CONTENTS

INTRODUCTION

The night sky, from Yaggy's Geographical Study *(1887).*

'When I follow the serried multitude of the stars in their circular course, my feet no longer touch the earth.'

PTOLEMY

What do we know of the beginnings of the universe? Really it depends on who you ask. A modern cosmologist will, of course, talk of the 'Big Bang', a theory that originated in 1927 with a Belgian priest named George Lemaître (see New Visions of the

Universe: Einstein, Lemaître and Hubble entry here), who posited the idea of there having been a 'cosmic egg' or 'primeval atom' from which the universe exploded into being. Billions of years ago all time, space and energy occupied a single infinitely dense, infinitely hot point known as the 'singularity'. In a trillion-trillionth of a second, this burst into expansion with a Big Bang and the universe came into existence, eventually ballooning to its current size of c.93 billion light years in diameter.

Ask another astrophysicist, and they could argue that this might not have been the *actual* beginning, as the theory is based on Einstein's general theory of relativity, which can only describe what happened after, not before, the singularity. In fact there are two Big Bang theories, and only one can be correct. The alternate suggests that the birth of space and time might have been even earlier, before the Bang, as part of a prior phase known as 'inflation', when the universe was dominated not by matter and radiation but by an energy inherent to itself – an as yet invisible 'dark energy' (see Breakthroughs of the Twentieth Century, and Beyond here), hypothetical yet apparently observable through its effect. Turn to another astrophysicist for answers and they might point instead to the recent quantum equation models, working with Einstein's laws, that suggest there never was a creation point, that the universe may have existed forever with no beginning or end. (This position, incidentally, is the same one held by Aristotle (see The Ancient Greeks here) more than 2300 years ago – for what could be greater evidence of the divine than the perfection of eternity?)

A ceremonial dancing coat used by the shaman of the Koryak people, an indigenous culture of the Russian Far East. The coat is made of tanned reindeer skin and embroidered with disks of varying size representing constellations, with the belt sewn around the waist symbolizing the Milky Way.

So... what exactly do we know of the beginnings of the universe? It is our oldest point of curiosity, the reason why we find creation myths at the root of cultures the world over. In Chinese mythology there is the first living being, P'an-ku, a furry horned giant who emerged from a cosmic egg after a wait of 18,000 years. P'an-ku cleaved the egg's shell in two with his axe to form the heavens and earth, and then fell apart himself. His limbs formed the mountains, his blood the rivers, his breath the wind.

Stephen Hawking was fond of illustrating his lectures with the belief of the Kuba people of the Democratic Republic of Congo, whose origin myth features the creator god Mbombo, or Bumba, a

giant standing alone in darkness and water, who suffered a stomach pain and vomited up the Sun, Moon and stars. The Sun burnt away the waters, revealing the land. Mbombo then threw up nine kinds of animals and, with a final retch, man.

Elsewhere, in Hungarian mythology the Milky Way is called 'The Road of Warriors', a pathway down which Csaba, the mythical son of Attila the Hun, will charge to the rescue should the Székelys (ethnic Hungarians living in Transylvania) be threatened. And nearly 4000 years ago in the region of modern Iraq, the ancient Babylonians had the *Enuma Elish* epic (see The Ancient Babylonians here), which told of the universe resulting from a cosmic battle between monstrous primordial gods.

A fifteenth-century mandala (universal diagram) of the three-headed, four-armed Hevajra, enlightened being of Tibetan Buddhism, who appears here dancing with his consort Nairātmyā between four spiritual gateways at the centre of the cosmos.

Consult the Bible (of which the Old Testament exhibits a clear influence from the *Enuma Elish*, with numerous narrative parallels) and the answers are provided in Genesis, with the Spirit of God moving on the face of the waters amid the darkness, before introducing light. Devoted faith in such biblical information has

inspired interpretations with rigid literality in the past, leading to a number of curious results, whether it's the belief in a flat, square earth (see the Orlando Ferguson flat Earth map in The Ancient Greeks entry here) or the long forgotten medieval belief in a sea above the sky, navigated by flying ships and sky sailors (see The Sea Above the Sky entry here). In the seventeenth century, the archbishop James Ussher (1581–1656) went so far as to pinpoint the exact date and time of creation, deciding that it had occurred at about 6 p.m. on 22 October 4004 BC. In addition to this, the same century[1] also yielded an actual depiction of the pretemporal nothingness before the light of Creation, shown here by the physician and occultist Robert Fludd in his *Utriusque cosmi...* (1617).

