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History of Astronomy: Babylonian Astronomy

The Birth of Stargazing

Aira Astralis

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Conclusion

This free sample contains the Introduction and Chapter 1. The complete book contains the full contents above.

Introduction

Somewhere in the south of Iraq, under mounds that were once the greatest city on Earth, lies the oldest scientific archive in the history of the world. It was not written on paper or papyrus but pressed into damp clay with a cut reed, and its authors were priests of a kingdom that fell twenty-five centuries ago. Yet every time you check a clock with sixty minutes to the hour, or read a horoscope with twelve signs, or hear an eclipse predicted to the second, you are living in the world those authors built. Babylonian astronomy is not a curiosity from the history of science. It is the foundation on which the whole edifice was raised.

For most of the last two thousand years, that foundation lay buried and unknown. The Greeks knew they had borrowed heavily from the Chaldeans, as the Babylonians' astrologer-scribes were called, but the details were lost when the clay tablets were broken, scattered, and swallowed by the earth. The rediscovery is barely a century and a half old, and the full decryption of the Babylonians' mathematical astronomy is younger still, the work of twentieth-century scholars who taught themselves to read ephemerides computed in base sixty before Rome was a village. What they found rewrote the history of science: a tradition of recorded observation running for seven uninterrupted centuries, and a body of theory precise enough that its numbers still feed modern studies of the Earth's rotation.

The subject of this book is that tradition, in its own right and in its consequences. Who were these observers, and what did they think they were doing, reading the sky not for its own sake but as a running report on the fate of kingdoms? How did a culture that worshipped its planets as gods end up treating the same planets as arithmetic problems? What did they see, over the roughly six hundred and fifty years of their systematic record, from eclipses to the apparitions of the comet we now call Halley's? And how did their habits of mind, the twelvefold zodiac, the 360-degree circle, the sixty-minute hour, the very idea that the sky can be predicted, pass into the bloodstream of every later civilization that looked up?

The book follows a chronological and a logical arc at once. It opens with Babylon itself, the city and its scribes, and with the excavation and decipherment that brought their work back to light. It then sets out the pieces of the tradition as the Babylonians built them: the omen series that made the sky matter, the star catalogues that organized it, the calendar that disciplined it, and the diaries that recorded it, night after night, for centuries. It explains the mathematics, the sexagesimal arithmetic, the zigzag functions, the eclipse cycles, which the late Babylonian scribes developed to a level of precision the

Greeks inherited but did not surpass for a millennium. It traces the transmission to Greece, and through Greece to the entire world.

It also tells the story of the scholars who recovered all this, because the discovery of Babylonian astronomy is itself one of the great intellectual adventures: the midwife of Assyriology, the testing ground of mathematical archaeology, and the source of some of the sharpest controversies in the history of the field. And it takes the story to the present, where Babylon's observations are still being used, still yielding discoveries, in laboratories that study the slow-down of the Earth's spin and the dating of ancient history itself.

This is a book about the first science of the sky, written by the people who made the sky a subject of exact record. They were priest-scribes working in mud-brick temples, and their successors built observatories on mountains, launched telescopes into space, and named a crater on the Moon after one of them. The story deserves to be told from the beginning, and the beginning is a city of clay on the Euphrates.

Chapter 1: The Discovery of Babylonian Astronomy

The city of Babylon rose on the Euphrates in what is now Iraq, and for two thousand years it was one of the capitals of the world: first of an empire under the lawgiver Hammurabi in the eighteenth century before the common era, then of a series of later empires that kept its name and its prestige alive. It was a city of temples and ziggurats, dominated by the great stepped tower of Etemenanki, the house of the foundation of heaven and earth, remembered in the Bible as the Tower of Babel. Its people wrote on clay. Letters, contracts, hymns, recipes, and astronomical observations were all pressed into damp tablets with a stylus cut from a reed, and when the buildings above them collapsed, the tablets were fired hard as brick and preserved. Paper rots and papyrus burns, but a clay library survives its own destruction, which is why we can read a Babylonian's weather diary across twenty-five centuries and cannot read a Roman's.

