, right and wrong, the wonder in nature, the arts, poetry, music, literature, the joy of dance: in short, all the things that matter in the universe. You see, Nova was the first animal to have an inner experience of something, and although that something could have been fleeting and weak and we don't know what it was, she had crossed what I am going to call The Awareness Horizon.

There are many things we can't say about her, but what we do know is that Nova certainly existed and that she was our direct ancestor. There is some evidence that Nova lived early in the history of multicellular animals, very early, perhaps around 600 million years ago. Yeah, you heard that right – over half a billion years ago. If so, this would have been a time, before the Cambrian period we mentioned in the last episode. If you remember, this was the time when spectacularly weird, little animals lived; creatures so unbelievable they were given names that reflected just how bizarre they were. If she did live before the Cambrian it would have been in a time we now call the Ediacaran. The evidence I alluded to, is more suggestive than conclusive, and, as we'll see, there is good reason to doubt this timeframe. But we know that because our earliest ancestors would have had no nervous systems and, we believe, could not possibly have had awareness of anything, at some point in the ancestral lineage that ultimately led to the appearance of our species there must have been a creature that crossed the Rubicon. This animal evolved the capacity for simple awareness: it had the sense of some inner feeling.

Before Nova, everything we seem to know about the Universe suggests that it was completely soulless and mechanistic, just moving particles and the forces of nature. This extraordinary creature changed all that.

Let's think more about what I mean by mechanistic. Think about a petrol engine. This is a very simplified account, but petrol/gasoline, is pumped along a pipe into the carburettor which mixes it with air and blows it into a cylinder where it is compressed by a piston, which rises from below. When it reaches the top of the cylinder, the top of the piston forms the base of a dome shaped chamber called the combustion chamber. At this point the fuel/air mixture is ignited by a spark from a spark plug, so there is a small, controlled explosion which drives the piston back down the cylinder. As it goes down it pushes on a connecting rod which in turn turns a crankshaft so that the up/down motion of the piston is translated into the rotary motion of the crankshaft (think of how the up/down motion of a rider's leg on a pedal cycle is converted into the rotary motion that turns the

wheels.) The turning of the crankshaft is transmitted through the clutch and gears to the road wheels. Everything that happens in an engine works fully according to the laws of nature. There is nothing good or bad about this system, you could never draw deep philosophical insight from it. It is just doing what the laws of nature tell it to do. And so, I want to argue, this is how the universe must have been before Nova.

The idea of a mechanistic universe can be a deeply disturbing one, and one which seems to work counter to the way we think about the way things are.

Let me explain: I remember in biology class at school learning about the paramecium, a single celled aquatic organism, and therefore one much simpler than Nova must have been. I recently came across this passage in the nuclear physicist, Roger Penrose's book, "The Large the Small and the Human Mind", "...a paramecium, a one-celled animal, can swim towards food, retreat from danger, negotiate obstacles and, apparently, learn from experience." End of quote. This little sentence is revealing in three ways. Firstly, on the level, Penrose presumably intended, it tells us something interesting about how responsive and complex the paramecium is, despite the fact that it is just a tiny cell barely visible to the naked eye.

Secondly it implies something about Nova, because I have said that she was a simple creature, and by modern standards that is certainly true, but if much simpler creatures like paramecia can behave in such complex ways, and we do not yet fully understand how they do it, then Nova herself would have been a massively complex entity. Remember that although the six hundred million years or so that have passed since Nova lived is an enormously long time, life had already been evolving on this planet for some three billion years before this. Such enormous complexity, even in single celled creatures, should not therefore be too surprising.

The third sense, in which the sentence is revealing, is that it might be argued that what it says is complete rubbish. We would never say that the piston in an engine has achieved success in reaching the bottom of the bore and turned the crankshaft. It is a lump of metal, what are we going to do? Give it a medal? There is nothing wrong with saying the paramecium can swim towards food, that's just a statement of fact, but it certainly couldn't retreat from danger, because danger implies something bad, and in a mechanistic universe nothing ever could be good, or bad. If a system is mechanistic, it is entirely value free, unless we mean arithmetic values like the number of paramecia in a given volume of water for example. A paramecium cannot negotiate obstacles because an obstacle prevents one reaching a goal and a creature that has no sense of its own existence cannot possibly have a goal in the sense that we usually understand it. The paramecium could not have actually experienced anything from which it could learn, because it almost certainly can't experience anything at least not in the way that we, in our post-Nova universe, can. I'm not arguing that the paramecium can't do what Penrose says. They act *as if* they are doing those things. We know that the electrical state of the paramecium's cell membrane changes in response to environmental stimuli. So, as I've implied, it must be possible to cash out the paramecium's behaviour, mechanistically, in terms of electro-biochemical processes. Unlike simpler single celled organisms like bacteria, paramecia are made up of what are called eukaryotic cells. The cells that make up your body, my body and would have made up Nova's body, are eukaryotic too, these cells are much more complex than those of bacteria, in fact extraordinarily complex each with its own little power plants, machinery for reading DNA instructions and tiny protein factories. Even so Penrose's sentence was loaded with value judgements which are not really compatible with a mechanistic universe.

I hasten to add here that I have no criticism of Penrose's use of these terms, pretty much everyone does it, even greats like Sir David Attenborough, and Richard Dawkins, talk about animals competing

with each other for success in the battle for survival. Charles Darwin himself did it. In Dawkins' case I know his work very well, and I knew that he would know that this way of speaking is metaphorical, but just to make sure – for the purpose of these podcasts – I met him and asked him, and he does. He suggested that there is something about being human that makes us want to use metaphor in this way, which chimes very nicely with some of the ideas that we will come to later in this series. I have tried to approach Sir David Attenborough through an intermediary, to ask him the same question. I don't know if he ever saw my letter, and I wasn't hopeful of receiving a reply anyway. So far, I have not heard anything.

Perhaps the most important example of a mechanistic system in nature is natural selection: the mechanism Darwin proposed to explain how evolution works. Darwin, though, did not come up with the idea of evolution; many scientists including his grandfather, Erasmus, were evolutionists, and the idea of animals and plants changing through time can be traced right back to an Ancient Greek philosopher with the rather wonderful name of Anaximander. What Darwin did was to show that change could happen as a result of natural processes, and given enough time, all life on the planet could have evolved from a common ancestor. In other words, the medieval philosophers were wrong to think you needed God to explain the organisation we can see in nature that I described in Episode Two. There was a natural process that could do it instead. If this makes nature sound cold unfeeling and calculating, it all got a lot worse in 1976. This was the year that Richard Dawkins published his bestselling book "The Selfish Gene". Dawkins was trying to resolve a technical question about what natural selection was actually acting on. Were individual organisms competing with each other, or was it groups of animals, or even species that were in competition? At the time there was a lot of confusion about this. But building on research by another evolutionary biologist, W D Hamilton, Dawkins showed that selection was actually acting on genes, and this view is now almost universally accepted. The way he put it was that genes build bodies, as survival machines, to help themselves get into the next generation. As you can imagine this idea generated a lot of attention, and not just in the scientific community, because it seemed to point towards the idea that if selfishness is natural then it might be a good thing, although this isn't what Dawkins said, and according to his subsequent comments it wasn't what he meant either. But this does imply something deeper, which I don't think is universally understood. If natural selection is a mechanistic system, then if an organism, whether plant, fungus, bacterium or animal has a particular genetic makeup that helps it get its genes into the next generation then its genes will still be here. That's it. It is not good to survive in mechanistic universe, nor is it bad to die, it is simply a statement of fact that some animals and plants are still here, and some aren't. The piston is either at the top of the bore, or the bottom, or in between. In a mechanistic universe, nothing matters, nature just *is*.

When Penrose and others talk about animals competing, they are speaking metaphorically, in such a way as to make their point intelligible. I have no problem with this; indeed, it is essential, how else could David Attenborough have illustrated the extraordinary wonder of nature in his documentaries if he hadn't added fire into his prose by talking about animals competing, winning and losing, fighting and dying? It seems unarguable that we human beings need stories we can relate to in order to make sense of systems that themselves have no sense of anything. The way leading scientists and communicators structure their arguments tells us less about them, and more about what it is to be human, as I've implied, we'll come to that insight later in the series.

Ok, let's speculate about what might have happened when Nova arrived in our universe. Unlike the paramecium, she would have had a nervous system: a series of connected nerve cells, neurons. In the case of her immediate ancestors some instinctive biological process would have guided them unconsciously towards food, then other instinctive processes would have kicked in allowing them to

consume it, not unlike the way we think the paramecium does it. Nova was different, she had a mutation in her genes that meant there was something about her nervous system that gave her the ability to experience a flickering, fleeting muted sensation of something in her nascent “mind”. Perhaps it was something like pleasure so that she “chose” a more nutritious food in preference to one that wasn’t as nutritious. Maybe the shadow of a predator passed over her and she had a negative sensation so that she wriggled her wormy little body away from the threat. Whatever it was that she experienced had to be enough – and this is important – to change her behaviour. Eating the more nutritious food, or avoiding the predator meant that natural selection could kick in, enabling her to survive and pass on the mutation to her offspring, and with the advantage the mutation had given them, they too would pass on the capacity to “feel” something to their descendants. It seems clear that there was advantage in having stronger and stronger and more lasting feelings so that the capacity for feeling increased in Nova’s genetic lineage, which is of course the same genetic lineage as yours and mine. Crossing the Awareness Horizon gave the universe a new dimension: a world of feeling. For the first time things began to matter in the universe and for that reason the universe itself began to matter.

I have already introduced two new ideas (or at least redefined old ideas) in these podcasts: the Omnitruth and best guess reasoning. The Awareness Horizon is by far the most important and takes us as close to the meaning of life the universe and everything as it is possible to get, with the current level of human knowledge. When Nova crossed the Awareness Horizon, she began the process of giving meaning to the universe, but it also implied something hugely important about the way we humans relate to the world in which we live. Think of it like this: Nova crossed the awareness horizon by rising above it. But it is possible to look down through it. You can imagine the Awareness Horizon as a floor on which all animals since Nova have lived, each animal, living above its horizon in its own world of feeling, unknowingly behaving in such a way as to maximise its chances of survival, and to pass on its genes. None of them aware of the heartless mechanistic underworld – yes, it is still there – beneath their Awareness Horizon “floor”. All animals that descended from Nova just follow their own feelings about what they should and should not do; they have their own value systems: food and sex good, predators bad etc., and in more complex animals a panoply of different emotions such as love of their partners, parents and young ones. If you object to my use of the word love in relation to animals, it will become clear why I’m doing so in Episode Five. As we saw in Episode Two, we evolved, we are animals. If a mechanistic universe is disturbing, the idea that, if we are animals, we too will have our own Awareness Horizon is also disturbing and perhaps even more so. We’ll find out what this means for us in our final episode.

There are some caveats to the Nova story: four I can think of. We know that there are billions of stars in our own galaxy and billions of other galaxies in the wider universe, and recent evidence suggests that many stars, if not most, or all, of them, have their own planets, or as they are properly called exoplanets. Sentient life – living things with feeling – may well have emerged on many of these billions of exoplanets before it did on earth, so my claim that Nova was the first animal to cross the Awareness Horizon in the entire universe is probably an extremely doubtful one. It may be that Nova didn’t make the universe matter; she might only have made *our* world matter. Well, I don’t know what you think, but that’s good enough for me.

The second caveat is that I need to point out that there are those who think that all living things, and perhaps even non-living things, have mind or some mind-like character. While it is true that plants, fungi and many other organisms do communicate with each other there is no good evidence, I know of, that they do so knowingly, so I’m going to put this idea, which is called panpsychism, to one side because, without evidence, it does not pass the Best Guess Reasoning test. Animal experiments have

suggested that crustaceans, like crayfish and hermit crabs probably have some level of feeling, and there is extensive evidence of very complex behaviour in cephalopods: creatures like octopuses, suggesting that they probably have some kind of inner awareness too. There is no evidence at all that this is the case in other simpler animals, let alone plants and fungi.

Next, I have declared Nova to be the animal from whom we descended. It may be that there was another animal that crossed the Horizon before her, but that lineage might have died out or led to some other lineage. The last common ancestor of crayfish, octopuses and humans would have lived in the Ediacaran, so that's why I put the crossing of the Awareness Horizon so early. However, this may not be the case. In his book, "Metazoa", The philosopher of science, Peter Godfrey-Smith, put it like this: quote "...either consciousness has at least two or three distinct origins – one for us, one for octopuses, one for crabs (and perhaps more) – or, if there was a single origin, it was deep in time and took a very simple form." End of quote. Which is of course the option I have chosen as the date for the Nova point, but as Godfrey-Smith rightly suggests there are other possibilities. Adaptations like the feeling of fear in the presence of a predator would be very advantageous to the animal experiencing it. We know that other useful biological features have emerged more than once. Wings evolved separately in birds, bats and butterflies. The eye is thought to have evolved independently at least forty times. If awareness of feeling evolved more than once, it allows the possibility that the Awareness Horizon was crossed more recently in our evolutionary past. In their book, "The Evolution of the Sensitive Soul, The Israeli, evolutionary theorists Simona Ginsberg and Eva Jablonka have proposed a method of testing whether animals have what they call "minimal animal consciousness". They make their assessment of whether animals have this this, based on whether the animals exhibit a particular kind of learned behaviour. Using this method, they think that "minimal animal consciousness" evolved – at least in our lineage – in the Cambrian, but later for cephalopods and crustaceans. But the kind of consciousness they seem to have in mind is rather more developed than Nova's simple fluttering of feeling. We know that by Cambrian times, the lineages that led to mammals, cephalopods and crustaceans had already diverged. So, if Ginsberg's and Jablonka's timescale is the right one, the animal I am calling Nova would have evolved some sixty million years later than I've suggested. If so, she would have been rather more fishy than wormy, and would have had a more sophisticated nervous system with more advanced sensory features like fully developed eyes, a sense of taste, and maybe even some sensitivity to electric fields in the water. She would also have swum free of the primeval mud. Although she would certainly not have been a true fish in the way we think of them today, she wouldn't have had scales, jaws, bones, and perhaps not even fins.

The third caveat is perhaps more important. We human beings make sense of the world by attaching names to people, ideas and objects. Some philosophers have even tried to argue that words themselves generate meaning, which, from the perspective of Best Guess reasoning, looks the wrong way round. The differences between say a rook and a crow are real. Words do not create the differences because they were there long before words were invented. We are just labelling them for our own convenience. However, evolution works gradually, and it isn't always possible to say, for example, whether two newly evolving kinds of animals have crossed the threshold to become new species. And, today, the Linnaean system has had to be enhanced with a gamut of new divisions like sub-species, infra-orders and super-families in order to shoehorn evolution's shades of grey into usable identifiable divisions so that the semantic tyranny of our clumsy black and white distinctions can make sense of them.