In fact, it was reflecting on this Fludd image of the black void of pre-Creation – an image, one could argue, of the very first 'sky' – that prompted the idea for this book. In essence, the aim was to collate a visual history of the sky, condensing the extensive and intricate worldwide histories of celestial mythology, philosophical cosmology, together with the landmark discoveries of astronomy and astrophysics, into a single illustrated journey through the millennia. While there is a variety of paintings, instruments and photographs gathered on these pages to illustrate the chronology of our gradual decoding of the cosmic theatre, primarily this is an atlas of celestial cartography.

Robert Fludd's image of infinity from his Utriusque cosmi..., *1617.*

To my mind, this is the most overlooked genre of mapmaking. In the history of cartography, reference works on the celestial map are vastly outnumbered by works focused on terrestrial cartography, despite the fact that the two genres were, traditionally, equally respected. Presumably this betrays an assumption that, while terrestrial maps portray the explorations and political machinations of monarchies and empires, maps of the

world above reflect little of the world below. Indeed there can be a modern tendency to reduce star maps to the category of mere 'decorative' material, with a perceived paucity of historical substance. (Certainly, this is not helped by their historical association with the pseudoscience of astrology.) Paradoxically they also suffer from a perception as lifeless technical diagrams of interest only to the student scientist. As we shall see, in response to both charges, nothing could be farther from the truth. Celestial maps are as vibrant with story as any other – while often being peerless in their artistry.

Of course, the mapping traditions of celestial and terrestrial cartography are as different as the manner of discovery they represent. Terrestrial mapping is rooted in the gradual process of active exploration. From our initial forays into the unknown world, blank on the page, we recorded and measured our geographic expansion step-by-step and ship-by-ship across the terrestrial plain. The grand pageantry of the heavens, on the other hand, was always on full glorious display from the very beginning. Against the countless visible stars, the Sun, Moon and wandering planets carried out their actions and phases openly, yet in total mystery.

To celestial cartographers, faced with such overwhelming vastness, the sky was itself a canvas for the projection of every myth, fear and religious fantasy in the mind of its observer, as the human brain searched restlessly for recognizable patterns in the chaos. With no vessels of exploration to probe this greatest of oceans, the astronomer–artists could only draw on what they knew

– their gods, myths and animals – and apply them to the constellations prominent in their order of brightness. Hence the twelve signs of the zodiac are older than written record, used by the ancient Romans, who inherited the concept from the Greeks. They, in turn, drew the idea from the Babylonians, and so on, back into the murk of prehistory.

Though this book opens with a gathering of prehistoric relics from the field of archaeoastronomy, it is with the ancient Sumerians and Babylonians of Mesopotamia that the story of recorded astronomy begins (as we discover, for example, that the first named author in history was a lunar priestess). The journey then takes us across to ancient Egypt, and on to unravel the various spectacular celestial concepts of the ancient Greek philosophers. The most wonderful and enduring of these early Hellenistic ideas is the concept of the crystalline spheres (see Capturing the Cosmos: Clockwork and the Printing Press entry here), the idea that the world exists within a nested hierarchy of increasingly large and transparent, but physical, spheres, each one supporting a planet, the Sun or Moon, against a backdrop of the 'fixed stars'. As bizarre as it seems to us, the idea does have an obvious logic, as it accounts for the travelling motions of the celestial bodies by extrapolating the known behaviour of the terrestrial realm – for something to move endlessly on such a long journey, it must surely be because it is carried.