The Babylonians inherited their sky-watching from the Sumerians, the older civilization of the southern Mesopotamian plain, whose language they kept for scholarship the way medieval Europe kept Latin. The oldest celestial texts identifiable in the tradition go back to the early second millennium, and the most famous of them, the so-called Venus tablet of Ammisaduqa, records the appearances and disappearances of Venus across the reign of an Old Babylonian king of the seventeenth century before the common era. Already there, in the oldest astronomical document of any civilization that is still readable, the habit that defines the whole Babylonian achievement is present: write down what the planet did, and when.

For the nations that came after, the Babylonians were the astronomers. Greek and Roman writers used their name for the profession, calling the experts in the stars Chaldeans, after the Chaldean dynasty that ruled Babylon in its last independent flourishing, and the Old Testament book of Daniel makes its hero an apprentice in exactly that Babylonian establishment, where he is trained among the astrologers and exorcists of the royal court. And then the knowledge seemed to vanish. Babylon was captured in 539 before the common era by the Persians, and the city declined over the following centuries under Persian, Greek, and Parthian rule, until the ancient traveler Strabo found it a desert of ruins. The cuneiform script in which everything had been written was forgotten so completely that by the medieval period no one on Earth could read it.

The rediscovery is one of the great feats of the nineteenth century. Travelers

had long copied the strange wedge-shaped inscriptions at Persepolis in Iran, and in the 1830s and 1840s a British officer named Henry Rawlinson, working from spectacular cliff carvings left by a Persian king, cracked the code of the Persian form of the script. The decipherment opened the way to the Babylonian form of cuneiform, which proved to be the script of an entire lost literature. Excavations followed. The sites of Nineveh, Nippur, and Babylon were opened by European expeditions in the middle decades of the century, and they yielded libraries by the tens of thousands of tablets, including the royal library of the Assyrian king Assurbanipal at Nineveh, which had looted the learning of Babylon wholesale.

Among the tablets were astronomical texts, and in 1870s a young Assyriologist named George Smith, the same man who found the flood story in the Epic of Gilgamesh, published the first study of the Venus tablet, which had been excavated from Nineveh's library. The realization slowly dawned on scholars that the Greeks' legendary Chaldean predecessors were not a myth. The Greeks had themselves said that their astronomy borrowed from Babylon, and here were the Babylonians' own records, in their own hand, in some cases copied by scribes born a thousand years after the tablets they were copying from.

A note on names is needed before the story starts, because the modern names of the tradition are not the ones its practitioners used. The scribes called their land Akkade, and their language Akkadian, and the discipline of the sky was for them one branch of the craft of the scribe. The word Chaldea, by which the Greeks knew their astronomy, is a dynastic label, and the word Babylonian, by which modern scholarship labels the whole tradition, is itself a simplification, since the astronomical scribes worked in several cities of the southern plain and the archive is a Mesopotamian achievement rather than the property of one town. This book keeps the conventional name, Babylonian, because the archive's center of gravity and its largest single set of observers genuinely were at Babylon, and because the name carries the story's point: a science identified forever with one city on one river, which the whole world afterward inherited.

The most spectacular discovery, though, did not come from a scientific excavation at all. In the late nineteenth century, local diggers working the ruins of Babylon brought enormous numbers of tablets to the antiquities market, and among them, unmarked and unprovenanced, were batches of tablets that made no sense: columns and columns of numbers in sexagesimal notation, running for line after line, related to no omen and no incantation. For decades they were filed as mathematical exercises. It was only in the mid-twentieth century, above all through the work of the Austrian-born historian of

science Otto Neugebauer, that these tablets were recognized for what they are: ephemerides, worked-out tables predicting the positions of the Moon, the Sun, and the planets, computed by rigorous arithmetical rules by scribes who died before the common era began.

The greatest astronomical archive of antiquity had been sitting in museum drawers, unrecognized, for two generations. Babylonian astronomy was discovered twice, once by the archaeologists and once by the historians of mathematics, and both discoveries reshaped what we know about the origins of science.

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ABOUT THE AUTHOR

Aira Astralis is a science writer specializing in astronomy and space exploration. Her work spans the full breadth of humanity's relationship with the cosmos -- from the earliest naked-eye observations to the engineering marvels of modern space missions.

Her books are built on a foundation of primary sources: peer-reviewed research, mission archives, and direct engagement with the scientific community. She writes for readers who want to understand not just what we know about the universe, but how we came to know it.

She believes that the most important frontier is not out there but in the gap between what scientists discover and what the public understands. Her books exist to close that gap.