The labelling problem was evident when people wanted to know how life started. Things are alive, or they're not alive, right? Well actually no. During the eighteenth and nineteenth centuries, there

was a way of thinking called vitalism that consisted of the idea that life could not be explained by biochemistry alone. Put simply, the vitalists thought that there needed to be something extra, a kind of life spark to make something not living into something that *was* living. As the twentieth century progressed this was shown to be untrue. Life is an electro-biochemical process that evolved gradually. It started with simple organic molecules that evolved over time into more complex organic structures until things emerged that we now call living organisms. The bacterium *Escherichia coli*, or *E coli* for short, gets one of Linnaeus's double-barrelled names because bacteria are considered to be living things. Bacteria can live on their own as individual organisms. Viruses on the other hand are not independent living things. They can't reproduce on their own and need to get inside the living cell of another organism like a plant, bacterium or human being in order to be able to reproduce. So viruses are not considered to be living things and don't have a snappy Linnaean binomial name. The one that caused the coronavirus pandemic is saddled with the slightly more unwieldy moniker of Sars Cov 2. You may wonder why it matters. Why would viruses need to exist independently before being declared living? I mean all animals depend on other living things to survive: None of us can live if we don't eat other living things. Viruses exist as independent entities and as we have found recently, they can cause an incredible amount of trouble. But scientists had to draw the line somewhere, and the requirement to exist independently is as good as any. And this is relevant to the Nova story. Her ancestors could have had a capacity to feel something simple and prosaic, perhaps when something touched them, they had a simple sensation of awareness of it. But I named Nova so it is up to me to decide what criteria need to be satisfied to declare which precise animal I want to claim to be Nova, and simple feeling by itself wouldn't be sufficient. As I implied earlier, it was important that Nova's inner sensation changed her behaviour because otherwise Darwinian natural selection would not have worked its magic, and the adaptation would not have passed on to her offspring beginning the process of increasing feeling that ultimately provided meaning to the universe. More needs to be said about exactly what inner sensations are, and exactly what it is that changes behaviour but that will have to wait for the next episode.

And the fourth caveat is that because we know that nature works gradually it may be that awareness of feeling evolved slowly, by increments so that Nova was not one single animal but a species of animals evolving over time. Perhaps there was never a Nova Point in our evolutionary history but instead a Nova transition. Evolution, by natural selection, is not a system that is good at creating something new; it is largely a process of modification of what's already there. Perhaps there is more going on in simpler creatures like paramecia than we know about, and that prepared the groundwork on which evolution could build sensations and feeling. There could have been a number of precursors that gradually came together to create awareness which seems to be what Peter Godfrey-Smith thinks. But it seems clear to me that an animal either has simple awareness that changed its behaviour or it doesn't, and even if there was a slow transition to awareness, there still had to be a starting point and that is the point at which Nova would have lived, and if it turns out that I'm wrong and it was a gradual process – and I might be wrong – then I'll have to admit that the Nova story, at least as the story of a single animal, is itself a metaphor.

The question of how it happened is one we can continue to debate. However it happened, what is of essential importance is that it did happen. What had been an unfeeling, uncaring and nihilistic universe acquired beings with the capacity to experience emotion so that things began to matter. Feelings are what give meaning to the universe. Nova's descendants cared about things, and would, in time, come to reflect on and begin to understand the universe itself. I want to argue here that if no feeling being cares about something then it doesn't matter because it can't matter.

This is the reason I'm arguing that accepting that you are an animal does not in any way diminish you or rob you of any part of your humanity. In the opening episode I spoke about how cultures sometimes make assumptions that are wrong. In the Judeo-Christian tradition we are brought up to think that to be human is deeply special and something fundamentally different from what it is to be an animal. In the first book of the Bible, Genesis, we are told that human beings are made in the image of God, and that God gave man "dominion" over the animals. So from this perspective we are not quite divine, but not far off. Other people might think that promoting feeling as the only thing that matters in the Universe is wrong. In our culture, we are encouraged to believe that the Universe was created by a kindly, caring, beneficent God, and God is central to some people's sense of self, it gives them purpose, meaning, and hope of an eternal life, so we need to look at the question of religion and spiritual feelings with some sensitivity and in more detail. We'll do that in the final episode of this series.

As I've already said, one of the big questions I want to address in this series is the question of what it means to be human. And in light of the fact that we know we evolved we can see that this is the wrong question. If evolution happened, we *are* all animals. What we should really be asking is "What is it to be this kind of animal?" I said that in Episode Five I would describe a meeting that was perhaps the most important in human history. On one level we might dismiss Nova as being unimportant, because it was not her, but what was to come after that gave the universe importance, and the same might be said of this meeting. What it did was begin a sequence of events that opened a window into the way it is to be this kind of animal, that we could never have had otherwise.

Time for another metaphor: think about a geologist wanting to understand Mount Everest. He could go to see it, measure it, estimate its volume and mass, and investigate the properties of the rocks that make it up. But if he were to say that Everest was different from the other mountains around it, because it is bigger, more spectacular and had a special status because he believed it to be the largest mountain on the planet, he would have completely misunderstood. Everest is part of the vast Himalayan Mountain Range. Everest's uplift: its very existence, could never be understood without understanding the processes that built the mountain range itself. But that is exactly what we do when we think about what it is to be human. To understand humans, the thought is, you look at humans. What could we learn if we deny what I'm going to call the Everest Syndrome, and take evolutionary theory and the Nova story seriously? By the end of this series of podcasts we will find out, but before that there is a hugely important and rather obvious question looming, what was it that happened in Nova's nervous system when she crossed the Awareness Horizon. This is the most difficult of all the questions, and I'll do the best I can with it in the next episode.

In Nova's universe we can see that it is a transcendentally and supremely magnificent thing to be an animal, at least one with feelings. An evolutionary understanding of our place in the universe does not diminish us, if anything we grow in stature. It is not our humanness or our intelligence that make us special, it is the fact that we are the sons and daughters of Nova. It is our feelings as members of a family of sentient animals that makes us special because, together, we provide the universe with meaning.

Before I go, I want to leave you with one last thought: Some people might doubt that feeling is the foundation for meaning in the universe. You might be one of them. And you might "*feel*" very strongly about that.

Thanks to Professor Richard Dawkins for responding to questions about the case in these podcasts, and to you for listening.

Episode Four: The Consciousness Problem

This is the episode I have been most dreading. I've tried to keep these podcasts simple and easy to understand without dumbing down too much, but consciousness is such an expansive and involved topic this will be hard to do in a single podcast episode. And, spoiler alert here, this episode will not explain consciousness. Many far more capable and learned minds than mine have applied themselves to this problem and the consensus of current opinion is that they failed to do so.

Here is a short quote from philosopher A. C. Grayling's 2021 book, "The Frontiers of Knowledge," which spells out the problem more eloquently than I can:

"It [consciousness] is simultaneously the most familiar and the most mysterious thing in the universe. It is the most familiar because we experience it, intimately and immediately, in all our waking moments and, in somewhat stranger forms, many sleeping ones. We also feel its distortions when drunk or drugged, or infatuated. We therefore know what it *feels like to be conscious* pretty well.

It is the most mysterious, because we have little idea of what it is, and no idea of how it arises from brain activity – some will add: *if it does so.*" End of quote.

So, in this episode my role is also to fail to explain consciousness, but to do so as informatively, and with as much skill and aplomb as I can muster. In Episode One, I said that in the journey of understanding on which we are embarked, the path fades at one point. This is that point. As Grayling illustrates, there is a problem, what neuroscientists and psychologists call the Hard Problem of Consciousness, first labelled as such by philosopher, David Chalmers, in 1994 and it is the question of how a physical object, the brain, can produce a mental one: that rich and extraordinary experience of being alive we call consciousness.

Before this episode in this series, I have steered away from talking about consciousness; awareness is a much simpler concept. So how does, what I've called awareness relate to consciousness? And what do we know about how brains do it? Rene Descartes, the "I think therefore I am" philosopher we met in Episode One, thought that mind and matter were two completely separate things. This idea is unpopular today for the very good reason that I just raised my arm. Did you see that? Of course you didn't this is a podcast. But if I decided to raise my arm in my mind then my physical arm does rise it means that mind and matter cannot be two separate things.

One way of thinking about consciousness is to say that the brain is like a wire, and the mind is like the flow of electrons: the electricity that goes through it. On this view the brain is made up of particles while the mind is the movement of some of those particles. Another way of thinking about it is that brains are like computer hardware while minds are the software. The computer scientist, Marvin Minsky, said: "The mind is what the brain does". But none of these comparisons gets us very far. While the brain's neurons communicate with each other and do so in an almost infinitely complex way, on the face of it, this does not seem to be that much different to the mechanistic process of wires connecting in an electric circuit. It might be argued – and it is by some – that computers have something like consciousness. They make decisions based on inputs just like the brain does.

This argument seems to be that consciousness emerges spontaneously, simply on account of the vast amount of complexity, and the intricately, involved computations, that go on inside advanced brains like ours, so that, if this were true, if we built a computer big and complex enough it would be

conscious like a human being. Hmm. I'm not sure that this amounts to the kind of awareness of *feeling* that we are looking for if we want to explain Nova's experience of crossing the Awareness Horizon. Perhaps the answer is that we experience qualitatively different experiences when different neural circuits are energised. When one circuit is activated, we might feel hate, when another one fires up, we might feel love. More of the same circuits on their own can't be the sole answer; something must be different about the two circuits if they produce different experiences. Just adding more wires and transistors into the mix doesn't seem to get us an answer to the conundrum. This just gets worse when we come to specific kinds of experiences like, for example experiencing the colour red. What is going on in the brain that is different when we experience red compared to when we are experiencing blue, for example. Scientists and philosophers call experiences like seeing colours qualia.

Some thinkers, such as Daniel Dennett are sceptical about the importance of qualia. Remember him, the guy who wrote *Darwin's Dangerous Idea*? Dennett does not, of course, deny that people do experience red and blue sensations, but he doesn't think we need anything more than the explanations we already have, to explain the mind. He thinks that what happens in the brain just creates a "mirage" that we experience as a mind. I agree that best guess reasoning does not seem to point to spooky outside influence and the brain and other parts of our nervous systems must be solely responsible for producing consciousness. Dennett's demystification of the process is welcome when there are people who think that consciousness is beyond explanation or that it somehow connects us to some outer non-rational or non-physical explanation. But I think we still need to know more about how brains do it.

What do we know about brains that might help? Well actually quite a lot. The computational aspects of the way the brain reasons and works things out, as opposed to the emotional aspects of consciousness, are now very well understood.

When different parts of the brain become damaged due to injury or illness it has been possible to work out what parts of the brain do what. We also have a wide range of machines like fMRI, EEG and PET scanners so we can find out what parts of the brain are active at any specific moment, so we know how brains are behaving when the subjects of experiments are experiencing different things.

Let's describe the overall structure of a typical human brain. When you look at pictures of the outside of the brain you can see that wrinkly pinky, purple, reddish surface. This is called the cerebral cortex, and neuroscientists think of it as being divided into lobes. The one at the back of the brain is called the occipital lobe; it's where the optic nerves terminate. This lobe is involved in sorting and interpreting the vast amounts of data coming from the eyes, so it is principally concerned with vision, which might present itself to you and me as a simple process, but it actually involves a massively complex series of procedures that take place in different parts of the brain: there are at least ten neural pathways that come from the eyes into the brain. Across the top of the brain, in what's called the parietal lobe, there is a region called the Penfield Homunculus. Because the brain doesn't have nerve endings and you cannot feel pain there, there are surgical procedures that allow the skull to be opened in living conscious patients, and when different parts of this region are stimulated with a mild electric shock, it has been found that the patient feels sensations in different parts of the body, so astonishingly, it is as if there is a map of your body printed across this part of the surface of your brain.

On either side of the brain are the temporal lobes. On the left side there are regions that are responsible for creating and understanding speech. Some people that have epilepsy in another part of their left temporal lobe have profoundly powerful experiences which feel to them like religious or

spiritual revelation. The frontal lobes, which are found behind your forehead, are involved in inhibiting more basic emotional responses. When psychopaths have their brains scanned, it has been found that this region of their brains is much less active than in people without the condition, so they can't seem to moderate their behaviour in the way most people can. Of course, some, though far from all, psychopaths are known to be serial killers.

Of perhaps more interest to us in explaining Nova's awareness are more ancient structures that are found deeper within the brain under the cerebral cortex. First there is the limbic system. Here there are parts of the brain involved in emotion, the laying down of new memory and olfaction – the sense of smell. A structure called the amygdala lights up when its owner is experiencing fear. The hypothalamus is involved in regulating hormonal activity in the body and the hippocampus helps to create new memories. Beneath the limbic system there are even more ancient systems: In a part called the forebrain, the striatum is involved in feelings about something being good or bad and then there is the hindbrain, which includes another large part of the brain called the cerebellum which is tucked under the occipital lobes at the back of the brain, and is known mainly to be responsible for co-ordination, balance and body posture. The cerebellum, interestingly, has as many neurons as the rest of the brain put together, but there is some doubt about whether it has a role in conscious processing.

Beneath these structures is the brain stem. This is where the spinal cord enters the brain, and it is involved in homeostasis: that's basic bodily functions like breathing and thermoregulation.

There appears to be no individual region of the brain responsible for consciousness. All parts of the brain are connected up in different ways, so that for example seeing a vicious dog ready to attack you would involve neural activity in the occipital lobes, and related areas, where messages from the eyes would be decoded so that you experience an image of the dog, memory circuits would be involved so you could identify the dog, as, well, a dog. Other cognitive circuitry would become active to evaluate the threat – it's a *dangerous* dog – signals would also go to the amygdala which would light up generating a sensation of fear. Other signals would be sent from the hypothalamus to the adrenal gland flooding the body with adrenalin making it ready for immediate action, the frontal lobes would make the decision about whether to run like hell, or to stand your ground and move back slowly and it would send messages to the parietal lobe to tell the body how to proceed.

As humans, we think it is just the conscious *me* that makes the decisions, but this doesn't seem to work quite in the way you might think. Most mental processing actually happens without the *me* being aware of it. But it does seem to be true that any conscious experience involves more than one part of the brain. The brain does not have a consciousness centre.

If all this sounds complicated, I haven't started yet. The neurons in the brain have evolved to respond to chemicals called neurotransmitters. Some of these are released from a fountain-like array of chemical releasing neurons that radiate out from the centre of the brain. When these chemicals are released, they trigger particular responses. When you get a flush of excitement, this is caused by the release of a chemical called dopamine, a sense of achievement, and euphoria from one called serotonin. And the "cuddle" hormone oxytocin is released when you hug someone you care about. Neurons in different parts of the brain have receptors that respond to the chemicals, influencing the way they send signals to other neurons. But studies of brain anatomy and chemistry combined with clinical investigations and brain scans can only get us so far in understanding consciousness. One possible answer is that we may need to know is what is going on at a more fundamental level: what is happening inside the neuron itself that makes it different from a simple current going through a wire, and science can only give a partial answer to this question. We do

know a lot about how the brain wires itself up during development and how it reorganises itself in response to new learning experiences. In this sense the brain is said to be “plastic” because it can readily rewire itself to cope with the changing threats and opportunities in the world outside. Neurons are not all the same, there are a huge variety of shapes and sizes. To send a signal neurons fire in what is called an action potential, and the wave frequency in which they fire can vary enormously from one or two times a second up to five hundred times a second, and the amplitude – the size of the wave – varies too. So, until we fully understand what these complex cells are doing, we may not be anywhere near the end of understanding how feeling is generated.