A zodiac wheel from Astrolabium Planum *by Johannes Angelus, after 1491.*

In fact the story of the heavenly spheres illustrates a notable point that one comes to realize applies to much of the history of astronomy. The true breakthroughs were often made precisely by *disregarding* the obvious, the learned and logical; and reaching instead for a theory counterintuitive in its originality. Perhaps the most famous champion of this approach is Copernicus (see Islamic Celestial Works entry here), by his tearing of Earth from the centre

of God's created universe to replace it with the Sun, sending seismic shocks through contemporary religious and social institutions and triggering the scientific revolution. Arguably the most important instrument of astronomers, we discover, is the imagination, as they pursue the ultimate goal of attaining an objective viewpoint of the universe, to best survey the intricacy of its mechanics.

This is why the stories of erroneous astronomical ventures, or scientific myth, are collected here alongside the great discoveries and the assorted cultural myths in this book – whether it's Percival Lowell's observations of alien-made canals on Mars (see Percival Lowell Spies Life on Mars entry here), René Descartes's notion of a 'full' space of swirling vortices (see The Cartesian Universe entry here), or curious escapades like the hunt for the phantom planet Vulcan (see The Phantom Planet: Vulcan entry here). We learn as much from these ultimately disproven flights of imagination and interpretation as we do from the triumphs. And in step with this march of progress (and its occasional diversion) we see the celestial cartographic art, as the pictorial record of these innovations, flourish with the invention of the Gutenberg printing press and, along with the cartographic art as a whole, explode in popularity with the Renaissance passion for measurement and accurate depiction of form. The Age of Discovery, which opened in the fifteenth century, was also the golden age of cartography. Just as the discoveries of new nations and continents filled maps with increasing detail and sense of scale, so too did discoveries of the sky, together with diagrams of the battling theories as to the

structure of the cosmos. The celestial atlas reached a particular artistic highpoint in the seventeenth century, with the publication of Andreas Cellarius's *Atlas coelestis* (see Newtonian Physics entry here), commonly agreed to be the most beautiful sky atlas ever created.

The Aboriginal constellation Emu in the Sky is made not of stars but of the darkness between them. Here it is viewed from Mount Arapiles, Victoria, Australia.

In astronomy, the mysteries were unravelled further with the later development of spectroscopy, as it was realized that the stars telegraph their chemical secrets via the spectrum of the light they emit. Out of this the science of astrophysics emerged, and the scope of celestial mapping transformed with the coinciding development of photography. With the innovations of the twentieth century, the rate of discovery hit a new velocity with, for example, the search for universally applicable laws, most famously featuring Albert Einstein's theory of general relativity

(see New Visions of the Universe entry here), that would influence the aforementioned 'cosmic egg' idea of Monsignor Lemaître. With Edwin Hubble (see New Visions of the Universe entry here) subsequently finding that the glowing nebulae in the sky are, in fact, entire galaxies of stars lying far beyond the boundaries of the Milky Way and that, in addition, many of these galaxies were racing away from us, the model of the expanding universe was proven. Only in 1998 was it found that, contrary to previous thinking, this expansion is not slowing down but speeding up, that the galaxies are racing away from each other, which is as puzzling a discovery as tossing a stone into the air and watching it fly at increasing speed away from you. Exactly why this is happening is a mystery, but by calculating the rate of expansion and working backwards we were able to put a figure to the age of the universe at somewhere between 10 and 20 billion years. Just over 350 years since Archbishop Ussher's estimate of a 5650 year-old universe, with the help of the Hubble Space Telescope we have refined the modern figure to 13.8 billion years and, astonishingly, are now able to lay our eyes on galaxies of almost that light-travel distance, like GN-z11 (see Breakthroughs of the Twentieth Century, and Beyond entry here) in the Ursa Major constellation, which existed just 400 million years after the Big Bang.

From Kopperu Tenmon Zukai, *1808, by the Japanese artist Shiba Kōkan, who introduced the heliocentric theory of Nicolaus Copernicus to Japan.*

And so we arrive back at our first – or rather, *the* first – question: what exactly do we know of the origins of the universe? Well we know that with each day we venture deeper into the open heart of the mystery, as space probes cross the frontier of interstellar space and push back the shadows like the oceanic explorers of old.[2] We know that, with orbital space telescopes

extending our gaze with unprecedented acuity, the days of solving the myriad riddles tied to this primary question – the possibility of life outside our world, the fabric and fate of our universe – grow closer too, if we can survive to see them. From history, we've learnt that we should maintain a healthy scepticism of everything we think we know, for even our assumption of there being only one universe could be as myopic as that of the astronomer of 100 years ago, who *knew* the solar system to be the only galaxy.

