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History of Astronomy: Mesoamerican Astronomy

Maya and Aztec Skies

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

Long before Europeans crossed the ocean, the peoples of Mesoamerica had built one of the world's great observational traditions. Between roughly 1500 BCE and the sixteenth century CE, in the lands from central Mexico through Guatemala, Belize, and Honduras, cultures that included the Olmec, the Zapotec, the Maya, and the Aztec watched the sky with extraordinary patience, wrote down what they saw, and turned those records into arithmetic. Their astronomy had no telescopes, no geometry of orbits, and no theory of a solar system. What it had instead was counting of a very high order: repeating cycles tracked in stone, bark-paper books, and painted murals, precise enough to predict the behavior of the Moon and Venus for centuries ahead.

This book is about that tradition: what it was, how it worked, what it achieved, and what remains of it. The subject deserves care, because much of what survives is fragmentary and much of what is popularly believed about it is wrong. The ancient Maya did not predict the end of the world in 2012. They did not have secret knowledge lost to modern science. What they had was something more interesting: a fully developed mathematical astronomy built entirely on naked-eye observation, sustained by professional observers, recorded in the most sophisticated writing system ever developed in the Americas, and woven so deeply into religion and statecraft that the sky itself became a kind of political language.

The evidence comes from four sources, each with limits. First, four bark-paper books survive, the Dresden, Madrid, Paris, and Grolier codices, out of what were once thousands; the rest were destroyed, most infamously in the fires ordered by Bishop Diego de Landa in 1562. Second, tens of thousands of carved stone monuments record dated events with a precision that lets modern scholars align the ancient calendar with ours almost to the day. Third, the buildings themselves: towers, doorways, and whole architectural groups aligned to sunrise positions, zenith passages, and the extreme rising points of Venus. Fourth, the chronicles and ethnographies written after the conquest by friars and by indigenous historians, which recorded, alongside much distortion, the workings of the calendar systems the Spaniards were trying to erase.

From these fragments a coherent picture has been assembled, especially over the past sixty years. It shows a tradition that tracked the Moon and Venus through their full synodic cycles with a precision few pre-telescopic observers anywhere ever matched, that organized time into interlocking counts whose least common multiples mirror the sky's own rhythms, and that embedded all of it in a worldview where observation and divination were not rivals but the same act. It also shows losses that can never be repaired, and questions that

may never be fully answered.

The chapters that follow trace the discovery of this astronomy by modern scholarship, the structure of its famous calendar systems, the science hidden inside its tables, its observatories and instruments, its key texts and monuments, its place among the world's astronomical traditions, and the directions its study is moving today. The sky the Mesoamerican astronomers watched is the same sky over our heads now. Learning how they counted it is one of the best windows we have into what human attention, without any instrument but the eye and the record, can actually do.

A note on names and scope is needed at the outset. Mesoamerica is a modern scholarly term for the culture area extending from central Mexico through Honduras, defined by shared traits that included the two calendars, writing, the sacred 260-day count, and a common family of sky deities. The peoples covered in this book spoke hundreds of languages and built very different states, but their astronomy was one tradition with local dialects, which is why the Maya Long Count, the Aztec New Fire ceremony, and the Zapotec horizon temples belong in a single story. Where the evidence is specifically Maya, Aztec, Zapotec, or Olmec, the chapters say so; where a practice crossed the whole area, it is described as Mesoamerican. The book keeps its focus on the astronomy itself: the counting of the sky, the records that carried it, and the tradition that still keeps it.

Chapter 1: The Discovery of Mesoamerican Astronomy

Mesoamerican astronomy was discovered twice: once by the people who practiced it, and once by scholars who, centuries later, learned to read what they had left behind. The second discovery is a story in itself, and it explains much about what we know and what we can never know.

The first European accounts came from the conquerors and the friars who followed them. Bernardino de Sahagun, working in the 1550s and 1560s, gathered indigenous accounts of Aztec life into the encyclopedic work now known as the Florentine Codex, including descriptions of the 260-day ritual calendar and the ominous signs the Mexica read in comets. Diego Duran recorded the ceremonies of the Mexican year as they were still remembered. In Yucatan, Bishop Diego de Landa burned the Maya libraries at Mani in July 1562, then, in an act that historians have never stopped marveling at, wrote a detailed account of Maya life that preserved the essentials of the calendar: the 260-day count, the 365-day year, the interlocking wheels of days and months.

