MYTHSTAKES BOOK NINE: THE ALIEN SKY

CHAPTER ONE

In the UK there is a TV comedy called ‘Ghosts’. Set in the fictional manor, Button House, it features several ghosts, the oldest of which is Robin, the ghost of a caveman who has haunted the place for many hundreds of thousands of years.

In the fourth episode of the first series, we discover that Robin has a particular attachment to the Moon. We subsequently find out that this is because it is the one constant in his long, long afterlife as a haunting. Using the stereotypical stunted English fictional cavemen tend to speak, he says something to the effect of “things change. Place change. House change. People change. But Moonah always Moonah”.

There is obviously much truth to what Robin said. Things do change. Centuries ago many of the nations marked on a contemporary map did not exist, and certainly no 20th century technology like television, cars and airplanes were around in the prior to the 19th century. If we wind the clock back through timescales that stretch back further than Robin’s original life, we have every reason to believe the ancient Earth was a truly alien world.

Changing Landmasses

It is known, for instance, that the world’s landmasses are not fixed in place, but rather are slowly moving thanks to plate tectonics. The idea that the world’s landmasses might be moving was first proposed by a German meteorologist called Alfred Wegener (1880-1930) who coined the term ‘Continental Drift’. Such a term gives the impression of Africa, the Americas and all other landmasses gradually moving as they are carried along, floating on some kind of liquid (magma, perhaps).

When it was first proposed by Wegener, most people were inclined to write off continental drift as an obviously absurd idea. But over the 20th century, evidence mounted up showing Wegener was essentially correct, even if his proposed continental drift did not actually describe the actual process.

As Richard Dawkins explained, “plates do not plough through the sea, either of water or molten rock. Instead, the entire surface of the Earth is armoured, covered by plates, sliding over the surface…As a plate moves…the ‘gap’ is continuously filled by new material welling up from the deep layers of the Earth’s mantle and contributing to the substance of the plate, in the process called seafloor spreading”.

If we take Africa and South America for example, plate tectonics and seafloor spreading are causing those continents to be pushed further and further apart, so the Atlantic Ocean is growing wider. Not that you would notice this change. Those continents are moving apart at the rate of one centimetre per year, so on human lifespans the change is imperceptibly small. But wind the clock back hundreds or thousands of millions of years and the position of the Earth’s landmasses would have been drastically different. About 356 million years ago there was a gigantic continent we call ‘Gondwana’, sitting at the South Pole. It consisted of not only Antarctica but South America, Africa, India, Arabia and Australia, all slotted together

like pieces of a completed jigsaw puzzle. Viewed from space, Earth of 365 million years ago would have looked like an alien world to those familiar with a modern-day atlas.

Changing Life

Not only would the landmasses have looked so unfamiliar, the life inhabiting Gondwana would have been unlike anything alive today. It was earlier mentioned that the continents are moving at roughly the rate at which fingernails grow. Here's another example of a tiny change. In the 80s, Peter and Rosemary Grant (both born in 1936) travelled to the Galápagos Islands to study the many species of finch to be found there, and which had previously done much to help Darwin discover natural selection. In the years following 1982-83, when there happened to be an El Niño flood, the Grants discovered that a tiny difference in beak size determined which finches survived and which did not.

As Peter Grant explained in one anecdote, 'once, just as I was beginning a lecture, a biologist in the audience interrupted me: 'How much difference do you claim to see…between the beak of a finch that survives and the beak of a finch that dies?'

"One half of a millimetre on average", I told him.

"I don't believe it!", the man said, "I don't believe a half of a millimetre really matters so much".

"Well, that's the fact", I said. "Watch my data and then ask questions". And he asked no questions'.

Now what I find most informative about that anecdote is that it really emphasises the point that natural selection consists of very slight changes that accumulate over immense timescales. A finch with a beak half a millimetre smaller than another finch would of course look no different to us, but let such imperceptible changes accumulate over thousands of millions of years and you end up with enough change to transform a wormlike organism into something resembling, say, an ape.

An Alien World Under a Familiar Sky?

Thanks to evolutionary change and plate tectonics, the Earth of 65 million years ago was an alien planet. But when the dinosaurs looked up, and certainly when cavemen like Robin turned their attention to the heavens, we assume they did not gaze upon an alien sky. No, they saw the same night sky we see. The same constellations, the same planets visible to the naked eye following their familiar orbits, and of course that most familiar of heavenly companions, the Moon, waxing and waning just like it had done so since life emerged from its unknown origin. As Robin said, "things change…but Moonah always Moonah".

What parts of this book in the Mythstakes series intends to do, though, is try and show how this assumption of a night sky that remains pretty much unchanged throughout the course of human existence may not be true. In order to do this, we're going to have to look into some very fringe work that could be thought of as the mirror image of Mythstakes. That refers to science ignoring or explaining away evidence to the point where the model becomes

unsupported myth, but the disciplines we will be getting into later take actual myths and, rather than dismiss it all as the made-up nonsense of some pre-scientific era, instead casts an empirical eye over the strange landscape of mythic archetypes, connecting such themes to an alternative story of our solar system which, although it will come across as bizarre and probably unbelievable to those brought up on the conventional story of our solar system, actually has sufficient evidence behind it to at least take it a little seriously.

The Mythic Ages

When thinking about the broad sweep of history, we humans like to organise the continual story of human civilisation into various stages. Perhaps the most familiar of these stages is that of the ‘Age’. Most people are aware that, at the dawn of humanity, people lived in the Stone Age and that this was eventually superseded by the Bronze Age which, in turn, gave way to the Iron Age.

When one uses this modern scientific chronological determination of ‘ages’, the Iron Age is said to have begun around 1200 BCE and to have ended from 550 BCE (in the Ancient Near East) and 43 CE (in the case of the British Isles). Whenever the Iron Age did come to a complete end, the consensus of opinion is that it is something that happened long, long ago.

There is, however, a far older method of dividing the human story into different ages and, according to this tradition, the Iron Age remains the one humanity is living in. What I am referring to are the esoteric traditions which organised human society into four (sometimes five) Ages.

The Greek and Roman writers that devised this way of organising the human story were not motivated by technological development, but rather a way of explaining human history in the context of ancient mythology. According to Ovid (43 BCE-18CE) the Iron Age refers to a time in which people live within nations with definable boundaries; where the skills of navigation and mining have been acquired; where such virtues as a commitment to seek the truth or be loyal are rare (if, indeed, they really exist at all, anymore) and people are typically greedy and warlike. Given that politicking is still seen as involving the spinning of false narratives (these days they call it “perception management”), that success is defined purely in material terms and that nations still wage war, we remain in the Iron Age of esoteric tradition.

Before the Iron Age, it was said, people lived in a Bronze Age of heroic mythology, and such an Age was itself preceded by the Silver Age. That referred to a time of priestly knowledge and when agriculture was introduced to the world.

When one traces these three ‘Ages’ forwards, what one sees is human civilisation becoming increasingly corrupted, with heroism, honour, virtue and modesty increasingly replaced with selfishness, cheating, lying and aggrandisement. If that is so, it must necessarily be the case that, if we run the clock backwards, we see human civilization heading towards a state of greater perfection.

So far as the esoteric traditions are concerned, this is indeed what happens, for the Silver Age was said to have been a world born out of the chaos that ended the greatest Age of

them all. This was the Golden Age of Saturn's rule, a time of unparalleled peace, justice and plenty.

As what is to come is a radial view of the heavens, it might be better to gradually ease ourselves into this perspective rather than dive straight in. The best way to work our way comfortably up to this alternative view is to remind ourselves of the largely overlooked concept of the original singular god. The following chapter will therefore go over ground that Book Seven already covered. Those who know this stuff already may want to skip to chapter three.

CHAPTER TWO

I don't know about you, but I had always assumed that 'monotheism' was a belief that arose relatively late in human thought. To my mind, belief in one God was a feature of Western religions that have dominated since the fall of the Roman Empire, and that all religions that came before involved the worship of multiple gods. In his book 'The God Delusion', Richard Dawkins summarised the development of the idea of God as "a progression from tribal animism, through polytheisms such as those of the Greeks, Romans and Norsemen, to monotheism such as Judaism".

This seems to reflect the progression of religious belief as I am familiar with it. Long, long ago, our ancestors had a vague notion that unseen 'souls' or 'spirits' dwelled within the rocks, the waters, the animals and so on. Then, as these people developed more elaborate mythologies, these vague spirits became more anthropomorphised and personalised, becoming 'goddesses of love', 'gods of war', 'gods of spring' and so on. Later still, these pantheons of the gods got whittled down to one omnipresent and omnipotent deity.

Such a progression is suggestive of an evolution of thought that is perhaps appealing to a committed atheist like Dawkins. Our earliest ancestors believed in many mythological deities who often acted in capricious and whimsical ways. This polytheism then gave way to a rather more mature monotheism, a worldview that posited one god, a god who was not prone to mischief but who was rather a law giver who brought order to the universe, making it something we could understand through our god-given gifts of rational thought (although, to many theologians, God is to be conceptualised as outside and above the laws of nature that He wrote, and is therefore able to suspend them in order to perform miracles). From this stage it's easy to see what the next development for a maturing human race ought to be. It is to go one god better and remove that single deity of monotheism, believing instead in the evolution of a totally natural universe, one governed by 'rules' revealed to us through materialist science.

The Original Monotheist God

It turns out, though, that this is not a story that everyone subscribes to. In 1912 one father Wilhelm Schmidt (1808-1954) published 'The Origin of the Idea of God'. In his version of the origins of religion, monotheism was not a relative newcomer but rather was the original conception of God. According to his version of events, long before people had been building temples and sculpting statues in dedication to polytheistic deities, they had believed in a single supreme being who was first cause of all things and ruler of heaven and earth.

But there was one notable difference between this original supreme being and the god of later monotheisms. Whereas the Christian god (for example) has inspired countless forms of devotional art, cults, organisations and people like priests, popes and prophets who claim to be able to interpret His will, no cults were built around the original supreme being, nobody presumed to be able to interpret the will of this god, and nobody attempted to portray this god in any kind of devotional art. The reason why this original God did not inspire the sort of devotional practices we now recognise as quintessentially religious was because this was a deity that was far less personal, and far more aloof than the God of later monotheisms. This

god was conceived of as governing human affairs from afar, and so far removed from the experiences of mortal beings as to be beyond any possible human conception.

According to this theory, then, there should be no physical evidence- no paintings, no statues, no temples or anything- left to tell us that our ancestors believed in Schmidt's original singular god. Why, then, should we believe this story? What evidence is there to support Schmidt's claims? Well, many African tribes believe in what anthropologists call a 'Sky God' (also known as a 'High God') who is like Schmidt's original god in many respects. Most especially, while this sky god is believed to rule from heaven, be watching over us and ready to punish wrongdoers, at the same time there is a belief that such a god is beyond human expression. This leads to this god being absent in the lives of these tribes in a way that would seem strange to those of us who are used to religions that make great use of symbolic representations of their gods. Just like Schmidt's god, the Sky God is never depicted in effigies and no cults are ever organised around him.

The God that (Literally?) Went Away

Interestingly, for some of these tribes, belief in this supreme, remote and inexpressible deity has, over the generations, played a diminishing role in people's lives, to the point where some say this god has "gone away". This is something else that would seem to coincide with Schmidt's take on the first god. His theory was that eventually this god's very remoteness and inexpressibility proved to be his undoing, because he faded from human consciousness. Just as the Sky God of many African tribes has been forgotten and replaced by lesser gods that have the advantage of seeming more accessible and relatable, so too did the pantheon of gods as depicted in Pagan polytheisms present less exalted but more relatable gods for people to worship.

Regardless of whether or not this original monotheism as conceived by Schmidt actually existed, the fate of the tribal Sky God tells us something interesting about religious beliefs. These are ideas that survive in the collective consciousness so long as they 'work', and it should not be presumed that by 'working' what is always meant is "offering explanations that would satisfy philosophers or scientists". In fact, oftentimes our ancestors were simply not concerned with details that later philosophers would consider vitally important questions to answer.

Anyway, once it ceases to be the case that a conception of God 'works' (whatever that means) such deities fade from the memory of a people and are forgotten. The way the African tribes portray this implies people don't admit that this god was something they made up. Instead, they think of this god becoming increasingly remote until it is claimed he has 'departed'. Some time later, he is forgotten entirely.

Or, at least, that seems to be the common anthropological explanation for why tribal societies once believed in a sky god and then let that myth fade from consciousness, all without really questioning the validity of the idea. But, what if this presumption is wrong? What if there once really was a sky god or, rather, something our pre-scientific ancestors took to be a god? What if that 'something' really did depart, in the sense of some awe-inspiring spectacle that once dominated the skies but then physically moved away?

Dragons and Temples

Another one of those mythic archetypes repeated again and again in ancient cultures which would appear to have no natural counterpart is the chaos monster, the most familiar version being the dragon. The Enuma Elish speaks of a battle between Marduk, the Babylonian Sun god, and Tiamat, depicted as a monstrous she-dragon, who was the mother of the earlier Babylonian gods. It's significant that Tiamat was depicted as a dragon, because in almost any culture you care to name, such a mythological beast is a symbol of the unformed and the undifferentiated. So what Marduk is fighting against is the ever-present threat of order falling back into chaos.

Marduk eventually succeeded in slaying Tiamat, and afterwards used her body as the material with which to create the world of Men. Along with building this new world, Marduk in his role of lord of the gods of heaven and Earth also acted as the Rule Giver. He devised laws intended to preserve the order his victory had established.

It is not enough, though, to write laws down, for it is only by enacting them that they have any real meaning. And so, according to this myth, every year following Marduk's victory, the gods met at a certain place and there they held a form of public religious worship known as a liturgy. The place where these celestial rites were performed was, according to this myth, Babylon. In order to honour Marduk and provide a focal point for these ceremonies, the Babylonian gods set about building a great temple. This was Babylon's great Ziggurat, which is a kind of rectangular, stepped tower. Upon its completion, Marduk ascended to its summit, where a seat awaited him. As he took his seat, the other gods declared, "this is Babylon, dear city of the god, your beloved home!". With Marduk having taken his place as ruler of gods and Man, his subjects performed the New Year rituals that Babylonians would henceforth re-enact; symbolic gestures "from which the Universe receives its structure, the hidden world is made plain and the gods assigned their place in the universe".

It's worth emphasising that there was deep symbolism connected with this mythological story. According to Karen Armstrong, the Babylonians were well aware that this tale was not an attempt to provide a literal explanation for the Ziggurat's existence. That explanation was far more mundane: Their own ancestors were responsible for its construction, just as they were responsible for all of Babylon's material development. But what concerned these people was not so much the history of Babylon's material development but rather how that development could be made to endure.