There are two things, though, that I think are certain. The first is that it is our scientific and philosophical imagination that will remain our most useful tool, as it was for those who devised the lenses for the first telescope, rearranged the planets on the page or encapsulated the grandeur of the universe with a chalkboard of equations. The other certainty is the immortal life of the celestial map. The images in this book show just how differently we have mapped the sky across time and cultures, while through their mere existence demonstrating just how similar has been our determination to do so. In whatever advanced astrophotographic form cartography will take in the future, however far we move away from the prehistoric ancestor daubing the first star charts on the walls of caves, it will always be with maps that we draw the record of our accomplishments, and mark the way for the rest to follow.

---

1. For the most bizarre example of seventeenth-century Christian astronomical explanation there is the story of the Vatican librarian Leo Allatius, who allegedly wrote an unpublished treatise entitled *De praeputio Domini nostri Jesu Christi diatriba*

('A Discussion of the Foreskin of Our Lord Jesus Christ'), in which he claimed that the foreskin of the Son of God rose into the heavens and transformed into the rings of Saturn.

2. For example it was only in July 2018 that researchers at the University of Cambridge discovered, using data from the European Space Agency's Gaia satellite, that 8–10 billion years ago a dwarf galaxy named the 'Gaia Sausage' collided with the Milky Way. The Sausage was entirely obliterated, while the Milky Way was reshaped through the addition of stars, gas and dark matter, resulting in its distinctive bulge.

THE ANCIENT SKY

'Astronomy compels the soul to look upward, and leads us from this world to another.'

Plato, *Republic* (c.380 BC)

The ancient Chinese feudal state of Qi was very small in size. It's rarely mentioned in official records, and when it is it's usually with the note that 'its affairs are not worth mentioning'. However, the state is remembered to this day as the origin of a popular Chinese idiom used to dismiss baseless concerns, *Qǐ rén yōu tiān* ('the people of Qi worry about the sky'), which refers to how the Qi people went about their daily lives perpetually anxious that the heavens could fall down and crush them at any moment.

Figure of the Heavenly Bodies, *(c.1568) by the Portuguese cosmographer and mapmaker Bartolomeu Velho, illustrating the Ptolemaic universe.*

Like this relic of ancient belief glinting in present-day language, the history of our response to the sky striates the mass of modern culture, for the heavens have always been a source of wonder. In its arena we have found gods, monsters, the measurement of time, chemical secrets and divine warnings; all imbued with the dread weight of overhead cosmic endlessness. It's a mesmerism that holds true today, for the more of its secrets we decode the more layers of new mystery we discover and the deeper we are drawn in. The documented history of how we interrogated the heavens begins with the Sumerians as we shall find a bit later, but what of the time before record? What was the nature of our connection with the prehistoric sky?

The elk skin sky map of the Native American Pawnee people. Stars are drawn in different sizes to represent their order of magnitude (brightness).

Archaeoastronomy is the name for this field of study, which should be clearly differentiated from the later scholarly traditions of ancient astronomy. This is the attempt to decipher the enigmatic relationships that prehistoric people had with the sky, through the scant surviving material evidence. Recently, particularly in Europe, discoveries of ancient astronomical artefacts have helped to enhance our picture of the Neolithic and Bronze Age inhabitants as a people in possession of a more sophisticated knowledge of mathematics and astronomy than previously thought, long before the invention of writing systems or optical instruments to aid observation.