One idea about how consciousness emerges suggests that there might be communication going on in the brain at an even smaller scale. It has been proposed by Roger Penrose and Stuart Hameroff that quantum effects might have a role to play in the way consciousness works. Quantum mechanics works at the level of sub-atomic particles, but that doesn't mean quantum effects can't carry across large distances. The idea here seems to be that: say you are looking for your keys. You know they are in the drawer, and you are looking into it, but there is an untidy mess of lots of other similar objects, scissors, candles, a torch, ball of string and so on. Then, in a eureka moment, you spot your keys. “There they are!” This is where it all gets a bit strange – quantum physics is like that – but what these investigators think might be happening is that at the moment of revelation when you “see” your keys, particles in different parts of the brain collapse into a special kind of relationship called quantum entanglement. The part of the brain that can see but not recognise the keys suddenly connects with the part of the brain that has the capacity to remember what keys are and can identify them. If this theory is correct then different parts of the brain can communicate with each other in ways in which, before we knew about quantum mechanics, we could never have guessed. To illustrate just how odd quantum theory is, as I understand it, we can think of entangled particles as being the same particle existing in two places at the same time. Told you it was strange! Penrose does not appear, however, to think that quantum mechanics is the complete answer to the problem of consciousness, and it has to be said that, what seems to be, a majority of scientists, don't think that quantum effects could work as he suggests. As someone from the outside looking in, I'm not qualified to comment on who's right or wrong about this.

Other neuroscientists think that connections between different parts of the brain, could have something to do with activity at a larger scale. When neurons fire they create a tiny electrical field, when lots of neurons fire together this field is amplified. Sometimes this firing is synchronised across wide areas of the brain, and we get waves that are detectable in electro-encephalograph scanners. The idea here is that the sudden mental connection we experience as “seeing” those keys in the drawer, occurs when two brain regions synchronise the firing of their neurons. Some neuroscientists even seem to suggest that consciousness just *is* this field, and as philosopher Peter Godfrey-Smith thinks about it, the field can be “perturbed” by sensory inputs and emotional responses. But as important as this research is, I'm not sure it gets us nearer to the most important question from our point of view: that is understanding how feelings are produced

Perhaps part of the problem is that there has been a historical reluctance to consider the question of feeling in the male-dominated scientific and philosophical communities. Although this situation seems to have been changing more recently, this is what the neuroscientist, Susan Greenfield wrote in her book, “The Private Life of the Brain” in 2000:

Quote, “...I am suggesting that some sort of basic emotional state is present whenever you are conscious. And if emotion is a phenomenon that is inextricable from consciousness itself, then it should be a high priority for neuroscientists. Yet surprisingly, emotions have to date received relatively scant attention.” End of quote.

Scientists at the time obviously had not had the opportunity to listen to Episode Three of this series.

Perhaps before we ask what consciousness is, we first need to explain awareness. What's the difference? Well, by awareness I mean any sensation made up of feeling, and maybe sensations like experiencing blueness or redness are special kinds of feeling. Explaining awareness is all important. The reason I didn't call the Awareness Horizon, the Consciousness Horizon, is because I didn't want to suggest that Nova would have had full consciousness in the way that we humans do. While mental activities like willings, urges, beliefs and emotion are obviously underpinned by feeling, consciousness seems to be more than just awareness of these phenomena. For example, I can look at the wall in front of me, and know it is there without any obvious emotional content in my mind. The input here is sensory rather than being rooted in feeling. If we could explain the simple awareness of feeling, and sensory input, and we accept that consciousness amounts to lots of different kinds of awarenesses experienced either sequentially or simultaneously, in different parts of the brain, the Hard Problem looks much less intractable.

If the idea that consciousness is an electromagnetic field "perturbed" by outside influence is the right one, it raises the possibility that the simple awareness that Nova felt might have just been the acquisition of just enough neurons firing in sequence to produce a particular kind of electromagnetic field, or, if the explanation for awareness can be found at the smaller level: it could have been a genetic mutation that changed the neurons themselves.

The more difficult question of consciousness could then be explained as a whole load of awarenesses, created by effects at the small scale, or the larger one, or some combination of the two, except of course this creates two more problems, we still don't know what is different about one neural circuit that generates a feeling of love, and another that produces a feeling of hate, or the sensation of blue as opposed to red? What could be different about them? And the second is another hard problem: the problem of how a set of interconnected neurons creates feeling in the first place. So even if we accept that the real Hard Problem is explaining the generation of sensory experience and feeling, we haven't solved the problem at all, we have deferred it: just pushed it back a bit.

With or without a focus on emotion, the Hard Problem is still a hard problem. But is this the right way to think about it? Are we even asking the right question? Maybe this is where the human intuition problem raises its ugly head again. Maybe we are *designed* to think consciousness is a lot more special and difficult to explain than it really is. Whether or not this is part of the answer. I suspect that this might be an idea to which Daniel Dennett might be sympathetic.

Looking at this from the outside and in the context of evolutionary ways of thinking. Perhaps we could think of awareness as being an excited state in some part of Nova's primitive brain. Many physical processes involve excitement. A hot water bottle is warm because the water molecules in it have a certain level of energy causing them to jiggle about: that excited state is just what heat is. It would have been in Nova's evolutionary interests for her to respond to, for example, threatening stimuli, with some kind of excitation in her nervous system, whether at the small or large scale, so it could trigger whatever physiological changes that needed to happen to cause her to move away from a potential threat more quickly than she would have done otherwise. The best, explanation we have for awareness, and therefore consciousness, is that feeling is just this excited state, and if that sounds like a weak answer, I'm not arguing, I just haven't got a better one.

Without explaining the awareness of feeling, the theory I am developing in this series of podcasts is incomplete. I can't claim to explain meaning in the universe via the concept of the Awareness

Horizon if I can't even explain what simple awareness amounts to. But incomplete theories can sometimes be hugely influential and important. When Darwin developed his theory of evolution by natural selection, there was a huge gap in his theory too. At that time no one knew about genes. What Darwin called "the laws of inheritance" were unknown, and he knew they were unknown. In order to fully understand what was going on it needed scientists to develop a whole new science, the science of genetics, which was eventually found to dovetail neatly into Darwin's theory and made it an even more powerful one. And, as we saw in Episode Two, genetics was instrumental in refining and confirming his theory of evolution.

In order to complete my theory, I freely admit that we may well need a new, or at least better, science of consciousness.

We started this episode with a quote from A C Grayling, perhaps we should end it with two others of his which I've kind of cobbled together from the same book, in a way which I think will best get his point across: quote "...even though there is nothing in the universe that is not ultimately a matter of physics, the brain is not the whole story of the mind "mind' is not solely describable in terms of brain activity alone, but must be understood as a relationship between that activity and the social and physical environment external to it." End of quote. Wise words, I think.

Here I need to thank Professor Fred Coolidge from the University of Colorado, for kindly agreeing to read through the script of this episode and making some useful comments.

Phew! That's the hardest of these episodes over. Thank goodness. Thanks for sticking with it and I'll see you in the next episode.

Episode Five: When David met Jane

There were many momentous events during the Twentieth Century, some devastatingly bad like the trenches, Auschwitz and Hiroshima but also positives like the discovery of the structure of DNA, heart transplants, antibiotics and the moon landings. But there was one event that passed comparatively unnoticed. This was a meeting, a meeting between David and Jane, the time was the early 1960s, the place Africa.

There is a sense in which this meeting could be thought of as a reunion. Around about six or seven million years ago there was a group of animals that lived in the African rainforest. They were the kind of animals that, if they were alive today, we would call apes. But their world was changing. As a result of climate change their forests were drying out. This group divided; one left the other in the rainforest to make their way out onto the new grassy plains. It is appealing to think of the two groups looking back over their shoulders wistfully at each other as they parted for the last time, but it may well not have been like that. They might have just drifted apart over time, or it might have been an antagonistic parting, one group driven away into the grassland by the other. However the parting happened, for thousands of millennia, the two groups would stay apart, separately following their own evolutionary trajectory, largely, or completely, unaware of each other's existence. In time the rainforest apes themselves divided, giving rise to two modern hominid species: chimpanzees and bonobos. There is almost no fossil record for their ancestors; when animals die in the hot wet conditions of the rainforests, their remains don't stay around long enough to fossilise. The plains apes, however, did leave at least part of their story written in their dry, dusty, petrified bones. They evolved into the hominins: *Ardipithecus*, *Paranthropus*, the *Australopithecines*, and ultimately genus *Homo* including *Homo erectus*, the Neanderthals, the Denisovans and modern humans.

There would be no reunion between these two ancient groups until the primatologist Jane Goodall met one of her subject chimpanzees, David Greybeard one hot, steamy afternoon in what is now the Gombe Stream National Park in Tanzania.

While it's true that there had been extensive contact between chimpanzees and humans before this moment, these contacts were overwhelmingly between humans and captive chimps, creatures either bred in captivity or taken from their forest families as babies. Chimpanzee mothers and other members of their community will risk their lives to protect young chimps, and if the demands of zoos and research establishments for animals in the early Twentieth Century were to be satisfied their mothers and any other protective adults had to be shot dead so that the offspring could be dragged away from their mothers' bodies. So, any knowledge we had about our nearest evolutionary cousins came from severely traumatised young individuals or chimps brought up in captivity. The meeting between David and Jane that afternoon in the rainforest was not at all like that; it was a coming together of two autonomous, free beings, meeting on their own terms. This wasn't the first time Goodall had seen David, she had spent months getting the chimps used to her so she could approach them: a process called habituation. David was her favourite, he was friendly, curious and more accepting than his peers and he was instrumental in letting her into their world. Here's Goodall's account of what happened that day, in full, from her 1999 autobiography "Reason For Hope" co-written with Philip Berman, which is dedicated in part to David Greybeard's memory:

"What happened [...] remains as vivid in my memory now, nearly forty years later, as it was at the time. When David Greybeard moved off along a well-marked trail, I followed. When he left the trail and moved through some dense undergrowth near a stream, I was sure I would lose him, for I became hopelessly entangled in the vines. But I found him sitting by the

water, almost as if he were waiting for me. I looked into his large and lustrous eyes, set so wide apart; they seemed somehow to express his entire personality, his serene self-assurance, his inherent dignity. Most primates interpret a direct gaze as a threat; it is not so with chimpanzees. David had taught me that so long as I looked into his eyes without arrogance, without any request, he did not mind. And sometimes he gazed back at me as he did that afternoon. His eyes seemed almost like windows through which, if only I had the skill, I could look into his mind. How many times since that far-off day I have wished that I could, even if just for a few short moments, look out onto the world through the eyes, with the mind, of a chimpanzee. One such minute would be worth a lifetime of research. For we are human-bound, imprisoned within our human perspective, our human view of the world. Indeed, it is even hard for us to see the world from the perspective of cultures other than our own, or from the point of view of a member of the opposite sex. As David and I sat there, I noticed a ripe red fruit from an oil nut palm lying on the ground. I held it toward him on the palm of my hand. David glanced at me and reached to take the nut. He dropped it, but gently held my hand. I needed no words to understand his message of reassurance: he did not want the nut, but he understood my motivation, he knew I meant well. To this day I remember the soft pressure of his fingers. We had communicated in a language far more ancient than words, a language that we shared with our prehistoric ancestor, a language bridging our two worlds. And I was deeply moved. When David got up and walked away I let him go and stayed there quietly by the murmuring stream, holding on to the experience so that I could know it in my heart forever.”

End of quote. I don't know how you reacted to that story but reading it always brings a lump to my throat. Goodall was, and still is, criticised by some in the scientific establishment for her alleged sentimentalism. Maybe you agree. Maybe you think David was just an ape, a mere chimpanzee, but then we are mere human beings. David Greybeard also holds another special place in history. He has the singular distinction of being the first non-human animal ever to be observed making and using a tool; Goodall saw him modifying a grass stem to fish termites out of a termite hill. We now know of dozens of examples of tool use throughout the animal kingdom, but despite this and what I said in episodes two and three, there will be those who will think I've misrepresented the event just described by saying that it was a meeting of people, when it was just a human encountering an animal. I respectfully disagree. This was a signature moment in human history. This was humankind embarking on one of its greatest feats. It was humanity connecting with its roots.

In this episode there is an important question I'm going to consider, and it is this: Is it appropriate to think of animals like chimpanzees as non-human people? Maybe someone should ask Jane Goodall. Well as a matter of fact someone did. It was me. On one of the occasions I met her, I asked her whether we *should* think of chimps as non-human people. She paused for a moment and said “non-human animals”: something of course entirely different. Her books, and those of other primatologists, however, imply something very different, in their pages you read of friendships and fallouts, kindness, grudges, cruelty, coercion, jealousy, bullying, compassion, humour, (chimps have their own form of laughter), warlike behaviour including coalitions of chimps and the same competition for status that you would find in any human boardroom perhaps even a sense of wonder and, yes, in the middle of it all there is brutal bloody murder. Each and every chimp has its own personality. In short, reading especially Goodall's work I found myself reading soap opera. Can you really have soap opera without people?

Context is important here. It is perhaps not surprising that Goodall hesitated about ascribing peoplehood to chimps. When she first returned from the Gombe she was severely criticised by

people in the scientific community for ascribing “human” emotions and behaviours to animals. It was quite wrong – it was alleged – to suggest that an animal could express, say maternal love, because love – it was argued – is a human emotion. These were very strange arguments, the people making them knew about evolution, they would have known that closely related species would share similar behavioural responses and that bonding between mothers and their offspring would be of huge adaptive importance in the evolutionary process, and therefore almost certain to be shared across numerous species. These were less enlightened times, and they seemed unable to see that they were applying a double standard. While they insisted on the human/animal distinction in emotional and mental processing, when it came to physical features, they freely allowed the same terminology to be used. For example, they used the same name for a leg in both animals and humans. To be consistent they should bizarrely, have suggested that we should confine the use of the word leg to humans and force everyone to say that male dogs cock their “canine appendages” to urinate. In their defence, though, they would have seen themselves as scientists with the same commitment to dispassionate argument, rigor, reason and evidence as the non-scientist writing these podcasts. Objectivity in science is essential. The scientific method includes many checks and balances to make sure that the data produced is accurate. Scientists have built mechanisms into the process, such as peer review and double-blind tests, so that we know that, for example, antibiotics, paracetamol and coronavirus vaccines not only work but are safe for the vast majority of the people who take them. Scientists are human too though, and there have been occasional desperately sad and devastating mistakes such as the Thalidomide tragedy, but where the system goes wrong new procedures are put in place to minimise problems in the future.

Scientists who opposed Goodall’s methods suggested that she had been anthropomorphic. Anthropomorphism is a very big word with no, or at least hardly any, meaning. It is supposed to mean that it is wrong to assume that any animal has human emotion, and we can’t assume that they feel things as we do, and it is alleged that it is unscientific to allow emotional attachment to the subjects of your study. But this was itself unscientific because, even then, the science was in: we knew we evolved, we are animals, so the idea that emotion in humans and animals were in some way different could never have been unsupportable. Goodall knew intuitively that her opponents in the scientific establishment were wrong, and she wisely ignored them. I have been a bit sniffy about human intuition in these podcasts, but in this case she was right. While it is certainly bad science to develop an emotional attachment to one particular idea or other then to continue to defend it when the evidence shows it is wrong, chimpanzees cannot be understood without seeing them as feeling beings. A dispassionate, objective scientific approach is essential if you want to say, measure temperature, it works rather less well when we are considering feelings and value systems. There are no thermometers for measuring emotion.

As you will have gathered by now, I want to suggest that animals, including the human one, behave according to their response to the feelings they have about the world in which they find themselves. So, if we share similar responses to chimpanzees, we need to consider the question of the peoplehood of chimps and other advanced animals in more detail.