In having such a desire, the Babylonians were much like most other people of the ancient world, who typically attributed cultural achievements to divine ancestors and gods. The durability of material and cultural achievements could not be taken for granted. The forces of decay and disorder were an ongoing threat that might very well undo what had been built up. The best way to ensure this did not happen, these people felt, was by partaking in the power of the divine.

And so, the assumption being made here is that the city of Babylon was imagined to be an image of heaven, a heaven whose celestial palaces had replicas here on Earth. And if political stability had been achieved, its ongoing existence could only be assured if the Babylonians participated in the more enduring and effective government of the gods. It was

the New Year festival, celebrated during the month of April (or ‘Nisan’ to the Babylonians) that provided this link with the divine world. They were ritual gestures that served to project the participants out of profane time to the world of the gods where one could become immersed in ‘Mana’ or whatever sacred, numinous power was thought to underlie reality.

Again, what we have here is the assumption that the global myths have their origin in vague expressions of human hopes, fears and societal concerns. But what if this ‘City of Heaven’ actually had its origins in some actual celestial event witnessed by ancient peoples?

Part of the reason why gods became so anthropomorphised was because our ancestors were seeking closer affinity with the unseen world they believed was all around them. As Karen Armstrong pointed out, “when people began to devise their myths and worship their gods, they were not seeking to find a literal explanation for natural phenomenon. The symbolic stories, cave paintings and carvings were an attempt to express their wonder and to link this pervasive mystery with their own lives”. And so it was that this ‘Manna’, along with more natural aspects of the ‘world’, like the stars or the wind, became personalised in the human imagination.

So what Armstrong is asserting here is that our ancestors were not being “unscientific” or “primitive” in their myth making, because a “literal explanation for natural phenomenon” was not something they were seeking.

But, what if her assumption regarding what our ancestors were trying to do in creating those myths is wrong? And what if Schmidt’s concept of the original monotheist god is also incorrect, or at least crucial aspects of the concept are in error?

With these clues in place- that maybe something our ancient ancestors witnessed in the heavens that we no longer see was the original cause of religious worship- we shall now move on to chapter three which will ask a seemingly silly question: When our ancestors worshiped the Sun god, what heavenly object was such devotion aimed at?

CHAPTER THREE

While Armstrong is not out to debunk the whole idea of religion like Dawkins, her approach to the history of God is similar in that both thinkers attempt to reconstruct what they think could have been the evolutionary process through which religious thinking developed.

They are not alone in attempting to reconstruct such a history. Several other such attempts were made prior to these authors' work, including a study by E.A Wallis Bridge (1857-1934) called 'From Fetish to God in Ancient Egypt'. In such a title we can see the assumption of how religious thought must have been a gradual evolutionary development, out of which spirits of "spring" and other aspects of the natural world and the human condition eventually morphed into the gods of global religions.

According to Wallis's assertion, "animism must have preceded the magical cults of the predynastic Egyptians, and it, in its turn, was succeeded by the cults of animals, birds, reptiles, trees etc., which, after animism, formed the predominant part of the later religions of the Egyptians. The great merit and fact that it embraced a qualified totemism…prepared the way for the higher classes of spirits to become 'gods'".

It's interesting to note how Bridge confidently states that this "must have" been how the Egyptian religion evolved. Where can such certainty have come from? It certainly cannot have come from an anthropological study of predynastic Egypt, since all that took place in a period of time removed from ours by tens of thousands of years. Nor could such a definitive conclusion be obtained through a study of historical documents and artefacts. Since much of this alleged development happened in prehistory, there is by definition no historical evidence we can rely on, or at least evidence far too scanty to warrant such certainty in the conclusions drawn.

But then, what do these evolutionary theorists use as the basis of their confident theories? The answer is that they study the belief systems of contemporary tribes in Africa, Polynesia, or Australia, peoples living without states, farming, formal education and other trappings of 'modern' civilisation, and then they assume that the beliefs of these modern-day tribes correspond to the beliefs of so-called primitive tribes living in the far-distant past.

Now, what we should expect from this assumption, is that as we trace the historical record of ancient civilisations back as far as we can go, the magic, totems and fetishes that were later unified into gods, disintegrate into the superstitions of so-called primitive cultures.

But that's not what happens as you follow the evidence back to the earliest religious texts and symbols still available for study. In fact, such an investigation shows the opposite of what the evolutionary theory predicts. As David Talbot (b 1942) commented, "a comparison of early and later sources, rather than suggesting a development, actually indicates the disintegration of a once-unified idea into magic, astrology, totemism, and other elements with which the evolutionists associate the "first stages" of religion".

So it's not the case that, as we follow the evolution of religious belief from the earliest records to the dynasties of the first empires, disparate primitive superstition become unified

into gods; rather, we find a tradition of one “great god” going back into prehistoric time, with polytheism a later development.

That religion traces back to archaic monotheism seems pretty clear from what is recorded in what may well be the oldest religious hymns in the world. According to the Pyramid texts, the story of Creation began with a singular god, Atum, who was said to have been “born in the Abyss before the sky existed, before the Earth existed”. Furthermore, a passage from the Coffin Texts (written c. 2617-2181 BCE) makes it quite clear that this was one god, not a host of deities as one would expect from polytheism. “I came into being of myself in the midst of the primeval waters”, Atum says, “I had no companion when my name came into existence”.

Now it is true that each locality in Egypt gave this god a different name. But, from the descriptions of this god we can see it is many alternative names for a singular god, and not the names of many gods besides Atum. After all, this ‘father god’ is always “god One”, the “Father of Beginnings”, the “Only One”.

Nor is this archaic monotheism a feature unique to the Egyptian religion. We find it also in Mesopotamia. Having undertaken a study of Sumerian and Semitic sources, Stephen Langdon (1836-1957) concluded, “both in Sumerian and Semitic religions, monotheism preceded polytheism and belief in good and evil spirits”.

In fact, no matter where you look in the world, whether it be India, Greece, China or the Americas, the history of the idea of god does not begin with many deities or spiritual representations of nature, but with a singular god.

The Awesome Spectacle of God

Now, so far, all this does is add weight to Schmidt’s idea that the earliest conception of God was monotheist. But there is also a rather dramatic contrast to how he portrayed the original singular god, and descriptions of the deity found in the earliest surviving records.

Starting with the latter, the oldest and loftiest of the Sumerian gods, Anu, is described in a way that sounds nothing like a remote, aloof god, for we are told Anu was a god of “terrifying splendour” who cast “a shadow of glory over the land”. Similarly, Egyptian sources speak of Atum as “the lord of terror” or “the great of terror”, which doesn’t sound at all like an unseen, unfelt creator so aloof as to have had no impact on human lives.

In fact, the oldest surviving religious texts all speak of such an impactful god, it does not seem at all credible to suppose archaic monotheism was an idea that our ancestors arrived at through ivory tower philosophical speculation, interpretations of visions had during transcendental meditation or anything of that nature. Or, rather, it’s not credible that an Egyptian or Sumerian priest would say he arrived at the idea of a singular god via such methods.

More likely, the priest would insist that the idea was not “arrived at”. No, Atum, Anu (and their equivalents around the world) this was an historical deity, and the events recorded in the earliest texts are accounts of concrete history, things that really happened, rather than mere

fancies of the imagination. And we in turn ought not to take him at his word, but instead think of the myths as priests' attempts to interpret actual events they could not have understood to the best of their ability.

The Sun God of the Golden Age

That the god of archaic monotheism was depicted as a character of history rather than pure speculation is enforced by another common trait found in all accounts. In all the ancient cultures, the original god is not a purely cosmic being, a 'central light' shining down holy glory from the heavens; he is also depicted as a king who ruled on Earth. Indeed, he is no mere 'first king' but the prototype of what all future kings, tracing their ancestry back to the original god/king, should aspire to be.

According to Greek mythology, ancestry traced back to "a golden race of mortal men who lived in the time of Kronos when he was reigning in heaven. and they lived like gods without sorrow of heart, remote and free from toil and grief". The Egyptian religions speaks of a legendary god/king too. This was Osiris, who led the Egyptians out of barbarianism and established a golden age of prosperity and peace. He it was who taught the Egyptians how to worship their gods; who gave them the arts of civilisation; who formulated the laws upon which justice is built.

Similarly, the theologian and historian Eusebius (260-339 AD approx) found that, in Babylonia, the ancient tribes of Chaldea lived "without order like the beasts" until the arrival of the god-king Oannes (the Greek name for the Sumerian An). "He….taught them the use of the laws and divisions and also the harvesting of grains and fruits and in short all that pertains to the modifying of life he delivered to men". So, just as was the case with the ancestry of kings in Egypt, the dynasty of Sumerian kings traced back to a supreme figure, a "central light" who gave us the very institution of kingship and established a golden age "when An engendered the year of abundance".

Aztec legend traces the ancestry of their kings back to the age of Quetzalcoatl. He was said to have ruled over the golden age of Anhuac, during which time he acted as "lawgiver, teacher of the arts, and founder of the purified religion".

According to Karl Jung (1875-1961) "the further we go back in history, the more evident does the king's divinity become…In the Near East, the whole essence of kingship was based far more on theology than on political consideration…It was self evident that the king was the magical source of welfare and prosperity for the entire organic community of men, animal and plant".

Latin traditions concur. According to these legends the original god "drew the rude and scattered dwellers on the mountains together…His reign was the fabled golden age: The Earth brought forth abundantly: No sound of war or discord troubled the happy world: no baleful love of lucre worked like poison in the blood of the industrious and contented peasantry".

Around the world, then, we find all cultures with kingdoms making the same claim: Far from being so aloof as to be inexpressible in any art or ritual, the god of archaic monotheism- the

“central light who issued from the waters”- was the prototypical “good king” who founded the supreme civilisation on Earth.

What are we to make of this global archetype of a god-king who ruled over a golden age of prosperity and peace? Those whose agnosticism leans towards the non-existence of gods might suppose we should not take much notice of such legends. One might dismiss tales of a former golden age as mere nostalgia. Just as today some people reminisce about the “good old days”, fondly remembering a past that probably wasn’t nearly as “golden” as their recollections would have them believe, so too, apparently, did our ancestors long for the return of those better times they imagined had once been. And is it really so surprising if each king would claim to be the direct descendent of the ruler of a golden age, promising that in their reign the good times would come again?

As for the celestial aspect of this god, the “central light” who “issued from the sea”, one might well think there’s no mystery here. Haven’t humans always witnessed a radiant light that seems to rise out of the sea (or, at least, from below the horizon) and which pours forth energy without which human life would be quite impossible? Doesn’t it just make sense that the thing our ancestors first felt they should regard with awe and wonder was the Sun?

The Primordial Sun

Yes, that would seem to be the most likely interpretation of this god of “fearful splendour” and radiant appearance that features in all the earliest religious texts. But, actually, much of the story and attributes of this archaic monotheist god does not correspond to the Sun at all.

For one thing, there is a tragic end to the god-king’s rule. In some traditions the king is overthrown by a usurper; others have him succumbing to the weariness of old age, while according to some he committed some sort of sin. In all cases, though, the result is the same. The god-king departed from the world and, having fled from the scene (or tumbled from his appointed station) the golden age came to a catastrophic end: the legendary Doomsday.

Of course, it is true that the Sun always “goes away” in the sense that night always falls. But why should that mundane fact of life become a universal tale of a god-king who departed, never to shine his glorious light in the heavens again? The Sun, after all, invariably returns, literally as day follows night.

Furthermore, none of the descriptions of this sun describe it as rising and falling, but rather as holding a fixed position in the sky. So, for example, we find the following in the coffin texts:

The great god lives,
Fixed in the middle of the sky,
Upon his support.

The names of many of the great gods of Egyptian mythology represent this notion of a god holding a fixed position rather than wandering about the sky. For example, Femhetep is a name that means “the one who comes forth while standing in one place”. All hieroglyphs of

the great gods show them as firmly seated figures, which again emphasises the belief that the Sun held a fixed position in the sky, which again does not at all like our Sun that clearly seems to move from eastern horizon to the west.

And this notion of an unmoving sun/god-king is not unique to Egypt. Scholars of comparative mythology have shown how all cultures insist that the god who ruled over the golden age occupied a fixed position in the sky. Assuming some physical thing was responsible for this universal belief, such as an actual sun, then those who witnessed this glorious light would, presumably, have been looking at some radiant object that occupied the celestial pole. That, after all, is the only location in the sky where an object can seem never to move.

When Night Was Day

Yet another conflicting fact has to do with how the ancients calculated the cycle of day and night. We obviously base that on the day beginning at sunrise and ending at sunset. So, when we find chapters in the Book of the Dead titled ‘the Chapter of Coming Forth By Day’, we naturally assume it refers to the sunrise.

But, actually, in the ancient way of thinking days were reckoned to start at sunset, not sunrise. This much is obvious from ancient texts such as the aforementioned Book of the Dead, part of which reads “I am that god Re who shineth in the night”.

So then, the lineage of kings is said to trace back to a celestial universal monarch, likened to ‘the sun’ (or, at least, a luminary being) that held a fixed position in the sky and was most clearly visible during the night. All cultures, worldwide, agree that this was something humans once witnessed, and yet it is completely at odds with how our Sun behaves.

When Sol Was Saturn

There is one final piece of evidence that shows this primordial sun, the original source of worship and the prototypical king, was not our Sun, and that is that all the texts tell us it wasn’t. The Zoroastrian Zurvan, the “king and lord of long Dominium”; the Hindu god Manu; the Chinese Huang-Ti, and the Greek Kronos, they were all identified with Saturn.

The universal belief that Saturn was the father of gods and kings, and the primordial sun that ruled over a golden age, is an idea largely lost but which lingers on in our language. The Hebrew Sabbath was said to be Saturn’s day, as was the most celebrated day of the Babylonian and Phoenician weeks. The Romans, also, dedicated the most important day of the week to Saturn, calling it ‘Saturn Dies’ or Saturn’s Day. This became known to the Anglo-Saxons as the “Day of Seater”, which eventually became the familiar Saturday.

One might also consider such words as ‘Saturnian’ or ‘Saturnine’, the former bringing to mind splendour (not surprising since it traces back to that lost golden age of Saturn’s rule) while the latter is a melancholic term, which again links back to the global myth of Saturn, in this case his eventual fall and the ending of the golden age.

The Planet Mystery

Anyone who has even a vague interest in the planets is probably aware that they are named after the Roman gods. But it surprises me that people don't generally pause to consider how strange this tradition of identifying the planets with gods is.