PREHISTORIC STARGAZING

In 1940, near the village of Montignac in southwestern France, a pet dog named Robot led a group of teenagers to discover one of the greatest collections of prehistoric artwork ever found, via a small hole that led to the Lascaux caves. Inside they found a 'cavalcade of animals larger than life painted on the walls and ceiling of the cave', recalled Marcel Ravidat, one of the teens, who added that 'each animal seemed to be moving'. More than 600 wall paintings, using mineral pigments, and nearly 1500 engravings covered the interior walls and ceilings of the caves nicknamed 'the prehistoric Sistine Chapel'. The combined efforts of many generations, the artwork was estimated to have been created some 17,000 years ago. There were several areas to the caves: the Hall of the Bulls, which featured a bull painting 17ft (5.2m) long, the largest animal discovered so far in cave art; the Lateral Passage; the Shaft of the Dead Man; the Chamber of Engravings; the Painted Gallery; and the Chamber of Felines. The animal drawings appeared to have a calendrical nature, as the majority had seasonal characteristics: the deer were shown in their autumnal rutting season, the horses at times of mating and foaling.

(Curiously, though, there was not a single depiction of a reindeer, which was the principal food source for the artists at that time.)

A section of the Hall of the Bulls from the Lascaux caves, France. The black markings are believed to be a prehistoric mapping of the Pleiades star cluster.

Of particular interest was the drawing of a bull, a bird and a bird-man on the wall of the Shaft of the Dead Man. This has been interpreted by Dr Michael Rappenglueck of the University of Munich, and others, to be the earliest existing star map, the three figures representing the stars Vega, Deneb and Altair in a grouping known today as the Summer Triangle. These three are among the brightest objects discernible in the night sky during the middle months of the northern summer. Elsewhere in the cave, in the Hall of the Bulls, another diagram appeared to depict the Pleiades star cluster, sometimes called the Seven Sisters. Small dabs of paint in other parts of the picture might also have represented smaller stars. The cave was opened to the public in 1948, but this exposure

to touch and breath altered the internal environment, and the cave was closed in 1963 as a protective measure. Today, one can visit Lascaux II, a replica built just down the road from the original. As a kind of prehistoric planetarium, the Lascaux artwork allows us to view the cosmos through Ice Age eyes.

Interpreting the sky for measurement of time also appears to be a technique that predates the invention of writing. Take for example the Mesolithic 'calendar' monument at Warren Field, Scotland, created c.8000 BC, a site examined today by those searching for the beginning of the concept of time. Spotted from the air and excavated in 2004, the twelve pits seem to mimic the phases of the Moon to follow the lunar months, and align along the southeast horizon for the sunrise of the midwinter solstice. The latter feature would have provided the hunter-gatherers with an annual 'astronomic correction' to better track the passing of time and the seasonal changes, symbolically and practically. This is the earliest example of such a celestial timekeeping structure – no known comparable site would exist throughout Europe for several thousands of years.

The first image of Stonehenge drawn on site, c.1573, by the Flemish painter Lucas de Heere.

The British Isles is especially rich in Mesolithic monuments: in the development of the Stonehenge monument,[1] erected sometime between 3000 BC and 2000 BC, there was also an axis generally oriented towards the summer solstice sunrise, and the winter solstice in the other. 'For my own part', wrote the Victorian astronomer Norman Lockyer (1836–1920), 'I consider that the view that our ancient monuments were built to observe and to mark the rising and setting places of the heavenly bodies is now fully established.' The astronomical function of Stonehenge was self-evident to Lockyer; however, despite its popularity, the theory that Stonehenge was an ancient observatory remains only a theory. Recent research into the inner circle of bluestones has suggested an alternative function – that the inner circle of bluestones were chosen for their acoustic properties when struck

with rocks, which would explain why local stones were disregarded, in favour of hauling the bluestones into place from Pembrokeshire, more than 180 miles (290km) away. Near to this source point, the village church of Maenclochog is said to have used bluestone bells into the eighteenth century.

Another likelihood, if separate and not directly linked, was that Stonehenge served as a burial mound, as large deposits of human bone have been buried there from the time of its establishment over a period of 500 years. And, in fact, this connection with ritual burial and sky worship is spread across cultures from ancient history to modern day – the Zoroastrians of pre-Islamic Persia would build 'Towers of Silence', tall circular structures on which the bodies of the deceased would be placed to be picked apart by carrion birds. In Tibet, meanwhile, a similar tradition continues to be practised. The Tibetan 'sky burial', in which the corpse is placed on a mountaintop also for the birds to devour, is part of the Vajrayana Buddhism belief that, once the soul has left, the body is merely an empty vessel to be disposed of. Offering it up to the sky and its wildlife is considered the most generous way of doing so.