The Relacion de las cosas de Yucatan became the master key to Maya time, even as its author had destroyed the very archives it described. A few indigenous writers did the same work from the inside, most famously the authors of the Quiche Popol Vuh, which opens with the birth of the world and the setting of the sky, and the annals of the Cakchiquel Maya, which date early colonial events in the old calendar.

Interest then went quiet for two centuries. The ruins were known to local people all along, but the outside world took notice when John Lloyd Stephens and Frederick Catherwood traveled through the Maya lowlands in 1839 to 1842 and published their lavishly illustrated Incidents of Travel in Central America, Chiapas and Yucatan. Their books electrified readers on both sides of the Atlantic and established the central puzzle: these cities had been built by the ancestors of the people living around them, not by Egyptians or lost tribes.

Stephens bought the site of Copan for fifty dollars, an act of nineteenth-century presumption that at least attached a price to what would soon become priceless.

The calendar itself was cracked by a small group of bibliophiles and librarians working in Dresden, Madrid, and Paris in the last decades of the nineteenth century. The city of Dresden had acquired a Maya book, taken from Yucatan, sometime in the 1730s, and Ernst Forstemann, librarian of the Royal Public Library, turned to it in the 1880s. By comparing its tables with the calendar

information in Landa, Forstemann worked out the bar-and-dot numerals, the positional Long Count, the 260-day and 365-day cycles, and in 1886 he identified what remains the most famous product of Maya astronomy: the Venus table, five pages of arithmetic that correct the synodic period of Venus across a cycle of 104 years.

At the same time, in Paris, Leon de Rosny was doing comparable work on the Paris Codex, and the Mexican scholar Alfredo Chavero published studies of the Aztec calendar stone found in 1790. A generation later, Eduard Seler, arguably the greatest of the early Mesoamericanists, connected the calendar systems of central Mexico with those of the Maya and demonstrated that the whole region shared one calendrical grammar.

The twentieth century brought the mathematical core into focus and then the writing itself. John Teeple, a California chemical engineer who worked on Maya astronomy as an obsession, solved the lunar glyphs in the 1920s: the inscriptions recorded the ages of the Moon in a repeating series of 29- and 30-day months, so that Long Count dates could carry lunar information accurate to a fraction of a day. J. Eric S. Thompson organized the field's knowledge into his monumental 1950 study of Maya hieroglyphic writing, though he held for decades the mistaken view that the script recorded only ritual and astronomy, not history.

Two breakthroughs ended that view and opened everything else. In 1952, Yuri Knorozov, a Soviet epigrapher working in Leningrad, demonstrated from his desk that Maya writing was a logosyllabic system, partly built on syllabic signs, and began publishing the readings that would prove him right. In 1960, Tatiana Proskouriakoff showed that the dated glyphs on the monuments of Piedras Negras followed a pattern that could only be the births, accessions, and deaths of human rulers. The stelae were history, and the calendar that dated them was pinned to it. The floodgates opened: by the 1970s a young generation of epigraphers, including Linda Schele and later David Stuart, were reading dynastic records across the entire Maya area, and every decipherment made the astronomy legible too, because the two were carved on the same stones.

While the writing was yielding, the astronomy was being measured in the field. Anthony Aveni and Horst Hartung began in the early 1970s to carry surveying instruments into the ruins of Mesoamerica, measuring the alignments of buildings against horizon sunrise and sunset positions. Their work, summarized in Aveni's 1980 book Skywatchers of Ancient Mexico, founded the modern discipline of Mesoamerican archaeoastronomy and established that astronomical orientation was not incidental to Mesoamerican architecture but one of its organizing principles. Later decades added excavation to

measurement: the murals of San Bartolo, the painted room of Xultun, and newly found monuments bearing early Long Count dates have each pushed the tradition's origins deeper and filled in how it spread.

The discovery is unfinished. Most Maya cities remain unmapped under forest, most inscriptions are eroding faster than they are photographed, and the four surviving books have given up many but not all of their secrets. But the outline is now firm, recovered from the ashes Landa made: a tradition of watching and counting, older than Rome and as sophisticated as anything in the pre-telescopic world.

The decipherment era also transformed the region's map of who worked on the past. Guatemalan and Mexican institutions built the excavation programs of the later twentieth century, and the discipline now trains Maya scholars as well as foreign ones, a change with consequences for the astronomy itself, since the living tradition's knowledge of the count is now part of the scholarly conversation. The discovery of Mesoamerican astronomy, begun by a librarian in Dresden and an engineer in California, has become a joint project of the nations and communities where the tradition lives.

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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.