According to the prevailing astronomical and cosmological theories, by the time Homo sapiens sapiens evolved, the planets had been orbiting our Sun for billions of years. Whatever catastrophes occurred during the formation of the solar system (the evidence of which is said to be the scars some orbiting bodies bare, especially our Moon) all that was over by the time Man evolved enough curiosity to look up at the sky and question what he saw. What he saw, we assume, is the same sky we see: A Sun which rises and sets, a Moon that waxes and wanes, and the visible planets, slowly following their path through the zodiac.

Why, then, should cultures around the world have all identified the planets as gods with terrifying powers that had real, concrete impacts on Earth? It's true that one can infer from the positions of the planets that certain regular events such as the flooding of the Nile is about to happen, and that's useful to know if you depend on that, but why not regard that fact as mere practical knowledge, akin to determining a particular person had been in a particular location because he left his unique fingerprints? Why make up elaborate tales of gods ruling over a lost golden age, or of warring gods throwing thunderbolts?

Take Saturn, for example. Admittedly, it is one of the most spectacular planets, thanks to those magnificent rings. But such splendour is only visible through a telescope or, even better, by having probes travel the 746 million miles that separate it from Earth. To the naked eye, Saturn is nothing but the faintest speck of light, and if you're not trained in finding planets you'd almost certainly fail to pick it out among the stars. Why would this nondescript, dim pinprick of light even be noticed at all by our ancestors, let alone become the representation of a primeval sun-god, seated at the pole, who ruled over a golden age?

Another universal belief is that the planets representing deities are not all equated to male gods. The goddess that was known to Sumerians as Inanna, as Isis to the Egyptians and Ishtar to the Babylonians was known to the Romans as Venus which, like Saturn, is the name of this goddess we're most familiar with, being as it is the name of our neighbouring planet.

That this planet is always singled out as the representation of the mother goddess is another mystery that too few people puzzle over. Remember, the enigma here is not that some myths contain bizarre ideas. When all you have are flights of fancy unrelated to any natural phenomenon, you're bound to dream up some strange notions. No, the enigma centres around the common themes, repeated again and again in all the myths of the world. It's always a particular planet that is identified with a female deity; always a particular planet that represents the father of the gods/kings. And those are just two examples of global archetypes repeated (with some variations, such as different names) in the mythologies of the diverse people of the past.

A Question That Should Be Asked (But Rarely Is)

This, then, could be another one of those questions we should ask but never do: Where did all those common themes in mythologies come from, if there is and was nothing in the appearance or behaviour of the planets that could have inspired these worldwide themes?

If that is a question we should be asking, what might the answer be? While a detailed reply will have to wait, a general response would be as follows. We have been looking at the sky with minds prejudiced by what is perhaps the greatest mythstake of all. This assumption is one David Talbott described as the 'Uniformity Principle', summarised by the phrase "as today, so before". In other words, we assume that the night sky has undergone no dramatic changes in human memory, or at least none that could reasonably have said to justify such global themes as a model of the good king who ruled over a golden age whose glorious reign came to an apocalyptic end; a goddess famed for her beauty but who has a dual identity as a raging and terrible beast that is identified with Venus and comets, and many other common themes that, apparently, were inspired by nothing.

As Talbott himself remarked, "if, as is almost universally believed, the heavens have undergone no major changes in astronomically recent times, then the myths- however meticulously developed, can only be a fabrication, produced through the purest disregard for actual observation and experience".

We could hardly expect tales told with "purest disregard for actual observation and experience" by cultures that barely interacted with one another (or not at all) to nevertheless all come up with variations of the same common themes.

Unless, that is, those global archetypes are really our ancestors' attempts to explain cosmic events they really did witness, but which no longer appear in our skies?

If that is true, then perhaps we are mistaken in our assumptions of what creation myths are? When we think about the beginning of the world, or of time, we imagine this must be referring to events that either never really happened at all (in the case of myths) or happened long before any humans were around to witness such events. But maybe ancient creation myths concerning the beginning of time were our ancestors' way of interpreting actual events they lived through?

As we investigate these intriguing suggestions, we shall see how none of the more ancient myths posited a world created out of nothing, but rather from some formlessness of indeterminate age. It should not surprise us to learn that ancient people never considered the possibility that there was ever a time when 'the world' did not exist, for no such non-existence had ever been experienced. Whenever they built anything they had to rely, ultimately, on pre-existing materials. Creation from nothing never happened. However, they did have experience of the forces of decay and disorder threatening to undo their hard-won gains, and this reality was incorporated into their tales of the gods. This might explain how come these 'Mother Goddess' myths took such similar forms. It's because farmers striving to establish large-scale irrigation agriculture beside rivers that reliably flood and supply crops with much-needed water and nutrients experienced similar challenges.

But even if there is truth in this suggestion, and our ancestors did indeed seek to mythologise their daily experiences, it still fails to answer the point raised earlier- why would these ancient people apply the same archetypes to the same planets (such as Venus always representing a goddess) absent of any natural phenomenon to base these common themes on?

In the next chapter we are going way back in mythical time to a mysterious age that preceded the golden rule of the sun king Saturn.

CHAPTER FOUR

In The Beginning It Was All Purple

“In the earliest legend in which [the Kojiki] opens, one recognises the primal myth…the development from a primordial dawn of eternal twilight”.

So wrote George Post Wheeler (1896-1956) in his book ‘The Sacred Scriptures of the Japanese’. Such legends tell us that, prior to the Golden Age, humans had lived in the primordial dawn of an eternal twilight.

References to such a time come not only from Japanese scripture but other cultures too. For example, in his book, ‘South American Mythology’, Harold Osborne (1905-1987) noted how “some mythological cycles feature a primitive age of darkness before the existence of the Sun”.

North American Mythology agreed. “In the beginning there was only darkness. Yet in the darkness, there was already Raven”. That quote comes from ‘Heroes and Hunters From North American Indian Mythology’ by Marion Wood (b. 1939).

According to all these traditions from around the world, the Golden Age was preceded by an age of darkness. Given that it was also known as the age of eternal twilight, the obvious conclusion is that this mythological age of darkness imagines a time when all as black as night. But now we come to another one of those strange agreements in comparative mythology that doesn’t seem to correspond to anything in the natural world.

You see, this primordial age of darkness does not refer to a time when everywhere was black as night. Instead, it refers to a time, long long ago, when there was light, but a subdued light that had a distinctive colour.

In China the celestial North Pole region is referred to as the Purple Pole. Such a tradition has echoes in the Hopi tribe of North America, since these are a people whose songs refer to a “dark purple light” of creation coming from the North. Consider also the words of the Roman poet Martianus Cappella (305-440 CE approx). In one of his poems, the goddess Harmonia declares that the rays from the god Jupiter “renew the purple dawn for men”.

There is cross-cultural agreement, then, that the most primordial age humanity experienced was one in which our ancestors looked up and saw no blue sky, no gray sky, no star-studded black sky, but rather a sky that was purple. This light, it was said, came from a single, immovable orb, the only object in the heavens otherwise devoid of anything other than that omnipresent, chaotic purple sky.

Scholars of comparative mythology have identified that orb as the planet Saturn. However, it was not the Saturn we are familiar with, that far-distant gas giant with spectacular rings. Nor was it the Saturn of the Golden Age. According to Dwardu Cardona (1936-2016) “the evidence of myth which points to Saturn having once occupied a position above Earth’s North Pole regions is voluminous. There is not a race on Earth that has not preserved at least one account which states as much. According to this evidence, Saturn occupied a

north central position in the north celestial regions. It rotated, and rotated widely; but other than that, it was immovable".

When one gathers together all the points of cross-cultural agreement that comparative mythology reveals, we get a picture of what that most primordial age- the Purple Dawn- must have been like. Back then, people never saw any stars, just a dense, purple haze that prevented anyone from seeing the greater cosmos. There was no Moon and there was no Sun (or, at least, no Sun like we are familiar with, one that rises in the East and sets in the West).

Therefore, the Purple Dawn was indeed an age of eternal twilight, since there was no cycle of day and night. Nor were there any seasons. Since there was also no Moon there were no lunar phases by which the passing months could be measured, and no tidal forces influencing bodies of water.

In short, during the Purple Dawn, there was no way for humans to mark the passage of time, for there were no regular patterns of change one could use to measure such a thing. No planets could be seen moving through the constellations, no sunsets and sunrises announced the close of one day and the start of the next. All there was (other than that immovable orb, viewable if you lived far enough north) was that purple sky, an ocean of chaos, if you will. Interestingly, that ties in with all those creation myths in which, "in the beginning", chaos (symbolised by 'waters') preceded the coming of order and regularity. The ability to tell the time, the first gift of the Gods.

Now, attentive readers may have noticed that I have talked about this mythical Purple Dawn like it actually happened. To do so, surely, is absurd. For one thing, this is myth, and therefore not a factual or historical account. Also, the content of this myth is nonsense. An age, within human memory, when there was no Moon and no Sun; no day and night or changing seasons, and the sky was purple in colour? Ridiculous.

Yes. But it is precisely this ridiculousness, the reference to things never seen in our sky, that demands we do not just dismiss these stories. Instead, we should ask how come so many cultures agreed there was once a purple dawn and that Saturn appeared as a stationary orb situated at the pole, if no natural phenomenon ever existed to cause such cross-cultural agreement?

Maybe it was not the myths that were wrong, maybe it is modern science's assumption of what the ancient sky must have looked like, that is in error?

The Plasma Connection

In order to be able to start shedding light on the questions raised in the last chapter, we need to understand that there is something very unusual about this world we live in. Of course, the most obvious way in which planet Earth is a very rare place is that it is the only world we know of that has life. But I am referring to something else, and that is the fact that most of the materials we encounter in our daily lives are electrically neutral.

Most people are aware that matter exists in three states, those being a gaseous state, a liquid state and a solid state. But what many people do not realise is that there is another state of matter, and the reason why that is so is because of that unusual electrical neutrality mentioned earlier. It means we cannot see this state of matter unless there is a thunderstorm, in which case it will appear for a brief moment every now and then, or if we live near the poles and therefore get to witness one of nature's great spectacles. Other than that, though, you would only know that matter in this state exists if you had sensitive instruments that could detect its presence.

While this state of matter is the least familiar as far as most people are concerned, it is not the case that it is unusual for matter to be in this state. That may be so down here on most places on the Earth's surface, but if you travel just sixty miles above the surface of the Earth, you find yourself in a cosmos in which this form of matter dominates. In fact, it makes up 99% of the known universe.

But what is this mysterious yet ubiquitous state of matter that I keep referring to? It is something called plasma. Of all the familiar states of matter, plasma mostly resembles a gas, but there are also some major differences between these states. Most importantly, whereas a gas has component atoms or molecules that are electrically neutral, a plasma is made up of charged particles. Because plasma is made up of charged particles, it interacts with electromagnetic forces in ways that result in it forming far more complex structures than solids, liquids and gases can form (if you do not include biological forms, that is).

A major reason why plasma is a less familiar state than solids, liquids, solids and gases is because, in its most abundant form, we cannot detect it with our natural-born senses. Plasma physics talks of 'dark', 'glow' and 'arc' modes, and these represent the three primary progressive regimes of an electric discharge through a gas, categorised by how current, voltage and ionisation behave between an anode and a cathode. Dark Mode is the initial low-current regime where the gas is only slightly ionised by external radiation (such as ultraviolet light or cosmic rays) or low-level electric fields. It cannot be seen with the naked eye, only via specialised equipment like radio telescopes. Glow mode or glow discharge is characterised by a soft, diffuse coloured luminescence caused by excited gas atoms recombining or emitting photons (such as aurora, neon signs or fluorescent bulbs). Arc mode is blindingly bright, intense, and concentrated into a channel or filament without the layered dark spaces of a glow discharge. If a blindingly bright filament reminds you of forked lightning, that is because that is plasma in its arc mode form.

If plasma was given its due, it would be familiarly known as the primary state of matter. We would all know that there are four states- plasma, gas, liquid and solid- and that the first of these is, by far, the most common state that ordinary matter comes in . Furthermore, we would not consider plasma to be an unusual form of highly energised or heated matter (that's how most mainstream scientists who bother to think about it at all regard plasma), rather, we would think of gases, liquids and solids as unusual forms of cooled plasma (or matter with energy removed). Above all, we would not describe plasma as an "Ionised gas", since that is a very misleading way to think about it. We would acknowledge that it is a state of matter in its own right.

The reference to “ionised gas” may have reminded readers who read Book One of the story of Graham Chapman versus Hans Alvfën. What I want to do for the rest of this chapter is to repeat that story and then, in the next chapter, really dig down into how mainstream science arrived at the fundamental flaw that electric currents do not do anything in space. Also, because of this false assumption, mainstream science does not really know what stars are, how they are born, how they are powered, and why they come in different types like brown dwarfs and red giants. Since what is to follow is a repetition of ground covered in Book One, those familiar with it can skip to the next chapter.

Chapman Versus Alvfën

Plasma physics developed along two parallel lines. One such approach took a more empirical line of investigation. This hundred-year-old line of inquiry began with investigations into what were labelled ‘electric discharge in gases’. Practitioners of this method studied plasma and its behaviours in the laboratory, and in so doing they showed how plasma could exhibit such things as ‘double layers’, ‘striations’, and all kinds of oscillations and instabilities. But, what they did not do was come up with elegant mathematical theories that could explain all the complexity of plasma behaviour. Real plasma is too unruly and complex to lend itself to elegant mathematics, and this branch of plasma physics remained mostly experimental and phenomenological, with the theoretical side of things developing much more slowly.

The other approach to studying plasma came from a highly developed theory, which was the kinetic theory of ordinary gases. An alternative name for plasma is ‘ionised gas’, and the thinking was that the field of study known as the kinetic theory of gases could be extended to include ‘ionised gases’ aka plasma. This branch of physics succeeded in producing very elegant mathematical models, and claimed to derive all the properties of plasma from first principles.

But, really, such claims were a huge exaggeration. This approach to plasma physics was highly theoretical and had little to do with experiments in real plasma behaviour. In order to simplify that behaviour, a number of approximations were introduced in order for the complexity of plasma to be reduced to something that could be described in a mathematically elegant way. But, while these approximations were necessary if you wanted elegant equations, they were not always appropriate. Contact with real plasma and how it actually behaves would have shown this, but this line of inquiry was heavily theoretical, hardly ever concerning itself with experiments and ignoring most of the complexities that real plasma was known (by those who actually did conduct such experiments) to exhibit.

Meanwhile, astrophysics and cosmology were also developing in a way that lent heavily towards the theoretical and, because of this, these scientific fields greatly favoured the study of plasma physics derived from the kinetic theory of ordinary gases. As for the pioneers of the alternative method, their ideas were almost completely neglected and even now you would be hard-pressed to find any pop science book on space, stars and cosmology that so much as mentions them.