The Nebra sky disc, unearthed in 1999 in the German state of Saxony-Anhalt, and associatively dated to c.1600 BC.

Turning from sky sites to cosmological objects, another remarkable find was made in 1999, when two grave robbers armed with a metal detector uncovered a Bronze Age treasure trove at a site near Nebra, Saxony-Anhalt, in Germany. Among the small pile of two bronze swords, two hatchets, a chisel and pieces of spiral bracelets they found a unique object, a bronze disc 12in (30cm) in diameter, oxidized to a glowing blue-green patina and inlaid with symbols of gold. The looters (who were later prosecuted and, on appealing for leniency, had their sentences increased) sold the

stash to an underground antiquities dealer in Cologne, and for two years the disc and its burial companions changed hands on the black market. It wasn't until 2002, when the disc was recovered by authorities after a sting operation led by Dr Harald Meller of the Museum of Halle in Germany, that the true significance of the Nebra sky disc began to be realized.

The earliest surviving picture of Stonehenge, one of a number of drawings accompanying an abridged manuscript version of Wace's Roman de Brut, *made in Britain 1338–1340.*

Through radiocarbon analysis of the axes and swords with which it was buried, the disc has been associatively dated to c.1600 BC and the Bronze Age Unetice culture. This means that the Nebra sky disc is verified as the oldest confirmed depiction of the cosmos in existence – an astounding discovery that questions the

mines, the gold and tin content of the bronze were identified as originating from Cornwall, England, a distance of more than 700 miles (1127km) as the crow flies. The disc reveals not just an overlooked sophistication of its authorial culture, but also the existence of a substantial metal trade from the British Isles towards central Germany, and perhaps even Egyptian mythological inspiration, if it is indeed a solar vessel depicted. Little wonder, then, that in 2013 the Nebra sky disc was designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as 'one of the most important archaeological finds of the twentieth century'.

The unique 'Berlin Gold Hat', a ceremonial hat of embossed gold dating to the Late Bronze Age, c.1000–800 BC, found in southern Germany or Switzerland. A Bronze Age interpreter could use it as a solar and lunar calendar, predicting lunar eclipses and other celestial events.

---

1. Stonehenge, incidentally, is not technically a henge. This is defined as earthworks consisting of a circular banked enclosure with an internal ditch – Stonehenge's bank is inside its ditch.

THE ANCIENT BABYLONIANS

As fascinating as it is to examine these prehistoric discoveries, ultimately any definitive conclusion as to their astronomical nature is hampered by the lack of supporting documentation. The interpretations of their celestial significance are modern, driven by our zeal to trace evidential foundations of early celestial knowledge. For the earliest records-based research, we need to move from Europe farther east.

Western astronomy originated with the Sumerians, the supremely inventive people in southern Mesopotamia (modern southern Iraq) who devised, among other innovations, the modern practice of dividing a circle into 360 degrees, each of sixty minutes, and the earliest known system of writing – cuneiform – dating to c.3500–3200 BC. The task of studying and examining the sky on behalf of the monarchs fell to the 'EN', the position of high priest or priestess that carried with it great political power. The most famous character to hold this title (c.2354 BC) was Enheduanna, daughter of King Sargon of Akkad, who was the first woman appointed to the role. Today she is remembered for the poetry and hymns she composed relating details of her life, particularly the 153-line work *Nin-me-šara* ('The Exaltation of Inanna') which

features her lunar observations as priestess to the Moon goddess Nanna. As such, Enheduanna is considered the first named author in history.

Nicolaes Visscher's map of ancient Babylon, 1660.

As Sumer fell from power c.2000 BC, the Babylonian civilization grew under the conqueror-king Hammurabi. The Sumerian language was gradually replaced with Akkadian, but many of the Sumerians' advanced traditions fed into the younger Babylonian culture – most notably astronomy. As with other ancient cultures, early Babylonian astronomy was an attempt to impose order on chaos, a rigorous scientific analysis of the heavens powered by the unscientific motive that, in part, drove astronomy for the next 3000 years – divination. The Babylonians associated their gods with the stars and planets, and great value was placed on the interpretation of the behaviour of the heavenly bodies. Those who

were able to read the stars could hold real influence over terrestrial affairs.