Let’s look at this another way and think about how Goodall might have been right to be cautious about defining chimps as people. This episode has been getting a bit philosophical and heavy. Let’s change tone a bit: let’s talk about sex... in chimpanzees.

Chimpanzees do not have fathers. Ok... Ok... They have biological fathers of course they get approximately half their DNA from their mothers, and half from their fathers in the same way that we do. But in a social sense there is an argument that can be made that they don’t have fathers. When female chimps come into season, they advertise the fact by growing a large pink swelling on

their bottoms. At this point they will have sex with many, most, or all. of the adult males in their community. This implies that no female knows which male fathered her offspring, and no infant can possibly know who their father is, so that if chimpanzees had a language, it is unlikely that there would be a word for father, pop, daddy or dad. And it seems that chimpanzee' soap opera is missing some important storylines. No long-lost fathers emerging from the metaphorical woodwork. Above the chimpanzee awareness horizon there appears to be no concept of fatherhood.

Or is there? At this point I need to roll back slightly on what I've just said because a recent study has shown that adult male chimpanzees spend more time with the mothers of their own offspring than other males do, and another study showed that the adolescent sons of adult males spent more time grooming their fathers than they did other males. Another study, this time of captive chimps, seemed to show that they could recognise their own family members by their appearance. So although my claim that chimps don't have fathers is not as straightforward as I've implied, these studies don't really prove a *concept* of fatherhood in chimpanzees, they just show that they seem to know which animals are more closely related to them than others.

While, as I have already suggested, maternal love is certainly part of the chimpanzee's emotional repertoire, as is love of their mothers, brothers and sisters, romantic love seems to be largely absent. Female chimps certainly have their favourites among the males, and, while they are "pink", they will sometimes form consortships with a favoured male and wander off into the forest with him, but they don't seem to pair bond in the way humans and other species do.

There are a number of different ways of defining "people". You could be pedantic and insist that only humans can be people. This is an easy case to make, if only because there are no Neanderthals or other very closely related species alive today to muddy the water. Beings like these would certainly have had language, and the genetic evidence has proved that they had sexual relationships with modern humans. If such species were alive today it would very much harder to distinguish between people and non-people, but the idea that only humans are people has something of the Nazi about it, "Only people like us count as people". Alternatively, we could insist that only beings with language should count, or that in order to count as a person you need to be the kind of being that you could invite round to dinner – you would be very unwise to invite an adult chimp into your home you would be putting your life at serious risk. Chimpanzees are famously volatile and immensely strong. And, in any case what would you talk about?

I suppose the argument many people might make is that we are "intelligent", and animals are not. While it is true that chimps only reach the intellectual level of a human three or four-year-old, Goodall, and another world leading primatologist, Frans de Waal, have both indicated to me that their emotional intelligence exceeds that level. Still, we cannot deny that our intellectual capacity is much greater than that of any other animal. Our species' scientific name is *Homo sapiens*, which means Wise Man, and I suppose there will be those who think that our intelligence and undoubtedly powerful linguistic abilities set us apart from non-human animals. Some might say that we are more sophisticated and advanced, and we have a higher status – we have risen above them. In our society, to call someone an animal is to insult them. We think of animals as stupid and inferior: they are driven by instinct and have no moral dimension to their lives. But this is just not so. The argument that we are morally superior is an incredibly easy argument to dismiss; in fact, it is so transparently easy that I can do it with one word... *Auschwitz*...!

But wait there is a slightly better argument: while we ponder about what chimps think and feel, they almost certainly don't sit in the trees looking down on us as they reflect on the philosophical implications of what it is to be a chimpanzee as compared to what it is to be a human. There is some

anecdotal evidence that chimps might sometimes reflect on the world around them, and that they might have a sense of wonder... Why wouldn't they? We do. But does the complexity of our thought matter? If you've listened to Episode Three in this series you will know that it is not intelligence, but feelings, that count. Feelings make the universe matter, and we share many of the same feelings with animals as they share with us.

Which takes me to yet another argument: some might try to claim that although chimpanzees have emotion, they do not feel it with the same level of intensity as humans. This seems also to be false. There is another example of chimpanzee behaviour observed by Goodall and her team that puts this idea to bed: Flo was one of the first chimpanzees to be habituated, she looked old when Goodall first saw her, although it was never possible to establish her age. She was a high-ranking female and a good mother – not all chimps are – and her last surviving “child” for want of a better word, was Flint. Flint was very attached to his mother, and as Flo became more aged, and frail, she was not strong enough to wean him away from her as mother chimps normally do. Flo and Flint became inseparable; in her weakened condition she depended on him, and he on her. Here's how Goodall described what happened next in her book, “Through a Window”. You'll need to know that Fifi was Flint's older sister. This is where you might want to get your tissues ready:

“Flint [...] was eight and a half when old Flo died, and should have been able to look after himself. But, dependent as he was on his mother, it seemed that he had no will to survive without her. His whole world had revolved around Flo, and with her gone life was hollow and meaningless. Never shall I forget watching as, three days after Flo's death, Flint climbed slowly into a tall tree near the stream. He walked along one of the branches, then stopped and stood motionless, staring down at an empty nest. After about two minutes he turned away and, with the movements of an old man, climbed down, walked a few steps, then lay, wide eyes staring ahead. The nest was one which he and Flo had shared a short while before Flo died. What had he thought of as he stood there, staring? Memories of happy days gone by to add to his bewildered sense of loss? We shall never know.

It was unfortunate that, for the first few days after Flo's death, Fifi had been wandering further afield. Had she been there to comfort Flint from the start, things might have been very different. He had travelled for a while with Figan and, in the presence of his big brother had seemed to shake off a little of his depression. But then he suddenly left the group and raced back to the place where Flo had died and there sank into ever deeper depression. By the time Fifi showed up Flint was already sick, and though she groomed him and waited for him to travel with her, he lacked both the strength and the will to follow.

Flint became increasingly lethargic, refused most food and, with his immune system thus weakened, fell sick. The last time I saw him alive, he was hollow-eyed gaunt and utterly depressed, huddled in the vegetation close to where Flo had died. Of course, we tried to help him. I had to leave Gombe soon after Flo's death, but one or other of the students or field assistants stayed with Flint each day, keeping him company, tempting him with all kinds of foods. But nothing made up for the loss of Flo. The last short journey he made, pausing to rest every few feet, was to the very place where Flo's body had lain. There he stayed for several hours, sometimes staring and staring into the water. He struggled on a little further, then curled up – and never moved again.”

End of quote... Is there any other way of putting this but that Flint died of a broken heart?

When we learned about Nova, we found that feelings make the universe, and especially the living things in it matter. When we think of the gentleness and compassion in David Greybeard's reassuring touch, and the devastation of Flint's heartrending loss of his mother, perhaps we are nearing the answer to the question I set in this episode. With certain exceptions like romantic love, Chimpanzees and other great apes feel things in the way that we feel them, in every way that is important, so there seems to be a good case for allowing sentient beings like chimps to be thought of as non-human people. But if we include great apes as people then, for reasons too involved to discuss in this series of podcasts we must also include dolphins, whales and elephants as non-human people too.

But we also need to acknowledge the differences. Chimpanzees are not people in the same way that we are people – their behaviour is radically different – and what about other animals like wolves and domestic dogs and cats whose social organisation is slightly less complex than the animals we have talked about here and to whom, it is perhaps, harder to claim them to be people? They have feelings too, don't they? From Episode Three, we already know that it's the mattering that matters. On the other hand, it might *feel* important to maintain a sense of our own status, human specialness in the universe. Those feelings of specialness are feelings too. That's another question we'll need to return to.

So, are you convinced? Are chimpanzees non-human people? Hope not! It is not my role to convince anyone of anything. I think it is up to each of us to do our best to match our own beliefs to what is most likely to be Omnitrue, but it is not for me to say what that is, it is up to each of us to look at the evidence and decide for ourselves. The only useful role I might have, is to point listeners to knowledge and evidence that might be useful. To paraphrase the catchphrase of a popular 1990s television series, "The Omnitruth is out there". Isaac Newton is alleged to have said that the reason he had been able to see so far was because he was standing on the shoulders of giants. This modesty might have been uncharacteristic, as I understand it, the man was something of a monster, but for all his failings, he was a genius and he added new knowledge to the scientific canon, he taught us a lot about the behaviour of light and came up with a theory of gravity that was streets ahead of what had gone before. I am not a genius. I have added nothing. All I have done is to repackage what's already there. But if we know anything at all about the nature of reality, we know we evolved, we belong to the genus *Homo*, and the species *sapiens*, in the order Primates and class Mammalia, we belong in the animal kingdom, and our feelings like those of chimpanzees, tell us what is important.

Reading books about natural history or listening to nature documentaries we look at nature from the outside. We learn that this animal looks like this and behaves like that, and this other animal looks like that and behaves like this. Always the assumption is that they are animals, and we are not... In Jane Goodall's words "we are human-bound, imprisoned within our human perspective". If we know anything at all we know that we *are* animals and we need to put ourselves back into nature, where we belong. In the next episode we will ask what kind of animal we are, and why we are the way we are.

Thanks for help in this episode are due to Professor Stacy Rosenbaum at the University of Michigan, and belated thanks to Dr Jane Goodall DBE who wrote to me early in my research about chimpanzee behaviour. I also rather think that she would want me to mention her very worthy charity, The Jane Goodall institute. And, of course, thanks to you for listening.

Episode Six: Diving into Deep Nature

I almost feel the need to apologise for these next three episodes before you listen to them. Why? Because they are likely to be the most controversial and challenging of them all.

In other parts of our journey of understanding there were times when I had to add caveats to the case I made. In this episode the caveats need to come first. This is because I am going to break one of the principal unwritten rules our society demands of us and I need to be clear about why I am doing that, and what exactly I am saying.

As we saw in the last episode, the behaviour of our nearest evolutionary cousin differs radically from ours. But just as chimpanzee's behaviour differs from humans it also differs from that of each of the other great apes. If the behaviour of one species of animal differs from another, then it follows that the difference must have a genetic basis. It is probably uncontroversial to say that every advanced species on the planet has its own particular pattern of behaviour: uncontroversial that is as long as humans are not included in the list. If we do have such a genetically mediated pattern of behaviour it seems to be deeply embedded and hidden from contemporary cultural awareness. It is for this reason I have called the collection of thoughts and feelings that underpin the human behavioural repertoire our "Deep Nature", and I'll need use the same term for that of non-human animals too, otherwise I'll just perpetuate the misunderstanding that humans are not animals.

The idea that people's behaviour is an expression of their genes is accepted by at least some scientists; there are what they call "human universals": patterns of thought and behaviour that are common to all, or almost all, human beings. Evolutionary psychologists think of the human mind as being built of a massive number of modules. We have one for love, one for hate etc. And we can think of our Deep Nature as the complete compendium of all these modules.

Traditionally though, the rule that, in humans, we cannot link genes and behaviour is deeply embedded, and it is the one I am forced to challenge. Why is it contentious? I thought Richard Dawkins put this best in a television interview I heard him give many years ago.

As I remember, he said something like: "One of the things Hitler has to answer for, and there are a lot of things he has to answer for, is that we can never talk about behaviour and genes in the same sentence".

What I took Dawkins to mean was that if we admit that genes influence behaviour then people will say this harks back to a monstrous and repugnant idea that became prevalent in the Nineteenth, and early Twentieth Century, and fed into Hitler's despicable, Nazi ideology. The idea became known as eugenics. I don't want this series of podcasts to build into book length, so I'll need to be brief, but eugenics was based on the idea that some people had good genes, and some had bad genes, and to improve the species we had to get rid of the bad ones. In America, this was done by forcibly sterilising people with learning difficulties and other genetic disorders, and it was taken to an extreme by Hitler who used it as an excuse for his extermination of people he thought of as sub-human such as Jews, gay people, Romanies and people with mental or physical disabilities. Good reason you might think then for opposing the idea of linking genes to behaviour. But if you've been following the arguments in these podcasts, you'll know that these ideas were founded on a radical misunderstanding of how nature works. The natural system, at least the one below the awareness horizon, has no "good" or "bad" genes. As we learned in episode three what matters in the universe

is whether someone is a feeling being. A person's feelings and their right to enjoy them are ultimately what matter. Like all other animals, the indifferent world below our awareness horizon has no consideration for the lives, rights or feelings of the poor creatures living above it. It is we who have to care.

As a student at university, I was told twice that gender is culturally constructed, once, shockingly, by the leader of a science course. The idea that men and women are different because of cultural influence – which seems to be based on the idea that children subliminally absorb messages during their upbringing such as those exemplified in the nursery rhyme: Little boys are made of slugs and snails and puppy dogs tails while girls are made of sugar and spice and all things nice. When we look around at other closely related animals, the idea that our culture makes us male, and female, just doesn't work.

In Steven Pinker's seminal book "The Blank Slate" he challenges the foundation for what he calls the Standard Social Science Model – widely followed in academia – in which it is understood that human beings are completely, or almost completely the product of their environment. In doing so he effectively destroys the myth that we are wholly, or almost wholly, blank slates at birth on which experience writes out our personalities, gender differences and attitudes.

Would we ever say that chimpanzee females are less aggressive than the males due to the difference in chimpanzee culture? Most people would think that idea to be absurd, and yet, by many, it is freely accepted to be the case in human beings.

The disposition for society to hold humankind apart from the rest of nature is a classic example of what I called the Everest Syndrome – the failure to see human beings in their proper context. I want to argue that there is no problem at all in arguing that there are some differences in the way most men and most women see the world. The problem is that unfortunately, human beings are social primates and social primates are obsessed by status. If we agree there is an innate difference between the sexes, then we can't seem to stop ourselves asking which sex is the better one. And as you'll no doubt be aware, throughout most of human history, and in many parts of the world today, men just take it for granted that their gender is the best.

In the example of Jane Goodall, we saw that the dispassionate, unemotional, male oriented version of the scientific approach was completely inappropriate in understanding creatures whom, I think, are best described as non-human people. And in this episode, you will find mention of two other exceptional women: Dian Fossey and Biruté Galdikas. These people are not unconnected, Goodall was sent out to study chimpanzees by the famed paleoanthropologist, and discoverer of some spectacular human fossils, Louis Leakey. And after Goodall's great success, Leakey supported Fossey, who went to Rwanda to study mountain gorillas, and Galdikas who went to Borneo to study orangutans.

Most men sent out to study apes in the wild would probably have completed their investigations and returned to write up their theses, hopefully to great acclaim and leading to a comfortable seat in a prestigious university where their ongoing, err... primate, status was guaranteed. This is not what happened with these three women. They rightly learned to love these wonderful creatures. Each of the great ape species are threatened with extinction to various degrees, and these women devoted the rest of their lives to conserving and publicising their plight. I won't give the ending away but if you've seen the film, "Gorillas in the Mist" you'll know how much Dian Fossey sacrificed for her beloved gorillas. Men may have strong points, but women have their own to equal them.

Another massively important point is that, if you've been following the arguments in these podcasts, you will know that we are products of the heartless world below our awareness horizon, so because we behave in a certain way, this says nothing about how we should behave. I'll expand on this idea in the final episode.

An even more important point is that we could never expect every single human being to conform to any postulated human deep nature. What we know about nature is that there is always variation, not only in physical, but in behavioural attributes. This is not just important, it is essential to Darwin's idea of natural selection – as far as we know, the principle driving force of evolution. The evolutionary process depends on selection between the genetic variants that inevitably occur in any population of organisms. Those who say that, for example, gay people are “not natural” are demonstrating an extremely weak understanding of nature. Because we are the product of natural forces beyond our control and full understanding, we cannot be judgemental about anyone who does not conform to contemporary cultural understandings of what our deep nature is or should be. Again, this is another point to which we will need to return.