Now, you would be forgiven for supposing that, if plasma physicists running experiments had practical demonstrations that the theorists were wrong, it should have been easy to show those theorists that they were in error.

But, when one of the leaders in the field of practical studies in plasma- Hans Alvfën (1906-1995)- tried to show such demonstrations to Graham Chapman (1888-1970) (the leading figure on the theoretical side of things) he found that nigh on impossible to do. At one point, Alvfën recreated an experiment that a pioneer in the practical side of plasma physics- Kristian Birkland (1867-1917)- had once set up. The plan was that Alvfën would show Chapman this demonstration, and hopefully that would start a discussion on why the Birkeland currents that manifestly were produced could not also occur in space. But, as Alvfën recalled, “he flatly refused to go down to the basement to see it. It was beneath his dignity as a mathematician to look at a piece of laboratory equipment!”.

Eventually, the theoretical side of plasma had to confront all the complexities it had been ignoring for commercial reasons. Once it was realised that stars were powered by controlled nuclear fusion, a tremendously abundant form of energy presented itself. If nature could manipulate plasma into causing nuclear fusion, why could we not do the same? Indeed, the theoretical branch of plasma physics supposed this ought to be possible. After all, their theories seemed to show that laboratory plasma could easily be confined in magnetic fields, and then heated up to a temperature that would allow thermonuclear reactions to commence.

But when this was tried, the plasma absolutely refused to behave itself, exhibiting all those wild, complex and unpredictable behaviours the theoreticians had ignored, making sustained nuclear fusion a far harder form of energy generation than theory had led us to believe. Even now, nobody has managed to commercialise sustained nuclear fusion. We can, at great expense, achieve nuclear fusion for a brief time, using tokomak reactors that try to tame plasma with gigantic magnets, but attempts to achieve sustained nuclear fusion that outputs more energy than was used to start the process remains an elusive goal.

Meanwhile, that practical branch of plasma physics suggested alternative ways, methods that worked with plasma instabilities rather than trying to tame them. This line of inquiry has had as much success in developing fusion toward a commercial energy source, but sadly its advocates get only a fraction of the funds poured into mainstream approaches and remain a small group, out on the fringes, largely ignored.

CHAPTER FIVE

In the previous chapter, it was pointed out that, while most of us never see matter in its plasma state, there are regions on Earth where you can see plasma putting on a spectacular display. What I am referring to is the aurora borealis, more popularly known as the Northern Lights. I do not think it a coincidence that the scientists who best understand plasma came from regions where the Northern Lights are most visible.

One such scientist has been mentioned already, and that is Kristian Birkeland. He was a Norwegian who studied in Bonn, Geneva, and Leipzig, and there he learned about electromagnetic theory from such people as Henri Poincaré (1854-1912). In 1905, Birkeland began to follow up on some hypotheses that were forming in his mind. At that time, the frontier of research into electromagnetism involved the study of cathode rays, a line of research that had already led Wilhelm Röntgen (1845-1923) to the discovery of x-rays. That form of electromagnetic radiation had been discovered when electric fields had been applied to a partially evacuated tube coated with a fluorescent material. What resulted was rays lighting up one end of the tube.

When Birkeland witnessed that phosphorescent glow, he recognised that it bore similarities to those famous ghostly curtains of light known as the aurora. It got him wondering if the same principles that created the glow seen in laboratory experiments could be the same phenomenon producing the Northern Lights.

More specifically, he wondered whether electrons moving through the near vacuum of space could light up the northern skies upon hitting Earth's atmosphere, just as an electric current moving in a near vacuum in a laboratory produced something very much like that ghostly illumination upon striking fluorescent material.

Even if that was the case, though, it did not explain why the aurora is only clearly visible around the poles. However, Birkeland thought he had an explanation for that as well, one derived from his own experiments with beams of electrons. While running such experiments, he had noticed that the electrons were guided toward a nearby magnet. It was well known that the Earth has a powerful magnetic field, so why would it not also guide electric currents? Birkeland reasoned that when electric currents in space encounter the Earth's magnetic field, they would be forced to spiral around the magnetic field lines. It would be nigh on impossible for the currents to move across those magnetic field lines, but very easy for the currents to move along them.

What would it mean if the currents followed the field lines? They would have to enter Earth's atmosphere only where our planet's magnetic field is near vertical, and the only places on Earth where that is so is where the aurora puts on their most visible displays: the polar regions.

The reasoning was sound, but Birkeland was not content with mere speculation. He wanted to experimentally test his ideas and so he built a device that enabled him to do so. It consisted of a magnetised metal sphere that represented the Earth. In order to have a stand-in for the atmosphere, Birkeland painted a phosphor on the sphere which would glow

when hit by electrons. For the sun he substituted a set of cathodes, and the whole set-up was placed in a vacuum chamber to replicate Earth's habitat of space.

With the setup ready, Birkeland bombarded his model Earth with electrons. Just as he had anticipated, those electrons were captured by the magnetic field aligned currents that surrounded the sphere. Once captured, the currents spiralled downwards towards the magnetic poles, causing the phosphor to glow in the same polar regions the aurora are seen on Earth.

The laboratory experiment had returned exactly the results his hypothesis predicted, but Birkeland was not yet ready to rest. The laboratory data alone was not enough. He thought it necessary to get out and take measurements of the magnetic fields that, according to his hypothesis, are created by the current flowing during intense auroral 'storms'.

That, of course, would entail a field trip to some of the most inhospitable places on Earth, and Birkeland's own writings leave no doubt as to how arduous it was to do research in arctic conditions. "More than once it took three men with a great effort to close our little door, he wrote. "temperatures of minus twenty degrees Celsius accompanied by winds of [up to 20 MPH] were pretty frequent".

Braving those dreadful conditions, Birkeland and his team set up a network of detectors. With those instruments, he was able to show that the magnetic fields the aurora generate are so localised on the ground they can only have been produced by nearly vertical currents aligned along the magnetic field of the Earth.

More specifically, as the Earth rotates it generates a magnetic field. That field traps and deflects ionised particles and, once trapped, those particles wrap the Earth in a plasma called the magnetosphere. This does two important things. Most importantly of all, it traps what would otherwise be harmful ionising radiation. The leading edge of the magnetosphere slows down additional incoming particles and deflects most of them into the magnetosheath, which is the name given to the outermost region of the magnetosphere. Should any particles slip past this first line of defence, they become trapped by the van Allen radiation belt, which are two toroidal rings named after James A. Van Allen (1914-2006).

The second important thing- not really vital for protecting life on Earth but necessary for understanding the aurora- is that as those ionised particles sweep past the magnetosphere, you get sheets of electrons that are driven along the magnetic field lines of force, and that generates an auroral "oval" around the polar regions. As those electrons collide with oxygen and nitrogen atoms, that causes the celestial display of the Northern Lights.

Over the next few decades, Birkeland sought to apply his theories of the aurora to a wider range of astronomical phenomena, and by 1904 he was claiming, "space is filled with electrons and flying electric ions of all kinds".

However, it did take some time before science was able to confirm much of his theories. Take his ideas concerning the aurora. He proposed that theory in 1903, but it was not until 1973 that Triad, a US naval satellite, verified Birkeland's claims. It did so when its magnetometer detected two large sheets of electric current, each current carrying one

million amperes or more, down on the morning side of the auroral and up on the evening side, just as Birkeland had anticipated.

A year later further confirmation of Birkeland's ideas came in. He had hypothesised that space would be filled with electric current, something the mainstream considered quite impossible. But then, in 1974, those very currents (subsequently named "Birkeland Currents") were discovered by an artificial satellite.

Furthermore, when the Voyager probe reached Jupiter in 1979, it helped us discover Birkeland currents connecting Jupiter to its moon, Io. As with everything Jovian, the current is enormous, carrying something like seventy times the electrical power all the nations on Earth are capable of generating.

The Jovian Birkeland current may be enormous when compared to human standards, but in the 80s radio astronomy confirmed Birkeland currents on a galactic scale that make those of Jupiter and Io seem miniscule. This discovery came in 1984 when Farhad Yusef-Azdeh, Don Chance and Mark Morris, working with the Very Large Array radio telescope, found a structure near the centre of the Milky Way galaxy that is made up of plasma filaments that are typically three light years wide, running the full length of a 120 light year long arc of radio emission. The associated magnetic field is one hundred times greater than was thought possible on a scale as large as this.

Kristian Birkeland did a great deal to expand our understanding of the role electric currents and plasma play in space. It would be wrong to claim his research went entirely unrecognised. In fact, a working committee was in the process of nominating him for the Nobel Prize in physics, and he may well have received it had he not died at just 49 years of age. Nobel prizes are not handed out posthumously.

He may have missed out on the most prestigious award in science, but many of his works are used as reference materials and he might very well be Norway's greatest scientist. One reason for that is because, through working with devices that could produce intense electric sparks, he found a way in which artificial lightning could produce nitrogen fertiliser directly from the nitrogen in the air. Combined with hydroelectric power, this resulted in a method for cheaply producing tons of fertiliser, enabling us to produce more than enough food to feed the world (it's just a pity that markets, for reasons of profit incentive, do not allocate this abundance properly and allow obesity to coexist with malnutrition).

While it may be true that many of Birkeland's ideas are now widely accepted, it's also fair to say that his cosmological theories are hardly known at all. I own many books on astronomy, cosmology and the history of science, and out of all of them only one ('The Big Bang Never Happened') mention him at all. Nor do any of those books (again, save for Eric Lerner's) give any information about the many complex dynamic properties of plasma or, indeed, much reference to it at all.

It's little wonder, then, that most people think plasma comes in just the three states of gas, liquid or solid, and know absolutely nothing about the role plasma and electric currents play in the evolution of the cosmos. Indeed, Eric Lerner, one of the leading researchers in plasma

cosmology, keeps getting calls from people wanting information on blood, clearly misunderstanding what kind of ‘plasma’ his expertise is in.

Actually, there is some justification for such an error. Although Birkeland pioneered research into plasma, he never actually referred to matter in that state by that name. Rather, he called it “corpuscular rays”. Those corpuscular rays were bequeathed the name ‘plasma’ by Irving Langmuir (1881-1957) who worked for the General Electric Company. Some time around 1923 he had developed a fascination for studying the effects of electric discharges in gases. By studying that ionised material, he found matter in the state of ‘corpuscular rays’ displays lifelike and self-organising behaviour when it is in the presence of electric currents and magnetic fields. He borrowed the term ‘plasma’ from medicine, figuring it seemed a more apt one for the complex behaviour he was observing.

Since most people have no idea that plasma in the Birkeland/Langmuir sense makes up 99% of the universe, because mainstream pop science barely talks about plasma cosmology at all, it’s understandable if, on hearing some scientist is working with plasma, they assume it must be blood plasma.

Double Layers

Now, when referring to Langmuir’s work, it was mentioned that plasma displays self-organising behaviour. An important feature of plasma behaviour that Langmuir discovered is its tendency to create ‘double layers’ (Langmuir used the term “plasma sheath” to describe this behaviour). Double layers occur because plasma is able to form electrically isolated sections, giving the plasma a cellular structure. This happens because plasma is such a good conductor and cannot sustain an electric field, and so it self-organises to form a protective sheath across which most of the electric field is concentrated and where most of the electrical energy is stored.

Should a foreign object such as a voltage sensing probe be inserted into a plasma, a double layer will form around that object, shielding it from the main plasma. As a result, it’s difficult to insert probes into a plasma so as to measure electric potential at a specific location.

Double layers can form and they can also breakdown with an explosive release of energy. If you have ever seen close-up footage of the Sun, it’s likely you’ll have seen the effect of exploding double layers, because that’s what a solar flare is.

Or, rather, that is the explanation for solar flares put forward by a single group of collaborators led by Hans Alfvën in 1905, but it was an idea almost unanimously rejected by other solar sciences. Was there a good reason to be so dismissive? That is the topic of the next chapter.

CHAPTER SIX

At this point, we need to return to Sidney Chapman. If Birkeland could be described as the exemplary of the inductive method of science (that is, investigating Nature through experiment and observation, with theoretical, quantitative analysis always subservient to the more practical methods of investigation) Chapman should be seen as the representative of the deductive method, which entails investigating reality in a way that makes it possible to reduce it to elegant equations.

When it came to the aurora, Chapman's priority as a deductive scientist was to figure out which aspects of that phenomenon could be treated in a mathematically rigorous way. He realised such an approach was possible if one imagined the currents causing auroral storms were confined to the spherical shell of Earth's atmosphere. As for Birkeland currents in space, well, those were ruled out because such currents could not fit the elegant equations he could get by insisting currents were caused by disturbances in the Earth's atmosphere.

Chapman's model seemed more realistic to mainstream science at the time, because the assumption was that space is a vacuum. As such it could be likened to a perfect insulator, which meant currents in space were simply impossible. That "empty space" conception fit Chapman's model of Earth with currents and fields nestled within its own atmosphere really well, and since astrophysics and cosmology was leaning more and more toward the deductive approach, Birkeland's universe of plasma and currents was abandoned.

But not completely. As mentioned before, during the mid-sixties, Hans Alvfën, helped by his colleagues at the Royal Institute of Technology, developed an alternative model of the solar system. Their model was inhomogeneous, with currents concentrated into filaments. But while this model generally corresponded to laboratory experiments and space-based observations, the complexities of those filaments and phenomena like those aforementioned double layers, meant only a partial understanding of plasma behaviour was possible and a precise mathematical description quite impossible.

MHD Waves

Around 1943, while studying the solar phenomenon of sunspots, Alvfën had realised that plasma could support waves. Not light waves or sound waves, but waves of changing magnetic fields. Such an idea ran contrary to orthodox thinking, because electromagnetic waves cannot penetrate a good conductor. Back in the days before radio went digital, anyone tuned into a station while driving their car would have briefly lost the signal every time they drove under a metal bridge, for exactly the reason given. As plasma was believed to be a perfect conductor (we'll get to how we went from assuming space had perfect resistance, to assuming it had perfect conductivity later), no electrical field could form and, hence, there could be no electromagnetic waves. So, Alvfën's hypothetical magnetohydrodynamic waves, soon shortened to MHD waves, were ruled out.

Alvfën, though, believed that waves could form in a plasma under certain conditions, namely, when the plasma and the magnetic fields move together. His logic was that if you had a perfect conductor, thus one with no electrical field, then the imaginary magnetic lines of force would be visualised as moving exactly as the plasma did. Yes, any motion of plasma across

the field lines would generate an electrical field, but such a field would not be allowed by a perfect conductor. Since that was so, whenever the plasma moved the magnetic field would have to move as well. Since the magnetic field lines always moved exactly as the plasma did, they could be said to be “frozen into” the plasma, i.e, unable to move or change in any way. The end result of all this was that waves of plasma created waves of magnetic field direction.