This universal theme of searching for patterns in the chaos of the cosmos extended to the Babylonian creation myth *Enuma Elish*, possibly composed as early as the eighteenth century BC. Fragments of the story were discovered in 1849 amid the ruins of the Library of Ashurbanipal at Nineveh (Mosul, Iraq) by the English archaeologist Austen Henry Layard. In about a thousand lines of Sumero-Akkadian, written across seven tablets, the epic relates the birth of the universe, 'When the sky above was not named', as the waters of two primeval gods Abzu (representing fresh water) and Tiamat (oceans) mingled to bring about the great Creation. Several new gods came into being inside Tiamat's belly, one of whom produced a son, Marduk, who was given power over the wind and caused havoc by creating tornadoes. Abzu grew irritated with these gods and planned to kill them, but they pre-emptively launched a successfully lethal attack. Tiamat was moved to avenge Abzu's death, but Marduk was anointed as the leader of the gods within her, and with newfound power he defeated Tiamat, tearing her body in half. Thus were created the earth and skies. In a final formalizing act, Marduk also created the calendar, and arranged the Sun, Moon and stars in an orderly manner. The myth elevated the Babylonian god Marduk to superiority over other Mesopotamian deities, and serves to provide us with an idea of the scenes that played out in the mind of the ancient Babylonians as they gazed upwards – especially when catching a glimpse of the

A bas-relief scene from the ancient Assyrian city of Nimrud, which has been interpreted as showing the god Marduk's victory over the cosmic leviathan Tiamat.

The earliest astronomical texts in existence are Babylonian, the oldest being the Venus tablet of Ammisaduqa, which dates to the reign of King Ammisaduqa in the mid-seventeenth century BC. The cuneiform tablet is a record of twenty-one years of careful observations of the heliacal risings and settings (when a star or planet is visible on the eastern horizon just before and after sunrise) of Venus.[1]

The tablet is just one of a set of seventy in the collection of astronomical diaries known collectively as the *Enuma Anu Enlil*, which largely detail observed celestial omens, and the subsequent divinatory interpretations offered by contemporary priest–scribes, usually referred to as Chaldaeans. These records were maintained well into the first millennium BC, and provide a wealth of astronomical and historical material, documenting, for example,

the most seismic event of that period in the region – the conquest of Alexander the Great. One tablet, discovered in 1880, records the battle of Gaugamela on 1 October 331, when Alexander defeated the Achaemenid king Darius III and conquered Mesopotamia. As recounted in the cuneiform, the Chaldaeans had anticipated such an outcome, having read the sky eleven days earlier and recorded: 'There was a lunar eclipse. Its totality was covered at the moment when Jupiter set and Saturn rose. During totality the west wind blew, during clearing the east wind. During the eclipse, deaths and plague occurred.'


image
not
available

Alexander the Great that Darius desperately performed additional sacrifices before the battle but, with such a decisive statement by the heavens, no preparatory ritual could save him – not even the last-resort method to trick the gods that was reportedly favoured by King Esarhaddon, who reigned over the Neo-Assyrian Empire 681–669 BC. So terrified was Esarhaddon of lunar eclipses that he would install a substitute king (chosen from prisoners or the mentally ill) on the throne for a few days to bear the brunt of the gods' anger until the event passed. Esarhaddon then executed the man, to be certain that any residual ill portent was cleared away.

The Venus tablet of Ammisaduqa, the earliest existing record of Mesopotamian astronomical observations, dated to around the mid-seventeenth century BC. It recorded the first and last times the planet Venus was visible on the horizon in relation to sunrise and sunset.

The Fall of Babylon, *John Martin's 1831 painting of Cyrus the Great defeating the Chaldaean army.*


image
not
available

INDEX

A note about the index: The pages referenced in this index refer to the page numbers in the print edition. Clicking on a page number will take you to the ebook location that corresponds to the beginning of that page in the print edition. For a comprehensive list of locations of any word or phrase, use your reading system's search function.

Page numbers in *italics* refer to illustrations