All these caveats seem to be almost more important than the central point of the episode, and there is another which needs to be made crystal clear. Perhaps this should be obvious to even the most casual observer of human nature, but I need to spell it out anyway. Here goes: I am not suggesting that we have any kind of genetic determinism; that is to say I am not saying that we are compelled by our genes to act in any particular way. This might be true of the paramecium, where they might well be programmed to behave in a fixed pattern, perhaps not too dissimilar to the way a computer works: if food is detected move towards it which parallels computer algorithms like if x happens do y, etc. While nature has programmed animals that have crossed the awareness horizon with feelings that predispose them to act in certain ways, none of this is fixed. Sometimes the feelings conflict with each other as we'll see when we come to consider human sexuality. Nor am I saying that cultural evolution – the idea that cultures change and evolve without any suggestion of genetic change – is not real, nor am I denying its massive importance. If I thought that everything about being a human being is fixed and immutable there would be no point in writing these podcasts, because if it were true these podcasts would change nothing, and my dear hope is that they do change the way that people think.

Ok, now the caveats are out of the way, the rest of this episode will be descriptive rather than prescriptive or proscriptive; it will be about how things are, rather than how they should be. As I've said more than once, I'll hold back judgements about how all this impacts on right and wrong until later.

The next part of this episode contains adult content. If there are children listening nearby you might want to ask them to leave the room, or it might lead to awkward questions. In the case I'm presenting here, sex will turn out to have a significant role in our deep nature. It seems as if one of the principal differences between great apes, and here I'm including humans as great apes, is the way they manage their sexual behaviour. I don't know why these differences are so profound, but my guess would be that because it isn't enough just to survive in the Darwinian universe, you also need to get your genes into the next generation, and you do that with sex, sex is likely to be highly visible to natural selection, and therefore to evolve faster and more completely than other behavioural attributes.

When you listened to the last episode where we considered the sexual behaviour of chimpanzees, you might have been led to the somewhat disturbing thought of a woman growing a large, warm, smooth, curvaceous, pink swelling on her bottom once a month to advertise her fertility, and this

might well have evoked at least some sense of revulsion. It certainly grosses me out. On the other hand, large, warm, smooth, curvaceous breasts, or buttocks, elicit quite a different reaction in at least half of the adult human population. There are any number of therapeutic courses available to those who need them, for all sorts of problems, but there never seems to be a need for breast appreciation classes for young men.

So, it is obvious that there is a different pattern of behaviour in humans and chimps. Above our respective awareness horizons, we respond to the environment in which we find ourselves in different ways. In the rest of this episode, I'll explore the behaviour of the other great apes, to establish the truth of the uncontroversial idea that all advanced animals have their own deep nature. In the next, we will look down through the awareness horizons of a small number of species, including our own, to answer the more controversial question of why we think and behave as we do.

The first species I'm going to look at is another member of our immediate evolutionary family, a species as genetically close to us as chimpanzees: bonobos. A book about them written by Frans de Waal was subtitled "the forgotten ape", for the very good reason that this species is far less well known than chimpanzees, this is in part because they have the misfortune to live in a war zone and researchers have had great difficulty in observing them. Bonobos look like a ganglier, kindlier-faced version of the common chimpanzee. Although they used to be known as pygmy chimpanzees they are about the same size as the commoner variety. There seems to be a strong consensus in the scientific community around the view that, unlike in the male-dominant chimpanzee societies, female-dominant bonobos are much less volatile, less violent and more peaceable than chimps. The primatologist, Richard Wrangham, in his book "The Goodness Paradox" tells a story of when two communities of wild bonobos met up, the adults in one group played with the young of those of the other, swinging them high in the trees, amid the delighted squeals of the little ones, while their unconcerned parents looked on approvingly. This is a level of trust that would never be seen in two communities of chimps, who view each other with suspicion and often animosity, and whose mothers are often very protective. Bonobos' sexual behaviour also differs radically from chimps. The females also have sexual swellings, but they will have sex with any member of their communities regardless of their fertility status, and even their gender.

When we meet a friend, we haven't seen for a while, we shake hands or perhaps hug. Chimpanzees hug too, and will then often enthusiastically groom each other's fur, contrasting with the human response which is to enthusiastically chat about what's happened since they last met. Bonobos do it differently; when they meet someone they haven't seen for a while, they have sexual intercourse with them. The only sexual taboo in bonobo society seems to be between mothers and their male offspring, which presumably reduces the problems of in-breeding. Status works in a different way in bonobos as compared to how it works in chimps. Sex between female bonobos is used to cement their friendships, and to diffuse aggression between individuals generally. Female bonobos often rub their genitalia against each other and the orgasmic sounds they make suggest they rather enjoy it. Frans de Waal gives an example of their approach to sex in his 2019, book "Mama's Last Hug":

Quote:

"A female may lie on her back masturbating in full view of everyone, and no-one will blink an eye. She moves her fingers rapidly up and down her vulva, but she may also assign a foot to the job, keeping her hands free to groom her infant or consume a fruit. Bonobos are great multitaskers."

End of quote.

Right... err, I think we can say that bonobos have a much more tolerant and relaxed societal structure than chimps, at least in part due to their easy-going sexual outlook.

It has often been written that bonobos, unlike chimps, have never been observed to kill each other. This turns out to be strictly true, but misleading. One wild male bonobo was severely beaten by the females in his group; he disappeared into the forest and researchers never saw him again. Badly wounded or sick chimpanzees will often retreat into the forest for the very good reason that status is everything in their society and prospects would be particularly bad for them if they stayed in their communities while in a weakened state. For example, David Greybeard disappeared into the bush, one day during a pneumonia epidemic at Gombe, and was never seen again. If bonobos divide themselves off from their communities in the same way, it seems likely that the injured bonobo may well have retreated to lick his wounds and died of his injuries alone in the wilderness. Another male bonobo, at Twycross Zoo in the UK, called Kakowett, who had stopped having sexual relations with the more senior females, was attacked and was so badly beaten that he had to be euthanized by zoo staff because he had collapsed, and his injuries were so severe that he would not have been able to recover from them. These are the only two instances I know of where bonobos may have killed, or come close to killing, each other; there are dozens, if not hundreds of examples of chimpanzees killing each other in captivity as well as in the wild. Bonobos might not be the hedonistic “hippy” apes as they are sometimes portrayed, but it does seem clear that they are certainly very much less volatile than chimps and their behavioural repertoire is radically different from them.

Gorilla behaviour is different again. It is built around a nuclear family, typically consisting of a dominant silverback male, some lower status males, his harem of females and their young. Despite their tough appearance, unless they are facing off against another competing silverback, males are generally non-aggressive. They are gentle, fatherly and caring of their “wives” and offspring. Young female gorillas will move from one silverback to another until they find one they are comfortable with and then they tend to settle down with him for the rest of their lives.

So now we have three different patterns of behaviour in the non-human African apes. But if the behaviour of these species is radically different from each other, the behaviour of the last surviving Asian great ape, the orangutan, is off the scale. There is a question as to whether orangutans are social primates at all. Biruté Galdikas describes them as being “semi-social”. They spend much more time high in the tree canopy, they’re more arboreal, and see very much less of each other than any of the African species. One adult male was followed for twenty-three days straight, only encountering three other females during that time and whom he passed by with only the briefest of interest. Orangutans have an enviable self-assurance and self-sufficiency making them less needy. This apparently gives them something of a quiet inner serenity that the other great apes, including humans, seem to lack. Their lowered need for social acceptance means that they are free to be themselves without the need of any pretension. As Galdikas puts it: “Orangutans display an honesty and candour that humans and chimpanzees cannot afford.”

At the beginning of this episode, I invited you to consider whether chimpanzee behaviour engendered any sense of revulsion within you. Now we can reconsider this question in a different light, because now we might ask whether bonobos may think chimps to be sexually repressed, or whether male chimps might think silverback gorillas to be soft and wussy, while orangutans might be looking down from their trees laughing at the lot of us for our childish over-excitability.

It should not be necessary to make this interjection here because I did say at the outset that this part of the episode would be descriptive rather than prescriptive. But in the interests of clarity perhaps I should: I am not suggesting that we should take any lessons from how other great apes, like

bonobos, behave, much less tear our pants off and adopt their approach to sex. The only point I am making is that these differences exist, and what I'm trying to do is to understand why they're different, what's causing them to be different, and how this might influence the way we think about our own behaviour. That will be the task of the next episode.

Once again, thanks for listening. Thanks are also due to Clare Redfern and the team at Twycross Zoo for their kind help.

Episode Seven: Putin, Patriotism and Peacocks.

Welcome to Episode Seven. Here we're going to start looking down through the human awareness horizon, and, in doing so, we'll find out just what an old softy Vladimir Putin is, and why human beings have, not one but, two sex drives.

But first we need to understand why the animals we talked about in the last episode behave differently. What makes them have their particular genetic predispositions? Why do they have different deep natures?

Most people will know about the very different behavioural patterns of more familiar species like domestic cats and dogs. Cats are relatively solitary, private, territorial and in many cases, more timid creatures when compared to dogs. If you ever move house with your cat, if my experience is anything to go by, you'll see its face screw up in distress as it nervously and intently sniffs around its new environment, while a dog won't be bothered at all as long as he, or she, knows their owner is there. A cat will often go off on its own happily all day, while dogs are likely to fret if their owners go missing for an hour or two. Roll a large object, such as a football along the floor and a dog will chase it enthusiastically while any nearby cat will disappear behind the sofa. Alternatively make a small, unexpected scratching sound with your fingernail on the fabric of the sofa and any nearby feline will investigate intently, while a typical canine will look at you as if to say, "What are you doing that for?"

Now we are going to do something that these animals cannot do for themselves. We are going to look down through their awareness horizons to discover why they might behave as they do.

Dogs' wild ancestors, grey wolves, are apex predators. They are at the top of the food chain and therefore don't need to be as nervous as the smaller cat species who might find themselves prey to other species, *like* wolves. Wolves generally hunt animals larger than themselves, while cats hunt animals that are smaller than themselves. In the case of wolves, a lone wolf, although it might manage to survive on smaller prey, would find it hard to pull down large animals like an elk or even a fully grown red deer, so wolves, like domestic dogs, are sociable creatures that usually hunt co-operatively, or in the case of domestic dogs, happily go for long walks, hunting tennis balls, with their human pack leaders. While it is in their interests to have a home range so they know where water and food resources might be, wolves need to be able to roam freely if they are going to pursue their prey over large distances. On the other hand, it doesn't take three cats to kill a mouse so it is in the interest of female cats to have a territory so they can exploit all the small mammals, birds and other prey creatures in their territory for themselves and their offspring, and they'll want to keep other cats away. Little wonder cats get distressed when their owners take them somewhere they don't know, which potentially could be the territory of a hostile feline competitor. It will also be obvious that the small mammals that cats prey on often make little scratchy sounds. There are many other differences between cats and dogs that I could point to that are easy to explain by looking below their awareness horizons but there isn't time here.

Now it's time to find out why the non-human great apes' deep natures are different. All of these species spend a huge amount of time finding food and eating, which takes up most of their day. This is because much of their food is made up of vegetable matter, which contains complex sugars that are difficult to digest. As Richard Wrangham has noted, because these sugars can be broken down by heating, humans, unlike other great apes, can get away with three or four short meals a day because we cook our food. The other great apes don't have that luxury, gorillas, especially, eat large amounts

of tough tubers and shoots which are of low nutritional value. I sometimes think of gorillas as being the cows among the great apes. This is because, like cows they spend huge amounts of time eating low value food. This is why they are generally placid: fighting over food would be like cows fighting over grass. But unlike cattle they do not have the great advantage of having four stomachs to break down their fibrous food. Unlike, as far as I know, all the other great ape species, gorillas sometimes eat their faeces, and Dian Fossey described them doing so with “lip-smacking gusto”. In this way their digestive systems get a second chance to get the best from their ropey, fibrous fare. And, like cattle, male gorillas are much larger than the females. The ancestors of modern cattle, the aurochs, are extinct, so it is hard to know quite how their societies worked in the wild, but the males had huge horns which might have been used for fighting other males for access to a small herd of females, just as the great silverbacks fight with each other to secure and protect their family groups.

Chimpanzees live to the north of the Congo River where there are gorillas, while bonobos live to the south where there aren't, so bonobos have access to more medium quality food than chimps. Has this had some moderating effect on the levels of aggression in their species? Both species hunt various kinds of animals, although in bonobos both sexes are involved in hunting, while in chimpanzees it is only the males that hunt. Is it the subtle difference in their environment that has triggered such profound differences in their societal and sexual behaviour we discussed in the last episode? Or was there perhaps some minor initial difference in the two ancient chimpanzee groups when they separated, about two million years ago, that evolved gradually into such radically different behaviour? Here, I think the jury is still out.

In the case of orangutans, the Asian forests differ markedly from the African ones in one hugely important respect which can be described with one word: tigers. There are no tigers in Africa, so it is not hard to work out why oranges spend so much time high up in the trees. Galdikas describes how food resources are spread thinly in the Asian rainforest, so it isn't at all in the interests of oranges to clump together into family groups. Orangutans are large animals and if a particularly productive tree comes into fruit, one orang could easily consume all the food the tree produces on its own. If there was a group of oranges round the same tree they would quickly run out of food.

If you see orangutans on film, or in a zoo, you will get the impression of them being slow and cautious. A big animal like this needs to be careful if it is going to spend most of its time high in the rainforest canopy; a fall could be disastrous. Little wonder you don't see the noisy, enthusiasm of volatile, status-driven conflicts of the kind seen in chimps as they chase each other on the forest floor. Female orangutans don't have sexual swellings. Raising a young orangutan takes many years, and like other mammals, fertility is suppressed while mothers are providing milk for their young. The general rule seems to be that the young orang spends several years with its mother until it is weaned and independent, at which point the mother comes back into season and starts looking for a mate. Like gorillas, the adult males grow much larger than the females. Male oranges have an extremely loud “long call”, which they use to attract interested females who might be some distance away. While it is clear that oranges are much more independent than the other great apes, the research is also clear that friendships and what look like loving family bonds can, and do, persist throughout their lives.

So we can infer that the deep nature of each of the great apes can, at least partly, be deduced from the kind of world in which they live, and now we can get to the part you might well think is the important bit. Us!

Let's start out with our sexual behaviour.

The most obvious difference is that, unlike our nearest evolutionary cousins, human beings have not one, but two, sex drives. We have the drive to find partners and have sex with them as do other animals, but we have an opposing drive. I'm going to call it sexual fastidiousness. While we typically enjoy sex when we're doing it, sex is often seen as being somewhere between unseemly and immodest, and dirty and immoral. In contrast to chimpanzee society where dozens of male chimps, proudly sporting erections, excitedly chase round a "pink" female trying to mate with her. In most human societies, we decorously hide our genital organs and usually our breasts and buttocks: what scientists call secondary sexual characteristics, from everyone except our closest family members. The only exceptions being carefully specified and delineated situations such as medical examinations. Females especially are discouraged from having sex too early, or with partners who are unlikely to commit to them over the long term.