During the 50s, those MHD waves proved to be of great practical application. The race was on to develop practical nuclear fusion as a source of energy, but the plasma kept on behaving in wildly unpredictable, unruly ways. Fusion scientists quickly understood such behaviour was caused by MHD instabilities, and so it seemed prudent to turn to Alvfën’s theories of MHD waves in order to see if such an approach opened the way to tame plasma and make fusion power a commercially viable prospect.

By the 60s, it was becoming clear Chapman’s “empty space” (one, remember, that was incapable of carrying current because of its infinite resistance) was not tenable, and so a replacement theory had to be found. It was determined that a good candidate was waiting to usurp Chapman’s model, and that was MHD theory. It proved popular among astrophysicists wedded to the deductive method, because one could get mathematical results almost as elegant as Chapman’s, if one modelled space assuming it had zero resistance.

And so, the predominant attitude transitioned, from a model of space that was a perfect insulator, to one in which space was modelled to have perfect conductivity. If you have perfect conductivity and frozen-in magnetic fields, you cannot have electric fields, or current aligned with magnetic field lines, and you cannot have the generation of electrical power. The reason why not is because all that needs finite resistance and a flow of plasma past magnetic fields- both ruled out by perfect conductivity and frozen-in field lines.

Assuming MHD theory with its “frozen-in” magnetic fields was universally applicable, MHD plasma could not develop inhomogenities. It would be a perfectly smooth plasma with no large-scale structures that could transmit power over large distances.

The Limits of Applicability of MHD

So theory said. But, from the 50s onwards, Avflën had been doing practical work that showed Birkeland’s plasma universe could be possible. He spoke of the possibilities of filaments, currents and double layers in space, all of which was rejected on the grounds that none of that could exist in a perfectly smooth plasma.

Alvfën came to see that the problem was not that his hypotheses on plasma cosmology were untenable, but rather that those who would not countenance such things had forgotten one very important thing about mathematical models: They are only ever approximations that apply only to specific situations. They are never universal laws. But mainstream astrophysics was applying MHD theory like it was a universal law.

In doing so, they were ignoring the fact that there are real barriers preventing space from achieving infinite conductivity, and those barriers are the magnetic fields created by the currents themselves.

By doing research based on the insights mentioned above, Alfvën discovered that the electrical conductivity of plasma (and, indeed, any material) is determined by two factors and those are 1: the density and 2: the mobility of ions (i.e, charge carriers) in that material.

Now in the case of plasma, since electrons and ions can move freely in space, the mobility of those charge carriers is extremely high. But what about the concentrations of ions available to carry that charge, is it also always extremely high? The answer is no, if the plasma is very low pressure or diffuse.

Any such plasma would have an effective resistance, meaning field lines cannot, in fact, be frozen-in. That meant MHD theory was really only applicable to very dense plasmas such as stars. It wasn't valid for most of the plasma in the universe.

If astrophysics really wanted to understand the cosmos, it would be necessary to abandon applying MHD theory universally and work on developing Alvfën's circuit and current viewpoints instead. Perhaps understandably, Alvfën believed he could soon bring about such a shift in perspectives. After all, MHD theory was his creation, and surely if the very scientist who created a theory informs the scientific community of its limitations, that has to be a caution the community would heed?

But that's not what happened. Because astrophysics was moving more and more in the direction of the deductive approach, there was an unwillingness to abandon MHD theory as a universal rule, simply because it fit so beautifully with such a methodology. They did not care that it was ruled out experimentally and by observation. It facilitated the development of elegant equations, which was all that mattered to them. Any discrepancies between what their theories said ought to be the case, and what actual measurements were showing actually was the case, could be imagined to be reconciled through further understanding.

And so, while Alvfën's 1940s work on magnetohydrodynamics became ever more prestigious in the eyes of the astrophysics community, his subsequent and more generally applicable work on inhomogenous plasma was just ignored, dismissed as ridiculous.

In 1970, Alvfën was awarded the Nobel Prize in physics- for his development of MHD waves and the concept of frozen-in magnetic fields. For the only time in the history of the prize, the recipient used his address to criticise the very work for which he was being rewarded. "It is only the plasma that does not 'understand' how elegant the theories are and absolutely refuses to obey them", he told the audience.

That was a criticism clearly aimed at all those who continued to misapply his MHD model in order to bolster their elegant theories. Alfvën's speech was a call to abandon the 'perfect' universe beloved of devotees of deduction, and work instead on the universe opening up to the empirical method: a universe of plasma taking on dynamic, filamentary forms under the influence of electric currents and magnetic fields in space.

Was Alvfën's advice heeded? No, it was pretty much ignored. That is why hardly anybody considers plasma to be the primary state of matter, and why gravity's influence (with some help from magnetism thrown in occasionally, always without the electric currents needed to

create magnetic fields) is considered to be the only force shaping the universe, even though what we observe clearly fits the plasma model. Indeed, the gravity-centric model cannot work at all, unless you shoehorn in entirely conceptual forms of matter and energy that have never been verified as actually existing.

Because it is dominated by theorists wedded to the deductive approach, the complexity of dynamic plasma behaviour is ignored in favour of “pseudoplasmas” (Alvfën’s term) that can be made to work with elegant mathematical models. In short, then, there is an assumption that electric currents don’t really do anything in space, and that magnetic fields- frozen-in-can somehow form without the electric currents that create magnetic fields.

This false belief that electric currents play basically no role in space should be considered one of the fundamental flaws lurking in the foundations of modern mainstream cosmology, equivalent, if you will, to the assumption (once the dominant position) that the Sun goes around the Earth rather than the Earth being one more body orbiting the Sun. Dismissing plasma cosmology on the grounds of what psuedoplasma cannot do is a particularly frustrating habit for those of us who really want to know what drives the evolution of the cosmos, as the plasma approach provides a fantastic way of uniting theory, experiment and observation, as we shall see in the next chapter.

CHAPTER SEVEN

In the last chapter, it was stated that plasma cosmology provides a really handy way of understanding the universe. But what is it about this branch of science that enables such understanding? It is the fact that plasma phenomena is scalable. But what does that mean? It means that, regardless of the size of the plasma, their electrical and physical properties remain the same. Therefore, one can study plasma phenomena in a laboratory and know that what one sees will be identical to phenomenon on galactic scales. They all obey the same laws of physics.

Now, some readers might be thinking, “yes, laboratory plasmas may obey the same laws of physics, but galactic processes occur over vast periods of time, so how can events that need billions of years to play out be studied within human timescales?”.

The answer is that while certain key variables such as electrical resistance, velocity and energy remain the same at all scales, other quantities do change. Most crucially of all, as Alvfën discovered, time is scaled as size. Since that is so, if a process is, say, a million times smaller, it occurs a million times faster. In Nature, we see auroras lasting hours, solar prominences lasting days and galaxies lasting billions of years, and the plasma processes driving the formation of all these becomes, once scaled down to laboratory size, rapid plasma discharges lasting millionths of a second.

This means we can run accurate models of cosmic scale plasma behaviour in the lab, and get millions of results that generate effects observed in space that would have taken billions of years to play out at that scale. It is well established that plasma can be scaled by 14 orders of magnitude, so transient events lasting microseconds (easily studied in the lab using plasma discharge equipment) truly becomes processes of plasma evolution happening on billion-year timescales when those same processes are scaled up to galactic proportions.

Having said that, the equipment needed to do this kind of research properly is not exactly the kind of gadgetry just anyone can assemble. The most pioneering work in plasma cosmology study is undertaken by scientists working with pulsed-power generators like Blackjack V, that are designed to model the effect thermonuclear weapons have on electrical equipment. Much of this research is classified for reason of military secrecy but nevertheless what research these leading-edge plasma cosmologists have released shows the immense potential of this largely ignored discipline.

Alfvën’s Cosmos

Let’s return to the practical work Alfvën did, now that we understand how such findings will apply to intergalactic space. Ever since he embarked on a career in science, Alfvën had been aware that Birkeland had provided an explanation for the Northern Lights, demonstrating that they were caused by electric currents streaming through the plasma above the Earth.

While doing his work of carrying out experiments in nuclear physics labs, Alfvën had seen those same filamentary structures. Now, hitherto we have been calling these thin ropes of plasma filaments, but researchers studying such phenomenon in the lab found there was a

more accurate way of describing them. What we are seeing are really tiny electromagnetic vortices, snaking through the plasma, carrying electrical currents.

But what causes these little tornadoes of plasma? The answer is, a phenomena plasma physicists call the “pinch effect”. Whenever a straight thread of electrical current flows through a plasma, it produces a cylindrical magnetic field. That field attracts other currents flowing in the same direction. Just as water disappearing down the plug hole generates a swirling vortex, and air rushes together to form a tornado, those converging threads of plasma twine into a plasma rope.

Because of this “pinch effect”, it is a natural tendency of plasma to develop inhomogeneity. As a combination of laboratory experiment, astronomical observations, and empirically derived theory shows, if you start out with, say, a uniform hydrogen plasma of free electrons and ions, it will be generally unstable to fluctuations, and the first of these fluctuations will be formations of tiny plasma vortices. The plasma will pinch itself into dense, swirling plasma filaments, separated by diffuse voids.

Let that process go on long enough and what should you see, if all this is indeed going on in space? What Alfvën proposed, based on these findings, was that streams of electrons would not only be moving at nearly the speed of light along magnetic field lines in Earth’s magnetosphere and above our sun; they would be doing so throughout the cosmos. Those vortices of plasma would attract other vortices moving in the same direction and tend to grow. As a consequence, Alfvën proposed, we ought to see sheets and ropes of electric current crisscrossing the universe on ever-increasing scales. Therefore, we should expect the universe to have a cellular and filamentary structure.

Such ideas were developed in the mid-20th century. But, maybe because plasma physics experiments get published in journals on plasma physics and electrical engineering, and not in astrophysics journals, most astronomers and cosmologists seem totally ignorant of the existence of such work.

If anything proves this point, it is this passage from a 2006 NewScientist article, written by Anil Ananthaswamy:

“Contrary to what everyone once thought, magnetic fields that stretch across galaxies have become a commonplace observation…They can also be seen on the scale of clusters of galaxies, and there are tantalising hints that they run in plasma filaments across even vaster tracts of space”.

Confirmation Ignored

Given that plasma cosmology predicted plasma filaments would be found on ever-increasing scales (up at least 14 orders of magnitude from laboratory scale phenomenon) you would think this tantalising hint of plasma filaments on a scale even larger than galaxy clusters would be worth at least a mention of people like Hans Alvfën and Anthony Peratt (b. 1940) who anticipated exactly these findings through their work on experiments with and simulations of high-energy discharges. Instead, as per usual, absolutely no mention of any

plasma cosmologist was given. Rather, it was asserted that these findings are “contrary to what everyone once thought”.

Can we really attribute this complete lack of reference to plasma cosmology entirely to the highly specialised nature of modern scientific research resulting in work published in some journals being entirely missed by scientists whose speciality is covered by other journals? I think something else is going on, too. Readers may recall how I said virtually all of my books on astronomy, cosmology and the history of science make absolutely no mention of plasma cosmology. But quite a few of them do mention another alternative cosmological model known as the Steady State Theory. When it is mentioned, you get at least a paragraph or two explaining who was behind this hypothesis, what it proposed and how it was shown to be invalid.

Plasma cosmology is never given its place in the history of science in pop literature, unlike geocentrism and Steady State. My suspicion is because, quite unlike those other alternatives, plasma cosmology has never been disproved. The most you can say, critically, is that it is nowhere nearly as well developed and refined as the Big Bang Theory. But is that any surprise, given that the Big Bang has so many more researchers and its devotees dominate the peer review systems of cosmology and astrophysics, and will not publish anything that dares to say the Big Bang never happened (saying you have found yet another contradiction between theory and observation is fine, provide you claim such gaps in our understanding are bound to be filled in a way that leaves the Big Bang valid, eventually).

So, whereas geocentrism and steady State could be, and were, found to be invalid, and the Big Bang just keeps on retrofitting itself to observations that show contradictions between what theory says we should observe and what is actually the case, plasma cosmology is, slowly, having its hypotheses confirmed and is refining its models in a truly scientific way, not patching over failures in its foundations with metaphysical abstractions that, I would argue, violate the fundamental rule of scientific theory, which is that success is measured by predictive ability.

It is, in other words, really a superior cosmological model, and as such so much more of a threat to the dominant cosmology of our time. Since it cannot be refuted (and it clearly is not using anti-scientific speculative techniques to patch up holes in its model) all the Big Bang devotees can do is just ignore it and hope their dismissive attitude encourages all of us to ignore it, too.

CHAPTER EIGHT

In the last chapter it was stated that any truly credible scientific hypothesis should have predictive ability. Let's be clear as to what that means. It means you make an educated guess as to what you should find and then, once our ability to observe Nature is sophisticated enough to allow us to see what's really out there, your guess is shown not to be in contradiction with what is observed.

Oftentimes, doing scientific fieldwork requires enormous dedication and patience, so it is quite understandable if scientists celebrate when their meticulous work in gathering observational data lines up with what their hypotheses predicted. But what you should not expect, certainly not if an hypothesis has been elevated to the status of Theory, is those scientists being "shocked" and "surprised" by results that were never expected.

Yet, somehow, when it comes to cosmology and astrophysics, such surprises seem a fairly common occurrence.

Star Birth

A good example of what I am talking about happened in the early 2000s. The XMM-Newton X-Ray observatory, an instrument belonging to the European Space Agency, was used to examine a star-forming region known as R Corona Australis, which is about 500 lightyears from Earth.

Though called a star-forming region, it was not expected that stars would be found there. No, the "nebulae hypothesis" model of star formation, which proposes stars are born from the gravitational collapse of clouds of gas, led astronomers to believe that the nebulae of R Corona Australis had millions of years to go before collapse had reached the point where nuclear fusion could start to birth stars. Given that the temperature of the nebulae was an estimated 400 degrees below zero Fahrenheit (minus 240 degrees Celsius) not much activity was expected at all, other than the slow gravitational collapse over literal ages.

But, rather than R Corona Australis being the inactive and diffuse cloud of gas in space the investigators had anticipated, it turned out to be way more active than theory predicted. In fact, there were extremely high energies at work, strong enough to produce X-rays.

According to a report from Space.com, "the detection of x-rays for the cold stellar precursor surprised astronomers". One of the co-authors of the report into R Corona Australis, Michael Corcoran of NASA Goddard, said, "the x-ray emissions shows that forces appear to be accelerating matter to high speeds, heating regions of this cold gas cloud to 100 million degrees Fahrenheit".