This perfectly illustrates a point I alluded to when I was talking about the caveats to the suggestion that we have a deep nature. We are not programmed to behave in a consistent way. The sexual drive and the sexual fastidiousness drive are in competition with each other. It is the balance between these two drives that produces the behaviour that is most likely to succeed in getting people's genes into the next generation.

It seems that we have been sculpted, by the evolutionary forces that made us to keep the sexual act back primarily for our intimates. Or to put this another way – and speaking very generally as we must when we talk about deep nature because not everyone will conform to our species' norms, it looks very much as if we are designed to find a single life partner, or at least a series of life partners. We are built to fall in love and stay together. My first thought when I was writing these podcasts, was to say that we were built for monogamy – this is where men have one wife – but then I realised that the drive is not that specific. Some people are sexually attracted to those of the same gender, but they still fall in love and often spend the rest of their lives together. We seem to be primarily programmed for romantic love, and long-term pair bonding rather than monogamy, although monogamy seems to prevail. Looking below the awareness horizon in respect of gay people, one might be forgiven for thinking that gay relationships should be strongly selected against by natural selection because such people are less likely to produce children and pass on their genes. But that isn't the full story. All this is complicated and there might be a number of possible explanations but there is a well-known evolutionary principle called kin selection which means that a gay family member, if he, or she, provides help and support to their family, assists their tribe's survival, and is effectively helping his or her own genes get into the next generation, because they all share the same family genes.

Monogamous relationships are not uncommon in the natural world, and although they are unusual among primates, they aren't unknown not even in apes. The so-called lesser apes: gibbons and siamangs are principally monogamous. In birds, monogamy is extremely common, and when we look below their awareness horizons it isn't hard to see why. Because birds fly, it is better for them to lay eggs which can be produced quickly then laid in a nest, rather than having to carry a large foetus with all the paraphernalia needed to support it such as a placenta and a fluid filled amniotic sac inside them as they fly around during the inevitably long period of the development of the foetus. The problem with eggs is that they need to be kept warm until they hatch, then in most species the nestlings need to be protected and fed until they fledge. This would obviously be easier if both parents contributed to rearing the young, and so, most birds form a mutually beneficial pair bond, which they adhere to with varying amounts of commitment depending on the species. Which isn't to say egg-laying is an essential requirement for flying animals, bats evolved from mammals which

couldn't fly, but managed to get round the problem by hanging their young upside down from the ceilings of caves, in the way you can't hang an egg.

Flight is not a consideration for humans, so carrying our unborn offspring round with us is not so much of a problem. It also has the advantage that we are spared the chore of keeping eggs warm. So why form pair bonds? One of the things that seem to be unique about our species is the enormously long period of the development of our young. Most mammals have grown old and died over the fifteen years or so that it takes for human children to reach sexual maturity. However, we know that chimpanzees reach sexual maturity at about the same age as humans, and in fact they are weaned later than human children, at about four or five years old. At this time chimpanzee mothers push their youngsters away, and although the youngsters will often remain near their parent for a time, and the emotional bonds with their mothers will remain, they are sufficiently independent to be able to make their way in their society and will spend much of their lives with other chimps in their community. The essential difference here is that at five years old human children are still highly dependent on their parents for education, protection and emotional support, which they continue to need for many years after this. In the time before contraception, it is conceivable that, if all her children survive, a lone human mother might have ten or more dependent children of varying ages, and it wouldn't make sense that a single mother, in the times before state support, would manage to successfully rear so many children on her own. It seems reasonable to suppose, then, that human offspring need the extended support of both the male and the female parent during this extremely long period of development.

In the cold rationale of the world below the awareness horizon, we can see why a divergence in the way men and women approach sexual relationships evolved. It would have been in the interests of a man to cheat his partner if in so doing he got another woman pregnant and duped another man into raising his child, although this lack of commitment to his primary partner, would have come with the risk of breakup and the danger that his own children might not do as well as other children who *were* supported by their own father. Fortunately, we do not live in that world we live in *our* world, the world of feeling, above our awareness horizon, where we can see that the cruel betrayal of trust of one partner by another, where it causes distress and pain can be construed as being wrong, purely on the basis of the pain it causes. It is feelings that matter. We can derive no justification for such behaviour from the mechanistic world below our awareness horizon.

All human beings will lie somewhere on the spectrum between being very prudish at one end and sexually open at the other. But in the interests of making sure of the support of their male partners it seems likely that women will be more likely to cluster around the prudish end of the spectrum, while men will generally cluster at the other end. I don't know of any scientific evidence about this, but a stereotype seems to have emerged in our society around the suggestion that gay men are often very promiscuous, while no such assumptions seem to be attached to lesbians.

Recognising that these differences exist could, in theory, build a better common understanding of our sexual roles, and a unifying influence between men and women.

Hopefully, now we can see more clearly why humans have two sex drives, and why sexual fastidiousness is likely to be more strongly developed in women than men as long as extremes are avoided, if overdeveloped, sexual fastidiousness, might make a woman not ever want to have sex and not have children.

At this point you might be forgiven for thinking that human societies are built to be defined by the nuclear family, as gorillas are: where mother, dad and however many kids, live together

independently, but this would not have worked out on the African plains. I don't know that much about the African savannah, but I do know that human beings can't survive by eating grass, and I'm guessing that there probably wouldn't have been enough fruit and vegetable matter on the grassy plains for our ancestors to survive on those alone. If this analysis is right, it would explain why our ancestors needed to become hunter gatherers. It is easy to see that this wouldn't have worked for small nuclear family groups. If dad is out hunting and mum's gathering food for tea, who's looking after the kids? Human beings are inherently slow creatures without natural weapons like claws and large teeth, so, individually, they would have been unable to defend themselves against dedicated African predators such as hyenas, lions and leopards, nor would they be able to counter the threat from other animals like elephants, buffaloes and hippos all of which can be extremely dangerous. A single man or woman hunting or gathering would have been extremely vulnerable. A man, even if he was armed with a spear, might find it impossible to fight off a persistent attack from a pride of lions or pack of hyenas. It is also fairly obvious that a man on his own would not be as successful a hunter as he would as part of a group of hunters with the capacity to develop tactics and strategies needed to hunt large animals. So the nuclear families composed of the pair-bonded adults and their children would have needed to form small communities with members of their extended family, so that bands of hunters, made up predominantly of adult males, could go out and hunt large, and small, animals, while other groups predominantly made up of women and adolescents could collect other food resources, while younger children could have stayed with other adults, or sub adults, perhaps at some kind of crèche at a home base which might have been temporary or permanent. We can also say that we needed to be a territorial species so we could capitalise on the food resources nearby. But even if we formed small, isolated communities, this would not have worked either. Without contact with other groups, small, familiarly related bands of humans would have become hopelessly inbred, so contact between groups would have been important too. So now we can see why our ancestors evolved to live in tribal units.

But because of the cold, amoral influences from below our awareness horizon it would be in the interest of one tribe to wipe out another if it could get access to more territory and food resources, and for the males to have sexual access to women from outside their group who are of childbearing age. It is for this reason that tribalistic warfare would have become part of our deep nature. Balanced against the urge for conflict, though, is the need for relatively stable societies. Because our children take so long to mature, there would be a selective pressure against tribal warfare happening too often. If I'm right about this, we can see why the human species would have needed to be calmer, less violent and less volatile than our nearest evolutionary cousins such as chimpanzees, or even bonobos. But, and it is an important but, when tribal communities were threatened by war from another group the potential effect on the tribe might be devastating. This means that the tribes would need to garner all possible resources and go onto a war footing, or what I think of as the emergency mode, where ordinary everyday activities, and the usual social norms are suspended while the war is being prosecuted or defended against.

Now I'm going to make a statement, and as you'll see there's something a little weird about it, or maybe, a lot weird about it. Here's it is: "That old softy, Vladimir Putin, is a hopeless sentimentalist, I mean he really lurves Russia, ahh, it's so sweet."

Let's think about this. Let's suppose I take the word, "Russia" from the statement, and replace it with the expression "fluffy bunny": "That old softy, Vladimir Putin, is a hopeless sentimentalist, I mean he really lurves fluffy bunnies, ahh, it's so sweet." Now the statement doesn't sound strange, it just sounds wrong. From what I understand of Vladimir Putin, he isn't the kind of person who goes gaga over cute animals. Those around him, and more widely in his country, seem to have given him

the strong, alpha male image of a leader. Now, I'm not a great fan of alpha-maleism. That's on account of the fact that I'm not a gorilla, and by gorilla, I'm obviously resorting to a stereotype, because we already know that silverback gorillas aren't anything like their macho-man image, but you knew exactly what I meant didn't you? And here I need to be clear that I'm not saying that Vladimir Putin is a gorilla, because that would be slanderous wouldn't it, so I am emphatically not saying that, and you are all my witnesses, aren't you?

So why does the first statement feel so weird? Part of the reason must have something to do with the reputation of the object of attention. Nation states like Russia are deemed to have prestige, they are thought to be high-status objects while cuddly little creatures like fluffy bunnies are deemed to be of a low status. But is that it? Status? Let's think about what Putin means by Russia? He can't mean the geographical territory, because he has said that Russia had lost respect after the fall of the Soviet Union, and the soil and rocks that make up Russia can't feel anything like respect. He could have meant the people of course, except that countries are not usually thought of as consisting of the people alone. There are sixty-seven million people in the UK, but I am surely not one sixty-seven millionth part of the UK, and Putin seems to have little regard for the Russian people anyway. Russia, like all other nations is an identity block, defined in part by its history, ethnicity, culture, and religion. Nation states exist ultimately as the emotional attachment people have for them. They are abstract entities made of feeling, which is not to say that they aren't real, the feelings exist so the countries exist. Nationalism is created by, and made of feeling, and feelings are what provide meaning in the universe, so love of your country matters, but this leaves open a deeper question. Now that we've looked down through the human awareness horizon, we can start to ask whether it should matter and why it is that the love of a country feels superior to the love we might feel for other things. We'll consider the extent to which it should matter in the next episode.

But one other point to consider is this: The countless millions of people around the world who have their lives enhanced as they innocently spend their time cooing over YouTube videos of playful puppies, or Facebook pages with images of cute kittens can at least console themselves with thought that puppies and kittens are real entities in the way that nation states aren't.

So, we *can* say that we have patriotism. We have a proud, noble, high-status attraction to little fluffy bunnies, and a wimpy, low-status attraction to our nation states. Err, sorry, just a minute, did I get that the right way round?

It seems that human beings are extraordinarily complex beings; we don't just have feelings, we have feelings about feelings.

One more question needs to be answered about the evolution of human beings. Why do we have such massive brains compared to the other great apes? Why are we so intelligent? On the face of it, it doesn't seem that we would need the kinds of minds capable of achieving university degrees and PhDs to make stone tools and hunt game on the African plains. This didn't make sense to me, and it troubled me for years. At least that was, until I read a book called "The Mating Mind" by psychologist Geoffrey Miller. He put forward an interesting and totally compelling argument, which I found utterly convincing. The idea comes from Charles Darwin's other theory which the grand old gent called sexual selection. Darwin realised that female animals were choosing males they thought would make better partners. This explains the extraordinary beauty of the peacock's tail. Generations of peahens had chosen males with more and more spectacular tails until they reached the sublime heights of baroque beauty we see in their tails today. This, according to Miller, was a similar process to what happened with human brain size. Putting it in colloquial terms, women don't like low status men who come over as stupid, so such men are less likely to find partners and have

children. It is possible, of course, to flip this argument. Clever young men can pull clever girls, but they can also pull girls who aren't so clever. Less intelligent men, who don't have a similar capacity for intelligent conversation are much less likely to find partners and pass on their genes so they would be at an evolutionary disadvantage. As in peacocks, there was a runaway evolutionary process, so that over hundreds, or perhaps thousands, of generations the more intelligent, socially adept members of our species were more successful than those who were less so, and their brains, and the skulls that contained, them grew bigger over time. For me that answers the question. What do you think?

Thanks for listening.

Episode Eight: The road's end – Or the end of the road?

It is really hard to think of any idea on which all human beings will agree. I might suggest that none of us want to die, but many thousands take their own lives every year. A better one might be that we all want to be happy, I'll come back to that, but another idea that comes about as near to universal as any is perhaps is the belief that it would be a bad thing if there was a massive cataclysm that were to wipe out most of humanity, and even more so if it caused the extinction of the human race, but even here there are some fundamentalist religious sects that think that, based on particular readings of Biblical scripture, such a cataclysm is necessary to trigger the second coming of Christ.

Let's assume though, that almost everyone wants humanity to survive, and to do so without experiencing a massive and destructive apocalypse, let's think about what could threaten the status quo. The one that gets most people animated seems to be the threat from a comet or asteroid impact, founded on the evidence of the one that created the sixty-six million years old Chicxulub crater, which triggered the extinction of the dinosaurs. Such ideas might make fantastic Hollywood movies, but events like this are incredibly rare. As far as I've been able to discover, the Chicxulub asteroid is the only one of equivalent size to have hit the earth in more than half a billion years, and even that one did not destroy all life. That isn't to say that one won't hit and cause massive damage and loss of life in the future; it probably will. I haven't done the maths, but the chance of a large, extinction level strike in our lifetimes is probably about equivalent to my dropping dead of some unknown deadly disease in the next two milliseconds. Hang on a moment guys... No, it's ok I'm still here. I might be getting on a bit now, but I should be good for the next half an hour or so at least. And anyway, it looks like we might soon have technology available that will let us deflect or destroy dangerous asteroids or comets.

Most of the major mass extinctions in earth's history seem instead to have been related to climate change, a sobering thought. These extinction events, though, seem to have resulted from massive volcanic upheavals called flood basalt events that happen in pulses over thousands of years caused when the earth's crust rifts open spewing out hundreds of cubic miles of lava which release billions of tons of carbon dioxide into the atmosphere, radically changing the climate and heating the planet. There is a vast area in northern Russia called the Siberian Traps made up of enough lava to cover the continental United States to a depth of one kilometre which has been firmly linked to the mother of all mass extinctions, the Great Dying, two hundred and fifty million years ago, when up to 96% of marine species and around 70% of land species disappeared. We might need to worry a lot about climate change, but it doesn't seem to be likely that the earth's crust will split open any time soon, so we probably don't need to worry about it coming from that source. Another possibility is that the death of a nearby giant star, a supernova, might flood the earth with cosmic rays which would strip away its protective ozone layer, and irradiate the surface with massive implications for the survival of life on earth. There is a suggestion that an event like this may have contributed to another mass extinction, 440 million years ago, but this hasn't been confirmed and, again, these look like extremely rare events. Because human lifetimes are so incredibly short on geological timescales, natural threats like these don't look like they should be anywhere on any scale of concern, for beings like us.

I've read that some scientists seem to believe that on average a species ought to expect to survive for about a million years. And now it's time for some fantastic news: We know that our solar system is about four and a half billion years old, and our sun will continue to burn for another three or four

billion years, so the human race should expect to survive for hundreds of millions of years at least, right? I mean we have eliminated our predators and produced a reliable worldwide food distribution network, why shouldn't we? You doubt it? You doubt that we could survive that long? Why? Animals like crocodiles have survived without changing very much for about two hundred and forty million years, sharks even managed to dodge the Great Dying and survived for about four hundred and fifty million years, why not humans? If you doubt that we might survive that long, I share your doubts. Our world is bristling with enough nuclear weapons to wipe out humanity several times over, and many nations that don't have them have in mind enhancing their primate status by acquiring them. On the other hand, some argue that the presence of nuclear weapons has prevented conventional war for the last seventy years or so. As I am recording this the war in Ukraine is raging, and as we've so far seen, major nuclear armed-nations are fearful of getting into a conflict with other nuclear-armed nations because of the worry that the conflict might escalate into all out nuclear war which neither side could win. So perhaps we don't need to worry about extinction. All we need to do is to make sure that we never elect, or otherwise bring to power, any patriotic leader who might want to take too many risks with everyone's future in the interests of national prestige. And additionally, of course, we need to make sure that no-one ever makes a simple mistake or miscalculation that might lead to Armageddon. This is easy, yeah? All we have to do is keep this up for a million years or so and we'll have reached the average life span of most other creatures. Simple right?

Ok, ok, I'm being facetious again. We can't predict what might happen for the rest of this month much less the next thousand years, let alone the next million. If we solve the consciousness problem, we might learn to build feeling machines that care about us and that might save us from ourselves. There could be other technological advances that make nuclear weapons, or their delivery systems, defunct, or societal advances that make it possible for us to ban and destroy them, but whatever the case, I don't suppose we'll ever be able to uninvent them.

What would nuclear war mean? There are four main ways in which you might die in one: Firstly, you might lose your life in the midst of one of the explosions themselves. Nuclear explosions come with their own ultra-efficient incinerators so effective that nothing is left: not even your ashes. You would be vapourised: reduced to a superheated gas, made up of the atoms of which you were made. If you are luckier, or perhaps not, and you were further from the epicentre of the blast, you could be killed by its effects such as the shock wave, or heat radiation which would cause any combustible objects within range, including human beings, to spontaneously catch fire. Thirdly, nuclear explosions suck vast amounts of dirt into the atmosphere. This becomes highly radioactive, then settles back to earth, falling as dust, like snow. It is known as radioactive fallout, and if you are exposed to it, it might cause you to succumb to radiation poisoning, which is a particularly unpleasant way to die; you might find yourself bleeding from every bodily orifice. But these effects, as monstrous as they may be, would not kill everyone. On the analysis, as I understand it to be, many billions of people would survive the initial blasts. Which takes me to the final effect. Because vast amounts of dust would have found its way into the atmosphere, the sun would be blotted out, for years. World temperatures would crash, and most, or all, crops would be unable to grow. This is what is called a nuclear winter, and, depending on its severity, could in theory finish the rest of us off. Disturbingly, during mass extinctions, larger animals, like human beings seem to be more vulnerable, and are more likely to disappear. In such situations it is always better to be a cockroach.

I have dealt with some of the big questions in this series of podcasts and here's the next: with the deep nature we have inherited, is our species viable? That is to say, will the instincts programmed into us when we were evolving in the very different world of the African savannah be appropriate in

a modern setting? Could they, in fact, doom us to self-destruction? Indeed, it is just conceivable that a nuclear cataclysm could wipe out all other sentient creatures on our planet and rob our world of the meaning it has had since the Nova point.

We set out at the start of this series, to investigate meaning. What matters in the universe and why? We can now see that it's the feelings built into our deep nature that tells us what matters and makes us who we are. But feelings cannot be the final arbiter of what is right or wrong. Russian nationalism *felt* important to Vladimir Putin when he invaded Ukraine. It *felt* important to the Nazis to complete the Final Solution: the complete annihilation of all the Jews of Europe. In Episode One, I said there are good reasons for mistrusting human intuition in this episode we will find out why, and we will begin to ask what feelings *should* matter.

I'm going to leave the question of humanity's survival hanging for a moment, because first we need a digression to consider another big question: I promised I would return to the topic of religion. Do I think there's a God? Well, as I said in Episode One, you certainly shouldn't be interested in what I think about it, although you might be able to work out the answer to that for yourselves. Would I call myself an atheist? No, although I wouldn't object to being called one. What I have discovered on my philosophical journey takes me inevitably to the need to abandon labels, we are all just feeling, caring beings, I prefer the doctrine of humanism. There are different ways of defining humanism, but for me it means valuing the feelings of all sentient beings equivalently, and the promotion of values like kindness, consideration, respect and tolerance, so if I'm forced to choose my 'tribe', I am a humanist, and incidentally a member of Humanist UK. If it is ok to follow a football team, then I suppose it's ok to belong to a tribe as long as its ethos is to respect, accept and understand the position of those who don't subscribe to its doctrines.

So, what does the evidence say about God? Hmm, when we apply Best Guess Reasoning the God hypothesis looks, well, well it looks pretty preposterous really. If we want to answer the question of why things exist, and God created everything, where the hell did He come from? Unless, of course, God created himself at the moment of creation, hmm... I don't know about that but well... what do you think... Shall we move on...?

In the Western Civilisation the predominant religions are derived from the Abrahamic traditions of Judaism, Christianity and Islam and we teach our children that there is a kindly, beneficent God who created us all. But if this were true, how do we explain why mother deer have to watch as their innocent young fawns are torn apart by wolves in front of their eyes? Why are there natural disasters? And why the holocaust? The problem of evil – why there is evil in God's universe – has been debated by philosophers and theologians over the centuries, but there has never been any satisfactory answer.

The task I set myself in this series of podcasts was to find the most likely explanation for what the Omnitruth might be, and the presence of evil unfortunately militates very strongly against the idea that a kindly, loving God created the universe. We cannot assume that that the best explanation for reality is the one we might wish it to be, no matter how strong that wish is. I can only follow evidence and reason to find out where it takes us.

On the other hand, there's an argument that seems on the face of it much more powerful. There are those who argue that science and reason are deficient when it comes to understanding existence and the place of humankind in it. They say that a scientific, materialist view of the universe leaves something essential out of the explanation, and this isn't a view confined to the cloistered realms of philosophers and theologians; many ordinary people have a profound sense of transcendence: they

feel strongly that there must be more to everything than just physical laws and moving particles. Indeed, the deep and fundamental need for some form of spiritual meaning whether founded in ancestor worship, animism, established religion or some other kind of supernaturalism, seems to be pretty widespread across all known current, and historical, cultures. You can guess what I'm going to say now, can't you: so let's say it. No matter how powerful and profound feelings of belief are, they are still feelings. Best guess reasoning takes us inevitably to the conclusion that the feeling that there is something beyond is part of our deep nature. If this is true, the transcendence argument for God completely collapses. Deep nature, after all, is made of feeling, it wasn't built to access reality; it is there to promote the random, artefactual and amoral aims of our genes to get themselves into the next generation. Many of us may feel a deep need for transcendent feelings, but that's just how we are made. Remember in Episode Four we talked about part of the left temporal lobe that seems to be involved in the generation of profound religious or spiritual feeling? Maybe our brains are just designed to produce that kind of experience.

It is obviously true that no-one is programmed for say, Roman Catholicism, Judaism or Islamic belief, deep nature is far too general and imprecise for that, it is just that our species seems generally disposed to need some sense of deeper meaning, and perhaps other kinds of systems which are central to people's self-belief like Communism, United States' Republicanism or British Conservatism are part of the same class of feelings. These are other things people believe in strongly. It also follows that, because of natural variation some people will need a sense of belief or transcendence more than others.

A side question here is that if we accept, and we must, that there is an Omnitruth, then there cannot be anything that can be supernatural. The Omnitruth describes what is true. If events really do occur that we think to be supernatural, then they are true and therefore part of the Omnitruth. Because the Omnitruth describes what is real and nature just *is* what's real, then nothing can ever be *supernatural* because supernatural, by definition, means outside of nature. There can only ever be things which we just don't know about yet.

Now we need to delve below our Awareness Horizon and ask why feelings of transcendence evolved, but before that something needs to be said about those who do believe, because this is one the profoundest and most difficult of human dilemmas. If feeling is what gives meaning to the universe, what do we say to those who have an honest and profoundly felt faith that provides them with meaning in their lives, those whose faith gives them comfort during bereavement, belief in an afterlife where they think they will be reunited with their loved ones, those who think they "know" there is a God, or those who have turned to faith as a less harmful obsession than illegal drugs, alcohol or gambling?

I don't know the answer to this, I really don't, and I wish I did. But I think that before we move on, we have to acknowledge how profound and meaningful these feelings are to those who do believe.

But then, what value truth?

I want to argue that the transcendence question is relevant to the question of our survival as a species. And the question we now need to address is why we have genes that build brains that predispose us to have faith? I don't think this is too difficult to explain once we understand how the world of our ancestors would have worked. As we saw, we are tribal animals, and occasionally human tribes, like chimpanzee communities, go to war. War is a high-risk strategy; if your side wins, the advantages are likely to be considerable in terms of gaining new territory, status and males'

access to females. On the other hand, losing a war is likely to be devastating when it comes to getting your genes into the next generation.

Chimpanzees will only attack members of another chimp community if they have a high numerical advantage; they seem to be very nervous about the potential downsides to warlike behaviour. So human beings are likely to have been “designed” with a delicate balance between warlike actions and peaceable ones. But if there was an evolved trait that didn’t involve the risk of making them more warlike in their general everyday behaviour but gave them a strong advantage when war did start then this is likely to have been strongly favoured by natural selection. Now imagine two tribes, one with a strong belief in something, whatever that might be, let’s say belief in ancestor worship, and the other easy going, laid-back hippy types. If these two tribes did go to war, all other things being equal, it’s not hard to see that the believers are going to win. They would be far more committed, they would be engaged in a battle for a higher purpose: they would be fighting in the name of beloved, lost ancestors, and whatever traditions they uphold. The hippy-types would not care as much about succeeding and would be at a massive disadvantage. The belief trait would be an attribute that does not confer a risky disposition to go to war unnecessarily but would be a trigger to give a much stronger response when war did start.

While we need to acknowledge the feelings of those who have a strong faith, we must also recognise the deleterious aspects of religion. I went to a Roman Catholic school, and I remember as a young child being taught that if I went to hell I would burn in the flames forever, and ever, and ever, for all eternity. But the teacher explained that I wouldn’t really be burning, it was just that burning causes the worst possible pain humans can endure. So that’s why we use that example. Fortunately, I was the kind of child who questioned what I was being taught, so it turned out that it didn’t terrify me and poison my mind for the rest of my life. I can’t speak for the other kids in my class. We also bring our kids up to believe the ridiculous idea that God created the universe in six days. How on earth did we get here? One way to think about it is that these ideas are founded on the beliefs of what amounts to a bunch of Bronze Age goat herders. Another way of thinking is that we cannot really criticise those who wrote the scriptures: they could not have known of the great age of the earth or the mechanisms that made us what we are. In Episode Two, we saw that nature is highly organised. Before Darwin had what Dennett called his “Dangerous Idea” a quite natural assumption to make would be that someone must have organised it. The idea of a god, or gods, would have seemed perfectly reasonable to them. They were using best guess reasoning as it would have applied at the time. Given what we now know, the God hypothesis looks incredibly unlikely. And, of course, the 9/11 hijackers were doing what they thought their god wanted. The loyal battalion commander of faith seems to have been the main supporter of Major-General Tribalism throughout all of human history.

Do we need God? One faith position we can all hold onto is the fact that nature’s wonder and its glory are unbounded: the spectacular sight of mountain peaks, the night sky, the majesty and irresistible power of the oceans and the jaw-dropping extravaganza of different living things that share this wonderful planet with us are far beyond amazing. How do we know that our world is wonderful? We feel it to be the case and therefore it is the case. There are no downsides to this kind of spiritual experience. We can glory not just in the enjoyment of nature, but also the love we have for our dear ones and the love they have for us. These are the positive aspects of our Deep Nature. They give us something to live for. And, of course, compassion, empathy and concern for the wellbeing and happiness of others is part of our deep nature too. I suggested before that if there is something we all want it is happiness. America’s founding fathers eloquently sought to guarantee life, liberty and the pursuit of happiness to their people. The Ancient Greeks too valued happiness,

but with a rather different slant. They wanted people to have what they called eudaimonia which translates rather differently to the contemporary Western understanding of the word happiness, and, in part, means the quest for a good life well lived, so there is an implicit sense of duty to others in the Ancient Greek philosophical tradition which seems to be absent in the modern version with its focus on the freedom to be yourself.

Perhaps it is not surprising that the modern understanding of what happiness is seems to have been defined by politicians rather than the more thoughtful philosophers of classical antiquity. It is worth asking how politicians in our modern world come to power. To be successful, one would hope that they are good at what they do and that they have risen to the top as a result of hard work, commitment and that their personal history demonstrates sound judgement, and the knowledge and wisdom to do what is right for the people they represent. Now I am not a politician and I'm not privy to the inner workings of the political system, but from the outside this isn't how it seems to work. Politicians are the alpha males and females in our society; it seems more likely that they get to where they are as a result of jostling for power in the style of social primates, not so much different from the way chimpanzees do it, where bombast, determination, subterfuge, alliance building and sheer bloody mindedness are as likely to achieve success as competency, thoughtfulness, kindness and a fair and decent set of principles. This is compounded by the fact that Western politics, at least is, dominated by a tribal structure: the party system, so that a disproportionate number of the people who achieve high office are bound to have a strongly developed tribal instincts, and where ideological beliefs and patriotism are seen to be strong and noble attributes.

History seems to show that world leaders have often been very strange individuals indeed. You don't often encounter massive egos like Donald Trump or Boris Johnson in everyday life, let alone more disturbing personalities like Hitler, Stalin and Putin who have such determined and resolute – but unverifiable – certainties about their nationalism. Such people always know best, and they are so certain of their beliefs that more balanced personalities around them either become terrified of their power or consumed by commitment to their leaders' alpha male/female status. Such great egos are not representative of the billions of ordinary folk who just want to get on with it and enjoy a happy peaceful and contented life, and therefore the question must be asked as to whether these can ever be the right people to be in charge.

In contrast to perhaps most ordinary people, many politicians seem to enjoy the Darwinian cut and thrust and high drama of their particular brand of social milieu. But, of course, it has to be said that this isn't universally true because, there is a subset of ordinary people who think the ordinary, quiet everyday to be humdrum and boring and want loud charismatic leaders to shake things up and provide them with entertainment and distraction. Perhaps the most disturbing thought to emerge from this dalliance below our awareness horizon that we have embarked upon, is that it is inevitably the case that some people will express the tribal instinct more strongly than other people and such people are perhaps more likely to be attracted to totalitarian ideas, extreme political viewpoints and even terrorism.

The need for a sense of belonging to a social grouping is what scientists call in-group/out-group behaviour, and it is certainly accepted by evolutionary psychologists as being one of their modules of the mind, and therefore part of our deep nature. In-group/out-group behaviour is a kind of catch all term that captures all kinds of xenophobic influences like tribalism, racism, sexism, nationalism and ultra-nationalism as well as what are considered more positive instincts like a sense of belonging, identity and patriotism.

We think of a sense of belonging as a vital part of our being, and when we think of our families, friends and loved ones as a unit to which we belong; it seems to define us. It is entirely right for us to feel the need for family attachment and it's an essential part of what it is to be a feeling being. It leads many people to feel a connection with others who share an attachment to a particular sports team for example, and team sport, which is really a kind of stylised warfare, can be a relatively harmless and enjoyable way of finding meaning, and a massive boost to the well-being of those who feel the need for it. But unlike the love of a football team or the spectacles of nature, love of the wider communities to which we belong has a downside.