100 million degrees Fahrenheit is pretty warm for a nebula that was predicted to be hundreds of degrees below the freezing point of water. It's even hot in comparison to the hottest part of our sun, the corona, which is about 2 million degrees Fahrenheit.

According to Kenji Hamaguchi, who is a NASA funded researcher at the Goddard Space Flight Centre, “the detection of x-rays this early indicates that gravity alone is not the only force shaping young stars”.

So what might be assisting gravity and hurrying along the star-forming process? The investigators conclusion was that “some previously unrealised energetic process, likely related to magnetic fields, is superheating parts of the cloud, nudging it to become a star”.

Neither the surprise at finding observations did not match predictions, nor the patch made up to save appearances, were particularly unusual. In fact, it’s quite typical for magnetic fields to be invoked in order to account for some process creating more energy than gravity alone can account for. But what you never also get is any mention of the electric currents that create magnetic fields.

This, of course, all ties in with that fundamental error in modern astrophysics, which is the assumption that space is electrically neutral. To recap what we have learned so far, initially astronomers were convinced that electric currents in space were inconceivable, because space was supposed to be a perfect vacuum. When space turned out to be pervaded by charged particles (remember, 99% of the universe is plasma) astronomers then concluded that any charge would be quickly neutralised by the movement of charge, which meant charge separation could not be maintained in space. So, once more, the idea of electric currents in space was ruled out, only now it was the belief that plasma is a perfect conductor that ruled it out, not the assumption that the vacuum of space acted like a perfect insulator.

But what insights might we gain if we look at R Corona Australis from the perspective of plasma cosmology? Well, for one thing, we would know, as every electrical engineer knows, that before one concludes a plasma is incapable of charge separation, one needs to know the current-carrying capacity of that plasma. When it comes to the sparse plasma of space, such as R Corona Australis, current-carrying ability is present, but limited. Since that is so, cosmic scale currents generated by the relative movement of dissimilar plasma regions are capable of being sustained over long time spans.

You should be able to tell that such electric currents exist in a plasma, because the signature of such currents is their magnetic fields. But astronomers not versed in plasma cosmology assume magnetic fields are “frozen-in” to plasma. So, to them, it’s as if such plasma is superconducting which, again, leads to the conclusion that space is electrically neutral.

But, while astrophysicists accept only that nebular clouds such as R Corona Australis are slightly ionised, what plasma cosmology tells us is that they are not everywhere charge neutral, and so electric fields and currents exist within them.

It’s handy that Birkeland currents thread their way through stellar nurseries, because they are almost certainly necessary for the formation of stars. The standard belief is that all you need for that to occur is gravitational collapse (with some assistance from magnetism on occasion) but there is an obvious problem with this concept: stars cannot be formed by gas and dust falling inwards because rotational energy will put a stop to it.

But if we turn to the electromagnetic “pinch effect”, we find a more plausible mechanism of star birthing. The “pinch”, you will recall, is created by the magnetic force between parallel current filaments. When such filaments are in close proximity they may spiral around one another, and when that happens any material in the plasma is likely to be compressed. The Z-Pinch electromagnetically scavenges matter over a large distance of space and, since its force diminishes not with the square of the distance as in the case of gravity, but rather with a force that diminishes directly with distance, it makes for a far more powerful force.

You can see that is so by considering the force that would be exerted on two bodies as you separate the distance between them. When plasmas interact electromagnetically, their force law varies inversely as the distance between them. That means if they are two arbitrary measurement units apart, they feel half the pull, and if they are a distance of three units apart, then it is one third the pull.

But, in the case of gravity, since its force diminishes with the square of the distance, it’s not one third the pull at 3 units apart, but a weaker one-ninth the pull. At 100 units apart, the electromagnetic force is a hundred times that of gravity.

All of which is to say that the electromagnetic pinch effect is a hell of a lot more efficient at scavenging diffuse matter over a large distance and concentrating it. And, what is more, unlike gravity it can also remove that access angular motion that tends to prevent collapse.

From this perspective, then, stars are formed by the pinch effect. If we could see them at this early phase of formation, they would appear to us as beads on a string, or perhaps we should say a ‘wire’, since they are formed along an electric discharge in a dusty plasma. This linear alignment of stars cannot last forever, though. The discharge is bound to weaken and become unstable, at which point gravity takes over and the stars are then scattered like buckshot from their linear alignment.

So that’s how star birthing occurs, according to plasma cosmology: Not because of gravitational collapse, but because of the Z-pinch effect. But what is it that is being born when matter starts outputting starlight? That is the topic of the next chapter.

CHAPTER NINE

In the last chapter we saw how the Z-pinch effect concentrates matter caught between twisting pairs of Birkeland current. But, can any collapse or squeeze of matter go on indefinitely, so that it is concentrated into an ever-smaller space?

The standard scientific stance is that the answer is no, because whenever you concentrate matter, at some point its sheer mass will cause another force to come into play. Whenever matter is compressed it gets warmer. Try putting your thumb over the opening of a bicycle pump while pushing the plunger down and you'll feel the air heating up as its compressed. Saying matter is heating up is synonymous with saying its particles are becoming more energetic. Now, all electrons have negative charge, and all protons have positive charge. If you have ever tried to push the North Pole of one magnet against the North Pole of another, you'll know like charges repel, and that's just as true with the like charges of protons (or electrons). They just cannot be forced together.

However, if you make them really energetic, atoms can overcome the repulsive force. They can be forced so close together that another force, extremely powerful but working only at extremely short distances, holds them together. We call that glue the strong nuclear force.

At this point nuclear fusion has occurred and that can output enormous energy. In the 1920s, Sir Arthur Eddington (1882-1944) wondered where stars get their power from- was it applied externally, or were they powered from within? He speculated that the latter was true, suggesting nuclear fusion was occurring in the core of stars, transmuting hydrogen into helium.

From this perspective, a star like our Sun is a balance between two opposing forces. Gravity wants to collapse the star, but nuclear fusion won't let that collapse go beyond a certain point; thermonuclear energy wants to blow the star to pieces, but gravity prevents that from occurring. And so the star remains, balanced between collapsing in on itself and blowing itself apart, a giant fusion reactor in space.

To this day, the belief that stars are powered by nuclear fusion occurring within their core is, by far, the most popular explanation for how come there are objects in the universe outputting heat and light for billions of years. But, it is not quite a universally accepted theory.

A Very Fringe Alternative

In 1944, Dr Charles E.R Bruce (1902-1979) of the Electrical Research Association, looked at close-up images of the Sun with the eyes of an electrical engineer, and made the following observation:

"[The Sun's] photosphere has the appearance, the temperature and the spectrum of an electric arc".

Going by the old "if it quacks like a duck" argument, he went on to say this was because the photosphere "is an electric arc, or a large number of arcs in parallel. This accounts for the observed granulation of the solar surface".

By the way, the photosphere is called the Sun's surface, but the Sun does not really have a 'surface'. What the photosphere actually is, is the part of the Sun you can actually see (not that it is advisable to look directly at the Sun!).

Is giving the photosphere its granular appearance the only thing electric arc discharges do, or is there more going on? In the 1970s, Ralph Juergens (1924-1979), an engineer from Flagstaff, Arizona, was inspired by Bruce's work and claimed that stars are best thought of as concentrated balls of lightning.

Furthermore, he resurrected the hypothesis that stars are powered without by claiming they shine because they are connected to electric circuitry within galaxies, meaning a star like our Sun is not an electrically isolated body in space; rather, it lies within a larger galactic field.

More precisely, Juergens's proposal was that the Sun is the most positively charged object in the solar system. It should be thought of as the centre of a weak electrical field and the focus of a "coronal glow discharge" fed by galactic currents.

Juergens compared this model to a fluorescent light tube. In such a tube, the current is primarily carried by a drift of electrons in a weak electric field toward the positive electrode. Throughout most of the volume of a glow discharge, we find almost equal numbers of protons and electrons, meaning most of the plasma is semi-neutral. This also means that, at planetary distances from the Sun, the field is so weak as to be imperceptible. We might make a comparison to water swirling down a plug hole at one end of an Olympic sized swimming pool. If you were at the opposite end, you would not notice any drift of currents towards the drain, as such currents only become noticeable once you get close to the plug. Similarly, you would need to get really close to the sun to be able to detect the currents feeding it, because it is only beneath the corona that the electric field becomes strong enough to power the Sun.

But, if stars are concentrated balls of lightning, powered by external galactic currents, what is to stop them from undergoing gravitational collapse? After all, in this model, there is no fusion going on in the core to keep gravitational collapse in check.

The electric star hypothesis has an answer to that. The gravitational field inside a star distorts atoms. Therefore, atoms inside the star form tiny electric dipoles. Those atomic dipoles then align to produce a weak radial electric field. Electrons come under the influence of that field, and so they tend to drift toward the surface, leaving a positively charged interior. This mutual repulsion of the positive charge within a star is what is actually supporting the bulk of a star's envelope against gravity.

Testing the Models

Given that the electric star hypothesis is almost unanimously rejected, why should we spend any time understanding its basic concepts? One reason why is because, when you switch to this model, certain longwithstanding mysteries of the Sun have quite simple explanations.

Let's suppose it is true that the Sun really is radiating heat that is generated from within its core. What would you expect, given that supposition? The most obvious expectation would be that the further away from the core you moved, the less warmth you would feel. After all, a person close to a fire or a radiator in a room feels more heat than somebody further away, right?

But, in the case of the Sun, the temperature does not decrease as you get further away from the core. No, the temperature undergoes a spectacular rise with distance from the apparent surface of the Sun. The temperature 300 miles above the photosphere is about 4,400 degrees Kelvin. Then, as you head towards the chromosphere, some 1200 miles above the Sun's 'surface', the temperature steadily increases to something like 20,000 degrees K.

However, it is once we reach the corona that conditions get really hot. Abruptly, the temperature leaps to a whopping 2 million degrees K.

That the temperature of the Sun should rise in this manner is held as a mystery by advocates of the standard theory of stars. As one such astronomer wrote, "one of the great mysteries of the Sun is why it has a solar corona…something amazing occurs: at greater heights, the temperature increases, gradually at first, and then suddenly…understanding the physics of coronal heating and solar wind acceleration remains one of the unsolved problems of solar physics".

It might be an unsolved mystery if you accept the standard theory of what a star is, but once you switch to the electric sun you can use plasma physics to explain what's going on here. According to this model, since there is a discharge above the Sun, you're going to get a double layer forming. That means that there must be a region where there is an electrical field across a fairly short distance which can accelerate particles to high energy. This is what is going on at the corona. What happens when those particles encounter matter? The answer is, they excite that matter to high energies, experienced as tremendous heat.

In the quote regarding the 'mystery' of coronal heating, a reference to another mystery of the sun was mentioned, and that is "solar wind acceleration". The mystery here is that the Sun continually emits a stream of positively charged particles which, in theory, should decelerate due to the Sun's gravitational pull. But, not only are these particles completely unaffected by the Sun's gravity, they actually continue to accelerate away from it.

Why should they do that? The standard response is that this has something to do with the light the Sun obviously radiates. Just as we hope to one day use solar sails to accelerate probes, the idea is that those particles are being pushed along by solar radiation.

But, as far as electrical theorists are concerned, there are two drawbacks to this proposal. For one thing, it is completely lacking in experimental support. But, what is more, the electrical engineers claim such a proposal is completely unnecessary. They know from practical experience that there is a simple way to accelerate charged particles. In fact, they do this regularly with electric fields. All you need do is suppose the Sun is a charged body at the centre of an electric field, and then the acceleration of charged particles by such a field is a given.

T-Type Dwarfs

Another mystery can be found in the case of a certain class of star known as Brown Dwarf stars. Some such stars (known as L-type and T-type dwarfs) have extremely low absolute luminosity and temperature. How low? Well, the surface temperature of T-type dwarfs is, in some cases, under 100 k.

How, then, can they be stars? If standard theory is correct, the temperature in a star's core has to reach at least 3 million k if nuclear fusion is to occur, but there's no way T-type dwarfs have core temperatures anywhere near as high. Furthermore, the standard theory sets a minimum mass for stars. Only when gas giants are about 75 times more massive than Jupiter, or 7 percent the mass of our Sun, do they become stars. We have found many brown dwarfs that meet none of these requirements and yet they are still stars.

How can that be? The electric star explanation is that, since any star is inherently electrical to start with, there need be no minimum temperature or mass requirement before a gas giant can behave like a star. Indeed, the ES model shows that if you have a brown dwarf star operating in the upper boundary of the dark current mode, if there is a slight increase in the level of total current impinging on that star, that increase will move it into glow mode. When such a transformation occurs, it will be accompanied by a change in the voltage rise across the plasma of the brown dwarf's atmosphere. Thanks to Maxwell's equations, we know that such a change in voltage can produce a strong dynamic E-field and a strong dynamic magnetic field. Dynamic E-m fields can produce x-rays, if they are strong enough.

Interestingly, Chandra, an orbiting x-ray telescope, has discovered an x-ray flare being emitted by a brown dwarf. According to the standard theory, that should not happen because such a star should be too cool to be capable of x-ray production. But, as we have seen, we should expect the x-ray flare to be emitted by any electric star going from dark mode to glow mode (or glow mode to arc mode).

Stellar Evolution

Perhaps the biggest blow against the standard theory of stars (and once again, it favours the ES hypothesis) is the concept of stellar evolution.

This is the idea that, just as each person grows and develops through identifiable stages such as Infant, Child, Adult and Elderly, so too do stars change as time goes by. Therefore, you can tell which are older stars, and which are younger, just by noticing what class of star you are observing.

According to the standard theory, the process of stellar evolution is driven by the process of consuming a star's reserves of fuel. If we take our Sun as an example, according to standard theory every day it consumes about 700 billion tons of its own mass as hydrogen fuel, transmuting hydrogen into helium and releasing fusion energy in the process. 700 billion tons is a lot by human standards, but the Sun's mass is a whopping 2,000,000,000,000,000,000,000,000,000 tons, so it won't run out of easily available portions of hydrogen fuel for billions of years.

But, eventually, that fuel will have been consumed, and the centre of the Sun will consist of helium, which is akin to ash building up in a fireplace as fuel is consumed. At this point, some 5 billion years from now, the nuclear reactions occurring in the core of the Sun will start shifting upwards a little bit. The Sun will have begun to consume hydrogen closer to the surface.

Should anyone be around to record such events, evidence that this stage in the Sun's life has been reached will be seen in the way the outer layers of the Sun start to expand, and cool down slightly, so that the Sun's colour becomes redder. It will keep on expanding until, some tens of millions of years after we first notice the sun's expansion, it will have become a red giant star large enough to fill the orbit of Venus.

For those of us on Earth at this time, the Sun in AD 5 billion will be so large it will fill half the sky. Under such conditions, the oceans will boil away and surface rocks will melt.

The Sun will remain as a red giant, with a barren Earth orbiting it, for a further billion years. At this point, its great size is being held up by the helium in the core driving fusion reactions (once enough of that star ash accumulated in the core, its mass become so great the heat rose to the point where helium atoms were energetic enough to overcome their natural repulsion). Eventually, all that helium will have been consumed, the energy support that held up the mass of the Sun will be gone, and the Sun's apparent surface will sink inwards. There will still be some untapped reserves of fuel, and every time these dispersed fuel sources get tapped, the energy output will suddenly increase and the surface of the Sun will bounce upwards. Each time this happens, the Sun will blow some of its mass away. Over a period of a few thousand years, the Sun will have lost so much mass its gravitational field will no longer be sufficient to hold the planets in orbit. So, some 11 billion years from now, the solar system will break up, the planets will be cast adrift, leaving behind the core of the sun as it gradually cools to the ambient temperature of space.

Note how all these stages in an average star's life play out on timescales far beyond the one human lifetimes are measured in. That being the case, it's kind of misleading to say these are events that people will witness. No person can witness events that take centuries to unfold because our individual lifespans- measured only in decades- simply don't afford us that privilege. Here, we are talking about events occurring over billion-year timescales. So, it would be more realistic to say one generation of humans will observe the Sun as being the size and luminosity it has today, and then, some 40 million generations later, the great, great, great…..great grandchildren of those people will observe a red giant.

Or, at least, that is the way stellar evolution is supposed to play out, according to the standard theory. It is not a process that occurs within human timescales, not remotely so. Except…sometimes, it is.

Consider this report, recorded by CCD Astronomy in 1996:

"The star FG Sagittae breaks all the rules of accepted stellar evolution. FG Sagittae has changed from blue to yellow since 1955!…It is a unique object in the sense that for this star we have direct evidence of stellar evolution but in a timescale comparable to a human lifetime".

Describing FG Sagittae as a unique object makes it sound like this is the only star we know of that breaks the rules of stellar evolution. But that is not the case, for here is another example. In 2002, NASA's Astronomy Picture of the Day concerned what they described as a "mystery star". The star in question was V838 Monocerotis and the report stated that "observations indicate that the erupting star transformed itself over a period of months from a small under-luminous star a little hotter than the Sun, to a highly luminous, cool supergiant star undergoing rapid and complex brightness changes".

While, according to the standard theory of how stars are powered, these recorded events should never happen, there is nothing to rule them out in the electric star model, because it allows for rapid stellar evolution. This is because, according to the ES model, the luminosity of a star has nothing to do with how much nuclear fuel it has to consume. In fact, there is no nuclear fusion going on in the cores of stars. Instead, nuclear reactions occur at the 'surface', produced in the same way they are produced in the lab- by accelerating particles in an electric field. Rather than a star's brightness being dependent on the amount of fuel available, it depends instead on the power of the electrical current feeding it. If the appearance of a star is determined largely by its electrical environment, then should that environment change, the appearance of the star will change too, and pretty quickly.

We have only scratched the surface of observations that are hard, if not impossible, to explain when you assume stars are internally powered by nuclear fusion. In the case of the Sun alone, electrical theorists point to more than two dozen defining features of the Sun that makes little to no sense if the standard theory is correct, but which all follow logically from the low discharge model.

But I don't think we need to go through all such features. The sign of a good theory is not just that it answers questions within its own area of expertise where rivals can only shrug their shoulders and say "that this exists is a mystery". It is also that it unites seemingly unconnected fields of research, bringing them together into one single framework of mutual support. In the case of the ES hypothesis, that seemingly unconnected field is comparative mythology.

From the common elements of worldwide myths, we can infer that humans were around to witness the brown dwarf our planet once called its parent star, come into contact with the plasma sheath of another star, setting off violent electrodynamic events that would transform our original parent star into the gas giant Saturn, and rearrange the planets into the solar system formation we are familiar with today. Not really knowing what they were witnessing, our ancestors poetically talked of warring gods hurling thunderbolts, and chaos monsters let loose to spread havoc through the dwelling place of those gods. In the next few chapters, we'll run through these events using the electric star model.

CHAPTER TEN

In the last chapter, we saw how, according to the Electric Star hypothesis, stellar evolution need not play out on timescales way outside of anything humans can live to experience, but can sometimes occur well within living memory.

There are recorded examples of stars actually changing from one type to another well within living experience, which is one reason to take the ES hypothesis seriously. We can also ask: Could stellar change have happened in our past when a brown dwarf star ultimately transformed into the ringed, gaseous planet we know as Saturn? Is that what mythological interpretations were attempting to preserve, down through the generations?

The Purple Dawn Explained

Let's start by supposing Saturn was indeed once a brown dwarf. What would it have looked like? Well, for one thing, it would have been a fairly common celestial object. Just like the huge numbers of brown dwarf stars that exist today, it would have radiated energy in the red-blue spectrum (the Sun does not do this; it radiates energy in the brighter red-green spectrum).

Also, assuming it was a typical brown dwarf star, the object that was to become Saturn would have produced a kind of electrical bubble that extended out into space. Viewed in conventional stellar terms, this bubble could be described as akin to a far reaching heliosphere, but a more appropriate term from a plasma physics perspective would be a plasma sheath.

Supposing your location was within that plasma sheath, what would conditions have been like? For inhabitants living on a planet within the egg-like cocoon of a brown dwarf's plasma sheath, the inside of that plasma bubble would have acted as a reflective field. Therefore, it would be as if the heavens above, anywhere on Earth, acted like a dull mirror. Thanks to this plasma bubble, the radiation from the brown dwarf would have bounced off the reflective field of the plasma sheath and then bounced back onto all parts of the planet's surface.

Thanks to this uniform energy being reflected back onto every surface of the Earth, everywhere would have experienced the same sub-tropical temperature. There would have been no seasons, and many of the meteorological effects so familiar under our current Sun, such as wind and rain, would have been almost entirely negated by the unchanging, uniform warmth constantly radiating back from the plasma sheath. Though no rain clouds ever formed on Earth at this time, brown dwarfs are known to have copious amounts of water, and so every point on our planet would have been covered in a mist of dense and humid vapour, so rather than the whole of earth being a desert due to lack of rain, the entire planet would have experienced the conditions of a tropical rainforest.

As to what you would have seen had you looked up, well, that would have depended on which hemisphere you inhabited. For those who lived in the southern hemisphere, there would have been no celestial objects in the sky, for there was no way to see space beyond the plasma sheath, due to the light reflecting off it overwhelming the light of the stars. So all there was to see was a swirling chaos, dimly glimpsed through the ever-present damp mist.

For the inhabitants of the northern hemisphere, in addition to that swirling chaos there would have been the source of the omnipresent red-blue light in the form of a dully glowing orb, a stationary light source that would eventually become known in mythological tradition as a sleeping god.

Astronomically, what kind of arrangement of celestial bodies could have led to our ancestors in the Northern hemisphere seeing a dully glowing object that never moved? Well, we see many examples of such configurations, in the form of planets or moons orbiting in what is known as a “phase-locked configuration”. A very familiar example would be our own Moon which, thanks to its orbital relation with Earth, always keeps the same half of its globe facing us.

In the case of Earth’s primordial relationship to Saturn, we can infer from comparative mythology that the region currently known as the North Pole would have always faced Saturn as it orbited that brown dwarf star equatorially. Viewed from space, and compared to Earth as we are familiar with it, our planet would have appeared to be on its side, with the ‘north’ and ‘south’ poles facing east/west. It did not rotate at all.

From Phase-Locked to Polar Configuration

Saturn would have been a free-floating planetary system with phase-locked moons (which included Mars) for as long as any lifeform could recall. But, unbeknownst to the inhabitants of Earth, things were going to change. The reason why was because, some time between 100,000 and 60,000 years ago, our original brown dwarf star had begun ‘electrically sensing’ another star. This phase in Earth’s history began when Saturn’s journey through space brought it close enough to the Sun’s own, much stronger plasma sheath (commonly known as its heliosphere) as to be affected by its presence. As to how that effect played out, it would have resulted in Saturn gradually accelerating toward the stronger electric field of the Sun. This, in turn, would have affected the moons Earth and Mars, for during this acceleration they would have been gently dragged along in Saturn’s wake, until what had once been an equatorial phase-locked configuration became a ‘polar configuration’, so called because now Mars and Earth were aligned axially with Saturn’s north/ south pole.

Although the inhabitants of Earth would hardly have noticed this change, had you been able to view this planetary configuration from space, you would have noticed some obvious changes. For one thing, Mars and Earth would now be seen hanging below Saturn. It would have been invisible to the naked eye if it were in dark mode but, if you could have seen it, Mars and Earth may well have resembled two pearls, dangling below Saturn’s south pole via a connecting Birkeland current.

Interestingly, in the 3rd century BCE, Berossus, who was a Babylonian priest, described a planetary alignment as a “great conjunction”, saying the planets were “so arranged in one row that a straight line may pass through their spheres”. Similarly, Hindu accounts tell of the ‘Tripura’, a towering citadel said to be formed by three powers of celestial cities. According to the Tripura, the ‘three cities’ of this celestial citadel were arranged such that a single arrow of Shiva could “pierce the hearts of the gathered powers”. In both cases, if the Saturnian

system had been in a polar configuration, it would have led to these mythic interpretations of that planetary arrangement.

Another thing space-based observers would have noticed is that, due to their being trapped within Saturn's twisting and turning Birkeland current, both Mars and Earth would have begun rotating, too, while still in axial-alignment with Saturn. Inhabitants on Earth would not have noticed this rotation at this stage, because all the planets rotated together and so, relatively speaking, their positions never visually changed.

Throughout the tens of thousands of years in which these events played out, Earth would have remained within Saturn's plasma sheath. We have already seen how such conditions would have led to a uniform temperature of sub-tropical conditions at every point on Earth's surface. Because brown dwarf stars radiate energy in the red-blue spectrum, that omnipresent chaotic haze would have appeared purple in colour. Hence, the very earliest mythological traditions speak of a primordial "purple dawn" of mankind.

It would have been impossible to keep track of time under such conditions, for there was no seasonal variations, no tidal changes, no real change in local or global temperatures, no celestial events like lunar phases or rising and setting suns. It was, to all practical intents and purposes, a time before time began. However, though no inhabitant on Earth during the purple dawn could have known this, things were changing.

"Let There Be Light!"

Having 'electrically sensed' its heliosphere, Saturn and its moons were on a spiralling course that was bringing them closer and closer to the Sun. Being pulled closer to the Sun had the inevitable outcome of the plasma sheaths of Saturn and the Sun coming into contact. In all likelihood, thanks to the spiralling nature of the path Saturn was now on, these would have been relatively brief, glancing contacts that occurred multiple times (remember it is the plasma sheaths that are sometimes brushing together. We're not talking about stars colliding here!).

Of all these glancing contacts, it is the final one (estimated to have occurred about 10,000 years ago) that had the most interesting effects for people on Earth, for it resulted in something never experienced before: Change.

What brought about this change was that fact that when this particular glancing contact occurred, it resulted in a short-circuiting event during which the brown dwarf star Saturn experienced a tremendous nova-like surge of electrical energy. No humans around at the time to witness this flaring could possibly have known it was due to Saturn's plasma sheath short circuiting due to contact with the Sun's more powerful heliosphere, for the haze of the Purple Dawn blocked all views of the heavens. All they would have known, if they lived in the northern hemisphere at least, was that the 'sleeping god', that dully glowing orb that never changed in any way, had suddenly and dramatically released a blinding flash of light, bathing Earth's inhabitants in an intense yet diffuse red and black-blue light quite unlike anything humanity had ever experienced. It was as if the sleeping god had awoken from his eternal slumber and announced, "let there be light!".

Another consequence of this short-circuiting event (one arguably more consequential even than the flaring of Saturn itself) was that, having been overpowered by the Sun's heliosphere, Saturn's plasma sheath turned transparent. And so, the omnipresent chaotic haze of the Purple Dawn was no more. Now, when people looked up after Saturn's plasma sheath had been neutralised, they saw a vast revolving field of twinkling lights, so familiar to us as the stars. One of these stars would have been particularly noticeable, and that was the one whose heliosphere had caused Saturn to flare- the Sun.

Since it was still situated below Saturn's South Pole, rotating in axial alignment, people would still have perceived Saturn has holding a fixed position in the sky. But, in other ways, this was no longer the dull orb from time immemorial, for Saturn had now transformed into a polar sun. The radiation it outputted was less bright compared to the visible spectrum of the star destined to become our Sun, but nevertheless Saturn the brown dwarf had become Saturn the polar Sun, shining brighter than before, and the processes that went with this transformation and that brought the Purple Dawn to an end, would usher in the Saturnian Golden Age.

CHAPTER ELEVEN

In the previous chapter, we saw how the Purple Dawn came to a dramatic end when Saturn flared after having come into contact with the Sun's powerful heliosphere.

One consequence of this short-circuiting was the ejection of a giant piece of Saturn's electrically-stressed core. Remember that, according to the electric star model, matter inside stars becomes positively charged as electrons drift toward the surface, and this results in internal electrostatic forces that prevent the star from undergoing gravitational collapse.

But if a star should undergo some sort of external stress, such as its double layer coming into contact with the more powerful double layer of another star, that may cause some of the star's internal positive charge to be offset from the centre of the star. That offset charged matter will then tend to accelerate towards the 'surface' of the star because, after all, like charges repel.

For any observers witnessing such an event, the result would be a sudden brightening of the star. Conventional astronomy would call that a nova event, but in electric stars it is better thought of as a star-wide lightning flash, the result of electrons in the stellar atmosphere rushing toward the positively charged matter that is being ejected from the core of the star.

That ejected material constitutes a powerful electric current, and that electric current generates its own magnetic field. This will have a couple of consequences for the matter being ejected from the star. For one thing, the magnetic field will constrict the charged matter, so that it forms a jet. Secondly, the leading matter will be charge neutralised and thus will no longer be accelerated, but the matter trailing behind it will still be charged and hence still accelerating, and so it's bound to pile into the neutralised, non-accelerating lead matter.

The ultimate result of this is that the star can, in a sense, be said to have "given birth" by electrical fissioning, because its ejected core will have become either a companion star or a new planet.

Our (Un)usual System

It used to be assumed that the arrangement of planets in our solar system- inner ones being rocky, outer ones being gaseous- was no doubt typical of any planetary system. The thinking was that gaseous elements like hydrogen and helium are much lighter than solid matter, and so the solar winds would tend to push the material for making Jupiters and Uranuses to the outer regions, while the material for making planets like the Earth would remain orbiting closer to the star.