If we think about the Second World War from the German perspective, it was completely unnecessary, just as was, more recently, Putin's invasion of Ukraine. Neither leader needed to invade. Their case for war was underpinned by a form of extreme patriotism. The opposing perspective was different. It could be argued that the West, and Ukraine, were reluctantly drawn into unwanted conflicts to confront evil, and it would be churlish to deny that the overthrow of Putinism would make the world a better place in which people could live. So, on this reading, the patriotism of the allies in World War Two, and the coming together of the West in the face of Putin's brutality was, and is, an entirely good thing.

In fact, we seem to know intuitively that patriotism is a good thing, but how can this be true if its only useful role is to counter more extreme versions of itself?

While it is true that patriotism isn't the only driver of military intervention, NATO forces were used to good effect to stop the Balkans War in the late 1990s and early 2000s, and some ugly, cruel and immoral regimes do need to be confronted at least when they seek to dominate other societies against their will. If we were about to be invaded by a despotic, totalitarian, foreign regime, who wanted to overthrow our system, should we defend ourselves? Many would say that we obviously should. But what if this leads to our extinction, and perhaps the extinction of meaning itself, would it still have been worth it? I'll let you make up your own mind, on that one.

And it must be said that in other parts of the world I might be executed for blasphemy for writing these podcasts, or have Novichok smeared on my door handles for my treacherous attack on patriotism, or imprisoned in a "retraining" camp where I would be tortured, until I denied the truth of what I am saying. Unfortunately, as I've already implied, homicidal, genocidal and religious maniacs seem to be more common among our leaders than, thank goodness, among the general population. On the face of it, if feeling is really what matters in the universe, and the aim is to provide the people of the world with the greatest possible happiness the democratic political system, with its commitment to the rule of law and freedom of expression would seem to be superior to any authoritarian system, because for all its failings, faults and foibles, without democracy governments do not need to consider the best wishes of their people.

Whatever the truths of what I have just said, the point here is that it is only due to our deep nature that we feel the need for nation states in the first place. They only exist because we can't seem to escape the need for an identity group, otherwise all that really exists are people. Bonobos probably wouldn't understand war and would not have a word for it if they had a language. And, sadly, not for us the quiet, dignified, self-contained, contentment of the orangutan; although it has to be said that orangutans would probably not be bothered about learning to cure disease or to go to the moon.

I love and completely support the thought behind the oft-quoted statement against those who would discriminate against minorities. When confronting, say racism, homophobia and religious discrimination like anti-Semitism kind, good-hearted, decent people say: "There is more that unites

us than divides us.” But this is a lie, a bare faced, monstrous lie, because nothing divides us. All humans share the same deep nature. It seems to be the case that we have lying, conniving genes that have built into our deep nature the feeling that we are different from others when actually we are the same. And this seems to be the source of the deeply misleading Everest Syndrome. Animals, the feeling goes, are not like us. Although they won’t use these words, the meaning of those who argue for human exceptionalism is clear. Apes are *other*, they are smelly, hairy, stupid and subhuman, and have nothing at all to teach us.

While the life-enhancing love of nature, and of our families, is something we *should* feel, the othering of those who live in different societies, have a different sexual orientation, ethnicity and those of a different religion, is something we not only wrongly feel to be true; it is morally indefensible, it deprives millions of people of the happiness they deserve.

When chimpanzees exhibit warlike behaviour it only ever seems to be the males that are involved. If this trait transfers across true from our ancient ancestors, it seems clear that if all the world’s leaders were replaced by women, then war might disappear, and the greatest threat to the survival and wellbeing of our species: nuclear war would go with it. You might think this to be a ludicrous and completely impractical suggestion, and obviously it is, but only because our deep nature would never allow it to happen. It also needs to be said that not all women conform to what we think of as typical female stereotypes.

We think of ourselves as intelligent beings, but we are not clever enough to have brought the world together under a World Government where all points of view and all nations could be fairly represented. After World War Two, while the monstrous reality of war was still uppermost in people’s minds, humankind established an institution to prevent further conflicts: The United Nations. But it is regularly undermined, devalued and underfunded. Even at the time of its creation it was stitched up by nationalist politicians so that any of the resolutions made by its vitally important Security Council could be vetoed by any of the Council’s then permanent members: Britain, France, the USA, the USSR and China. No doubt the people successfully negotiating these treaties patted themselves on their backs as they celebrated the patriotic protection of the national interest of their respective nations.

We human beings are the product of nature. I said before that nature’s beauty is boundless, but we also know that its cruelty can be boundless too: this is the inevitable outcome when we remember what nature wants for us: The narrow and arbitrary aim of getting our genes into the next generation; it is not at all what we might, or should, want for ourselves.

On one previous occasion when I was writing these podcasts, I reached for a word that wasn’t there. When I was describing Nova, I wanted to say that she was important, but she wasn’t merely important she was more than that, the word was too weak. Even adding qualifiers to it like hugely or massively didn’t help either. Nova was far more important than even being massively important. No word adequately expresses how important Nova was. I now find myself looking for another word that does not exist, because no word adequately expresses the monstrous cruelty wrought on the countless millions killed, maimed, orphaned, bereaved, discriminated against or otherwise robbed of happiness, through countless generations by the lie we have been forced to endure. The false distinctions between religious, national, tribal and ethnic identity groups have led to all the wars, tribal division, discrimination and genocide throughout history and pre-history. The resulting anguish, death, hurt, suffering and destruction of lives is way beyond any calculation, or word to describe it.

At this point in the first draft of the script for this podcast, I wrote a stinging rant about lying, conniving genes, our obsession with status, the tribalistic, alpha-maleism of some of our leaders the corporate greed of those who promote their own capitalist “tribe” and to hell with soft, wet, woolly green policies that protect our planet and the precious creatures and indigenous peoples who inhabit it, but then I realised I don’t need to rant do I? You know exactly what all this means. And after all, even if it is all nature’s fault, who can we blame? There’s no-one home. Best guess reasoning points to Mother Nature as being as mythical as Father Christmas or the Tooth Fairy.

It seems clear that Humankind is about to face the greatest challenge it has ever faced. While countries, many who are ideologically opposed to each other, have nuclear weapons, and future wars are probably the principal threat to our survival, the other is anthropogenic, human caused, climate change.

I started this episode by talking about mass extinctions, and the view of many scientists is that we are in the middle of one now. The sad and unforgivable list of lost species eliminated by us due to climate change and habitat loss increases every year. Many of these wonderful animals and plants had existed on earth for millions of years. What are we letting ourselves lose?

Alongside the loss of biodiversity, and despite all the rhetoric about climate change, every single year we release more carbon dioxide into the atmosphere than the one before it, and people are now starting to see the effects for themselves on their television screens and increasingly through their own windows.

Even if we do avoid the level of destruction the world saw during the greatest of all mass extinctions, The Great Dying, and that is by no means certain, the two dangers of climate change and nuclear war are not completely disconnected. Another great worry is that as desertification increases and vast parts of our planet are lost to us due to sea level rise, there will be food shortages, and the mass migration of tens of millions, or even hundreds of millions, of climate refugees which might destabilise the world order and lead to war on an unprecedented scale.

We often disregard messages from scientists. Our genes might tell us we don’t belong to the scientific “tribe”, and we can disregard what they are saying. Our deep nature tells us that we need to look after our own, except that now, the entire world is our own. The world now needs to come together. It isn’t for me to tell anyone what to do, but if scientists are telling our leaders to reduce emissions and to stop support for the search for new fossil fuel resources and that individually we should all find ways of lowering our carbon footprint, then maybe we should all listen.

Just as those other elements of our deep nature: the sex drive and sexual fastidiousness conflict with each other, rationality and the intuitions about protecting our tribe are in conflict too, but in the case of reason versus intuition, at this point in our history, we can see clearly which should be the winner.

In light of the profound and existential threat from climate change. It isn’t it perhaps obvious that it is time to enter a new emergency mode. There were aspects of it that can be positive, and these aspects were strongly evident during the Second World War in Britain, when it was not just the soldiers who were fighting, but everyone else became involved in the national struggle. Men who were too old, or too young, to fight, became Air Raid Precautions Wardens or joined the Home Guard. Young women joined the Land Army to work the fields, and every other spare bit of soil was dug over for crops by an army of allotmenters, who were eagerly “digging for victory”. The special, positive, conditions of the emergency mode were evident, but perhaps not quite so strongly developed during the Coronavirus Pandemic, as people stayed home and clapped for carers. But

when it comes to the climate crisis there seems, disturbingly, to have been no significant change to the public mood. Why not? Perhaps the answer is that the emergency mode seems to need an external threatening and dangerous entity to trigger, and maintain, it. It is very hard to get mad at a barrel of oil, easier to get mad at a virus and easier still to get mad at a Nazi Stormtrooper. But if there are large numbers of refugees, perhaps coinciding with food shortages and while our own countries are shrinking because of sea level rise, it's not hard to see that the emergency mode might be back with a vengeance. Just as religion can have its positive and negative effects, the emergency mode is not always positive. It is usually only when communities of people trip over into it, that cataclysmic atrocities and serious violations of human rights occur. In normal, everyday human behaviour, it is one of the most egregious crimes of all to kill another human being. When we are at war, it is expected and sometimes even admired.

If the religion question throws up a profound human dilemma, the in-group/out-group dilemma is of a much more massive and more destructive kind. Our very survival as a species might well depend on our ability to confront genes which we acquired in the radically different world in which we evolved. We feel emotionally connected to our own. How do we preserve that wholesome instinct, respecting and valuing all other feeling beings while at the same time avoiding the worst aspects of tribalism like war with the inevitable dangers of the emergency mode?

Could our species be terminally ill with the genetic disease of patriotism? That's another question to which I have no answer.

I should say here that I am emphatically not suggesting that we start fiddling directly with our genes. And it is an enormous relief to me that we can't. There is no tribalism gene; genes interact with each other in complex and unpredictable ways, so we wouldn't know which genes to change or what other unexpected outcomes might follow if we got it wrong. As we heard in Episode six, the cruel and abhorrent behaviour of the eugenicists, should be warning enough that we shouldn't even think about this.

And while I've done my best to understand truth, guided only by science and real-world evidence, and this suggests I'm probably right about our deep nature. I could have, and probably will have, got some things wrong. Science is always provisional. While it has given us some clear, demonstrable, and unarguable facts, like evolution happened and the earth goes round the sun, instead of finding answers, it very often only finds more questions. I have tried to use best *guess* reasoning after all, and there will inevitably be some things we think are true now, but which will turn out not to be.

So we can't, and shouldn't, try to change our genes, but then we might not have to. In his book, *The Better Angels of our Nature*, Steven Pinker, with a raft of intricately researched and compelling evidence suggests that wherever we look around the world human beings seem to have become more peaceable, less violent and far less aggressive throughout historical time. Back through the centuries, murder rates have declined sharply across all cultures and societies. Slavery has been abolished, we no longer burn witches, execute criminals publicly, and not at all in many countries. Most people today would probably not condone torture, let alone extreme versions such as stretching people on racks, publicly breaking them on the wheel by fracturing nearly every bone in their body, or hanging, drawing and quartering them. It is as if the more positive aspects of our deep nature, like compassion and empathy are starting to take a stronger hold. It is possible that these changes have come about because of cultural change, as a result of increased education, better means of communication, scientific knowledge and societies' self-awareness. Cultures evolve as well as species do. Indeed, Pinker seems to doubt a genetic role for the changes he has highlighted. But I'm not sure he's right. It is possible that our deep nature might indeed be changing. For that to be

happening then the frequency of the genes in our population that underpin our deep nature would have to be changing too, and we would need to know how and why that was happening. I can think of at least one mechanism which could be driving it, and if the gene frequency in the population really is changing, then we are evolving. That's what evolution is. But that fascinating question is beyond the scope of these podcasts. If anyone ever actually listens to them, and they become successful, I'll add a supplementary episode, or episodes, to discuss the question of whether human beings really are evolving.

The main point of this series was to show that our best guess about the nature of the Omnitruth is that we are animals with a deep nature that does not always work in our best interest.

As I said at the beginning of Episode Six, the fact that humans have a deep nature is seen as problematic, and is likely to be seen as incendiary, to some people. There are two potential worries that people have about this. The first is that because something is natural then that's how it should be, and therefore if it's natural to define human or non-human people as *other*, then this somehow justifies it. I hope I have shown this up for the complete tosh it is. Nature does not know best; it does not know anything. There is a principle in philosophy called the naturalistic fallacy which states – quite rightly – that because something is natural this does not mean it is good. The second worry is that if it is in our genes, there is nothing we can do about it. This is a slightly better argument, but it is also false. We might indeed be stuck with the deep nature we do have, but if we can learn from nature, we can see how it influences us, we can learn to confront its cruel effects. The first step is to avoid the Everest Syndrome: the idea that we can understand human beings without looking at our nearest cousins and where we came from, otherwise we risk letting our genes manipulate us to do evil without ever knowing why.

Because of its robotic mindlessness, nature has played three bitter tricks on us, the first is the cruel realisation that we are all going to die, the second is that we seem to need external meaning when it appears that there is none; meaning comes from inside us. And the third trick is that we seem to be programmed with the inclination to destroy ourselves.

The great news is that we can still do something about the third trick. It is not too late. The first step in solving any problem is to define it and understand it. In this case, the next is to solve it by favouring other parts of our deep nature like compassion, empathy, kindness and love. With the right political direction and will, we could set policies, legislation and other mechanisms to transform our future.

Humanity's far future, if it has one, will be peaceful and harmonious, characterised by tolerance, co-operation, sustainability and respect for our environment. There will still be natural variation between individuals and there will be people who are outliers, but parochialism and sectarianism will be rare or non-existent. Whether these changes come about by social evolution or Darwinian natural selection it is where we must go, because if we don't, we won't be here.

In the final chapter of Charles Darwin's world-shattering book "The Origin of Species", in which he proposed the idea of evolution by natural selection, he said that "light would be thrown on the origin of man and his history." for the first time we know enough about nature and how it works to begin the process Darwin so presciently pointed us towards.

Something incredible is happening, or rather, could happen. All post-Nova animals have a deep nature and, because we are animals, we have one too. But of all the untold millions of species that have called this planet their own, our species is different. It has the unique honour of being able to look down through its own awareness horizon. Our nature need not be deep any longer. We now

have the ability to see what it is to be human with more clarity than ever before. Understanding that, and seeing through our awareness horizon, will give us an incredible insight, and the tools that might help lift us up, to leave our animal heritage behind us, and turn us truly into intelligent beings, with the best possible knowledge of what is true, what really matters, and why. That's how we will save our world, the other feeling beings we share it with, and humanity itself.

Before you go, I have something to ask you. You will have noticed that you have not heard any ads while listening to these podcasts; that's because I have chosen not to be paid for them. It might be monumental hubris on my part, but I feel the ideas you've just heard are important, and I didn't want anyone to be put off by any unwanted advertising. The ideas are a summary of much bigger philosophical system, which I initially wanted to publish in a book, called "From Slime Eater to Sapiens", but because I haven't got a seat in a prestigious university, a certificate saying I have a PhD, or a picture of me in a funny hat, I've been told that mainstream publishers won't take me on.

If you work in the mainstream publishing industry, you are a literary agent, or you know someone who is, would you please think about whether there is anything you can do to help?

Thanks for listening to these podcasts. I hope I haven't offended too many of you and that you enjoyed them and found them useful.