But since we gained the ability to actually find alien worlds, this assumption of how planets should typically be arranged has not been confirmed. Actually, it's more typical to find gas giants like Jupiter orbiting closer to their star than Mercury orbits ours. Admittedly, such massive planets are the easiest to detect using the methods at our disposal (these involve noticing the light from a star dim as a planet passes between it and us, or detecting a wobble in stars as they dance gravitationally with planets orbiting around them) but in many cases the fact that such gaseous giants orbit so very close to their parent star has been seen as

immensely difficult to explain, if you're assumption is that planets form from dusty discs of matter that surround stars and are what remain of the matter that became the star itself.

But, if we assume the electrical fissioning of stars, then it becomes much more probable that stars will typically have gas giants in close orbit. In the case of Saturn's flare up and consequent ejection of its core, what was 'birthed' was not a gas giant planet, but what would become a new addition to our family of rocky planets. We know that planet as Venus.

The Mythic Interpretation

Now, obviously, the humans who lived about 12,000 years ago and actually witnessed these events could not possibly have described them in terms such as I have just used. But they would surely have told some sort of story as they tried to make sense of the unprecedented events occurring in the heavens.

These ancient eye witnesses would have seen a mighty black spiral of ejected stellar matter, spreading out from an orb that had suddenly brightened. To them, the sudden brightening of the orb that had hung motionless and unchanging in the sky since forever meant the sleeping god had suddenly awoken. And no wonder, for those humans could all see that the abode of the gods had been invaded by the serpentine chaos monster, the dragon that would eventually become localised into a variety of myths.

Over time, those dark, spiralling, chaotic forms would form into shapes and configurations that inspired other myths as well as the universal theme of the sun god doing battle with the chaos monster. As that chaotic debris formed into the planet Venus it settled behind another planet that had always been there, but which humans had not seen because, up until now conditions meant it was hidden from view. But now, those ancient humans could see a dark orb- what we could come to know as Mars- with the more brightly glowing Venus settling behind it, and the gargantuan Saturn becoming the backdrop of Venus. To imaginative humans, the dark silhouette of Mars reminded them of the pupil of an eye, bright Venus invoked images of some bright iris, and Saturn's larger disc could be likened to the cornea of the great eye that was now looking down upon them.

If the common themes uncovered by comparative mythology do refer to events occurring in the heavens, it is fair to say that we have been labouring under a false impression of what world-building creation myths are. It is popularly assumed to refer to a story of how the universe began and, since such tales were told before we discovered Science, creation myths about why there are stars, how life began and what purpose humanity plays in this grand drama (if any) will just be wild guesses.

But we have already noted how isolated groups of humans, simply making up just-so stories of the origins of life, the universe and everything, could hardly be expected to incorporate themes in common with other cultures they barely interacted with, if at all. But how much more plausible do the mythic archetypes become, if we abandon the assumption that creation myths are nothing but wild guesses, and instead see them as attempts to describe a visible, metamorphosing formation in the sky?

One thing we should expect is that the older the myth, and therefore the closer its authors are to the actual cosmic events that inspired it, the closer those poetic interpretations will be to the events themselves. As for stories retold and reinterpreted after the formations in the sky had long since “departed”, it is to be expected that, like Chinese whispers, these increasingly detached tales would obscure the stories, as themes once unified around a common cosmic experience degenerated into local myths and legends.

Nevertheless, by teasing out the common themes and not insisting that the sky we see today has got to be the sky ancient ancestors saw, we can reconstruct the underlying patterns.

When such an endeavour is undertaken, we see that creation, which was not originally a story of the origins of the universe but rather of a change in conditions that enabled humanity to measure time, begins with a cloud of undifferentiated chaos that bathed the whole world in a dull, purple glow.

Next, we get the emergence, or clarification, of heaven. That does not refer to vague hopes of paradise in the afterlife, but to a sphere that once dominated the skies of the northern hemisphere.

Whereas the omnipresent chaotic cloud was too random in its changes to serve as a measure of time, the orb was too stable. It never appeared to change in any way. Or rather, it did not until humanity witnessed the planetary configuration differentiate into male and female aspects, with the latter universally agreed to apply to the planet we know as Venus.

As well as the common theme of selecting the same planet as representing a goddess rather than a god, we also commonly find Venus’s story closely associated with myths surrounding the planet Mars. Another common theme is depicting Venus (and Mars) as having some sort of connection to the eye. So, for example, the Egyptian warrior god Horus, their version of the latter Roman warrior god Mars, was also known as ‘Arit’ which translates as ‘Pupil of the Eye’.

Following on from the ejection of Saturn’s core and that matter’s formation into a planet (imaginatively interpreted as the birth of the mother goddess) we get high energy plasma discharges between the planets. According to the common themes found in comparative mythology, at first those discharges took on a triangular form, something ancient peoples interpreted as the visual name of the creator himself. Then we get common themes of something terrifying and glorious. So, for example, the myths of ancient Sumer spoke of “the terrifying glory in the centre of An”. In Aztec traditions, the word ‘Tonalli’ can be translated as meaning something radiating ‘life’, ‘power’ and ‘glory’, the latter also corresponding to the Hebrew ‘Kabod Shekinah’.

In all such cases, if we assume high-energy plasma physics and electrodynamic phenomenon inspired such themes, our ancient ancestors witnessed a heaven-shattering explosion, arc-mode plasma discharges they could only imagine to be the visible words of power spoken by the creator god himself. That explosive outflow took on starlike forms and seemed to give the appearance of protection around the location of the warrior god Mars (or his equivalent in other myths). Hence Venus (or her equivalents) would, among other

common themes, be universally recognised as the great star, the radiant dwelling, the protectress, and the radiant crown of the warrior god.

The Curious Relationship of Venus And Mars.

Venus and Mars have a close relationship in most of the creation myths of ancient people, which should be seen as very difficult to account for if one assumes the sky has always looked the same (at least within the timeframe of human experience). After all, Venus and Mars have, we mostly presume, always followed the same orbits, separated from each other by about 120 million miles of empty space (other than our own planet, lying between their orbits). They never interact with each other in any significant way (not like our Moon sometimes does with the Sun, when it comes between it and the Earth to cause spectacular eclipses if you're lucky enough to be on the right location down here). Despite this complete lack of any relationship, in all the global myths the archetypal warrior god and the archetypal mother goddess, are inextricably linked in a way no other imaginative pairing of planets you could dream up (Mars and Mercury?) ever are.

None of this makes much sense if we assume Venus and Mars have always been positioned where we now find them, but if we assume Venus and Mars did indeed once exist much closer to each other, close enough for high-energy plasma discharges to form in the space between them, and also between Venus/Mars and Earth, those common themes become a lot easier to account for.

The comparative mythology experts developing the polar configuration model tell us the underlying patterns in global mythic archetypes suggest there was a quasi-stable phase of an evolving metamorphing configuration. It was quasi-stable because episodic motions of Mars occurred along the axis, and that provoked streams of material alternating between Venus and Mars, and Venus/Mars and Earth. The common themes in global myths also tell us our ancestors witnessed dramatic changes in the number of discharge streams that stretched between Venus and Saturn. It seems that what first emerged as a triangular form in the dusty plasma medium became an explosive discharge. That discharge produced a vast cloud of luminous and chaotic debris that would eventually take on the appearance of an 8-rayed star.

In the common archetypes of global mythology, then, Saturn (or his equivalents) is the overarching luminary, humankind's original sun god; Venus is the Mother Goddess, the Radiant Eye, and Mars was the Pupil of the Eye, child in the womb of the Mother Goddess; warrior god. All such common themes refer to a close alignment of those planets and their plasma discharge interactions.

It was also those high-energy discharge events that led to common themes like the visible words of glory of the sun god, and the triangular form was the original inspiration for another common theme in mythology, that of the 3-fold goddess, three-faced goddess, or three goddesses in one.

Saturn Gets Its Rings

During its flare up, the brown dwarf star Saturn had expelled a vast amount of water into space. That water turned into countless ice crystals that would, in time, settle into concentric rings around the planet. Thanks to their reflective property, those rings of ice crystals would be more than capable of shining under the light of the distant Sun, and that same light cast Saturn's shadow over those rings. When viewed from a Northerly location on Earth, this would have appeared to human eye-witnesses as a great crescent in the sky with a bright star (Venus/Mars) within its bow.

The appearance of that crescent was a very important event for humanity, because it provided people with a means to begin keeping track of time. Recall how, up until this point, humans really had no regularly changing pattern with which to measure time. They could not tell day from night, never experienced changing seasons, saw no rhythmic patterns in the sky. But, once that great crescent formed, humanity did have a way to distinguish night from day and how long before one gave way to the other, thanks to an obvious effect of the fact that all these planets- Saturn, Venus, Mars and Earth- were revolving together. That of course meant that the crescent seemed to revolve around the central star.

As we shall see in due course, the revolving crescent of Saturn around the discharging plasma streams of Venus/Mars would be interpreted mythically in different ways, but all comfortably fit the polar configuration model while wildly conflicting with the idea that global myths have anything to do with the planets or moons following the orbits we are familiar with today.

Take the image of a star-like form lying within some sort of upturned crescent form. This is a common image, carved into rocks around the world and in many other artforms, and since the only crescent form easily recognisable in space today is our Moon, most interpret such images as representing the Moon and the Sun. But why would our ancestors all have imagined the Sun and Moon positioned in a manner we never see? Moreover, our ancestors spoke in one voice that the Sun of the golden age held a fixed position in the sky, and they all associated the Sun god with the planet Saturn.

If we assume that Saturn was once an electric star, positioned at the pole, these mysteries become puzzle pieces that slot neatly into place. Since the planets of the polar configuration were spinning in axial alignment, the crescent must have visually revolved around the central star of discharging Venus. It would have been at its brightest at midnight, when it was positioned below the polar centre. The twin tips of the crescent would have appeared to be facing upright, with the star positioned between them, just as all those images of the most celebrated time of the primordial sun god, the hours when it shone most brightly, depict. The crescent that Saturn was casting would then have risen to the right at sunrise until it stood inverted and dimly lit at Noon, and then it would have descended on the left side until it had returned once more to its midnight position.

Now, in this description I have used the terms 'Day' and 'Night' in the modern sense. Readers may recall, however, that ancient people counted the 'day' as beginning at sunset. Again, this is one of those preposterous themes in ancient myth that makes much more sense in light of the Polar Configuration.

Why would a diurnal animal like a human being think that the middle of the day occurred at midnight? The answer is that this was when the great crescent of the polar configuration took on its most visible form. This was the most celebrated moment in the day/night cycle of our ancestors. It is a mistake to interpret myths concerned with the primal sun god in terms of a star rising in the east and setting in the west, for such an idea will clash violently with the common themes found across world mythology. Saturn the polar sun god did not allow us to tell day from night by rising above, and falling below, the horizon, but rather through a daily cycle of brightening and dimming as its crescent revolved around the polar centre.

The Ship of Heaven

One of the common themes found in myths around the world concerns a certain mode of transport favoured by the creator god. According to Japanese myth, their creator god, Sukuna Biho Na, rode around in a “heavenly Kagami boat”. According to the natives of the Marquesas, in the beginning there was only an ocean upon which the creator, Tiki, floated on a canoe. Both the Egyptian sun god Ra, and the Babylonian sun god Shamash, were said to have sailed the primeval waters on a cosmic ship.

As well as all agreeing the creator god travelled around the primeval sea on a ship, these cultures also agree on what shape that legendary vessel had. It had a crescent-like form. Naturally, given that it’s the only object in our sky to show an obvious crescent, the standard assumption is that our crescent moon must have been the original source of inspiration for all such tales. And yes, that would seem like the logical conclusion to draw, were it not for the fact that many of the concrete details of this myth point to another explanation.

For example, in Egyptian texts we find descriptions of the sun god growing brighter, something usually translated as a reference to the rising sun. But the details of this myth are totally at odds with how our Sun typically behaves. Part of this myth goes as follows: “May you sail upstream toward the upper region of the night bark, and downstream toward the lower region of the day bark”. Notice how the sun is depicted as growing brighter when on its descending journey, and that it grows dimmer on its ascendency, which is not at all what we would expect if the rising/setting sun was the original inspiration for such myths.

But what happens if we switch instead to the Polar Configuration? Does that help make sense of these tales? Yes it does. Now we can see why it made sense to say the sun god moves upwards on his ship as time headed toward the phase of dimming (what our ancestors called ‘night’) and was descending during the phase of brightening (the archaic ‘day’). It was because, as the Polar Configuration visually turned in the heavens, the great crescent was brightest during the night when it was below the orb of Saturn, and then grew dimmer as it revolved, rising to the right until it was at its dimmest during what we would now call midday.

Another aspect of this myth that only makes sense when interpreted as a poetic description of a revolving crescent in the sky, rather than a rising/setting sun, is the depiction of the ‘night’ journey as being particularly perilous. Why? Because, during the phase of dimming, the ship was inverted or upside down. For example, spell 211 of the Coffin Texts provides instructions for newly deceased kings. He has to learn the path of Amentet (the ascending

path) then “ferry across the upper region when the divine hand is upside down”. Elsewhere the deceased declares, “It is the night-bark and the day-bark…I am not upside down in the presence of Ra”. Furthermore, in the Papyrus of Amen-Hetep, thought to be around 3,450 years old, we have a scene in which the goddess Nut is shown adopting an arched pose that represents the upper portion of the ship’s circuit, and the ship of the sun god himself is shown inverted as it crosses the body of Nut on its ‘night’ journey.

If the crescent cast by Saturn was the right way up during the phase of brightening to those who imaginatively saw it as a boat, then as the polar configuration rotated visually in the sky, by the time of the phase of dimming (what we would call ‘day’ but archaic traditions call ‘night’) the crescent would have looked inverted. Hence, the night journey was a perilous one, for it required the sun god to sail in a fully capsised ship.

Interestingly, in much later texts, the image of the sun god travelling around the body of Nut depicts his ship as being the right way up. This was probably because such hieroglyphs were carved long after the polar configuration had vanished from our skies. All later priests had were ancestral memories of Pharaoh fearing a night journey, but not understanding why the ship of heaven had to be inverted on its night crossing, so they just decided to render it as sailing as any ship normally would, thereby giving the king a more comfortable journey in death. Again, we are reminded that the more archaic the archeological record, and therefore the closer such people were to the source of inspiration that the mythic archetypes are based on, the more accurate such poetic descriptions of things once seen and heard in the heavens will be.

There is much more to uncover, with regards to the Polar Configuration and its usefulness in interpreting the mythic archetypes. But the next book will begin by drawing our attention away from the heavens and considering the ancient people who lived under that alien sky in order to begin to ask a question first raised in earlier books: How did we end up stuck in such a narrow range of possible societies?

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