The awe-inspiring presence of the sky has left a profound imprint on human culture at all times and in all places, to an extent that is seldom appreciated today. It is only very recently that we have managed to construct an environmental cocoon around ourselves. Barely a generation after the advent of street lighting in the United States, Ralph Waldo Emerson wrote,

One might think the atmosphere was made transparent with this design, to give man, in the heavenly bodies, the perpetual presence of the sublime. Seen in the streets of cities, how great they are! If the stars should appear one night in a thousand years, how would men believe and adore; and preserve for many generations the remembrance of the city of God which had been shown! But every night come out these envoys of beauty, and light the universe with their admonishing smile.¹

How could Emerson have imagined the current state of affairs in which most urbanites no longer have any idea how stupendous a sight is a truly dark sky on a clear night. Fewer still have ever actually seen the luminous band of the Milky Way, twisting and undulating with the hours and the seasons in its glowing course across the sky. While insulating us from the elements and enabling our modern lifestyle, our artificial surroundings now isolate us from the sky and our primordial heritage to an unprecedented degree. The unfortunate result is an impoverished understanding of the links between earth and sky, and a lack of appreciation for how profoundly astronomical phenomena have historically influenced domains as disparate as art, myth, cosmology, literature, music, philosophy, and the built environment. How, indeed, shall we preserve the remembrance of Emerson's "city of God?" Not for nothing was Emerson a leading light among "Transcendentalists."²

¹ Ralph Waldo Emerson (1979, Chapter 1).

² Surprisingly, in his magisterial survey *Religion in Human Evolution: From the Paleolithic to the Axial Age* (2011), Robert N. Bellah makes no mention of the profound impression the heavens surely must have made on the archaic mind. Although he notes in passing examples like Scipio's dream and Kepler's mystic vision of the cosmos as the fountain of all harmony – "there is something marvelous in the fact that the man who confirmed the Copernican heliocentric theory of the solar system actually 'heard' the music of the spheres" (p. 41) – Bellah overlooks the

Consider the broad rock shelf of the Sibudu Cave in South Africa with its eight-meter-deep record of continuous human occupation extending back 77,000 years.³ Or Les Eyzies in the Dordogne, in France, whose Fontde-Gaume cave is a "showpiece of Magdalenian engravings and paintings" from around 14,000 BCE, and whose cultural accumulations and abundance of flint tools give evidence of continuous occupation since the Mousterian (c.300,000 BP to 30,000 BP). Even if there are doubts about the cognitive abilities of their distant cousins, the Neanderthals, it is certain that the Cro-Magnons (with brains a third larger than ours) who created that wondrous Magdalenian cave art in the Upper Paleolithic were modern humans no less intelligent than ourselves. They deployed their ample intelligence in meeting the particular challenges of their own time within the constraints of their conceptual framework. What did the people of Les Eyzies think about the spectacular nightly display of luminous patterns wheeling across the sky? When they began to appreciate the seasonal regularity of distinctive stellar configurations, what stories might they have told their children to help them fix in memory the patterns that forewarned of the arrival of the spawning salmon or the reindeer migration on which their lives depended? Might they not have populated the sky with those creatures in their seasonal associations, together with items of daily use, much as the ancient Mesopotamians, Egyptians, and Greeks later populated theirs? Remarkable traces of these imaginings may have survived at Lascaux and elsewhere. As Ludwig Wittgenstein observed in commenting on Frazer's The Golden Bough,

That the shadow of a man, which has the appearance of a human being or his mirror image, that rain, that a thunderstorm, the phases of the Moon, the changing seasons, the similarities and differences between animals and people, the phenomena of death, of birth, and of sexual life, in short, everything that a person perceives around him year after year, connected with one another in the most diverse ways, that these will appear (play a role) in his thinking (his philosophy) and his customs is obvious ...⁴

Raffaele Pettazoni puts the matter in more spiritual terms:

The sky, in its unbounded immensity, in its perennial presence, in its wondrous luminosity, is particularly well suited to suggest to the mind of man the idea of sublimity, of incomparable majesty, of a sovereign and mysterious power. The sky elicits in man the

spectacle of the sky as a source of inspiration for the ancient belief in a "transcendent sphere of existence," as Li Bo (701–62) said, "another heaven and another earth, not of this world."

³ Balter (2011).

⁴ Quoted in Tambiah (1990, 60). The Big Dipper has been variously perceived to form the shape of a ladle, a plow, a bear, a cart, the thigh of a bull, etc. No less an authority that Owen Gingerich mused (1984, 220), "In the widespread mythological connection of the dipper stars with a Great Bear (Ursa Major) we have a hint that a few of the constellations may date back as far as the Ice Ages." See also Joseph (2011).

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feeling of a the ophany. This is the feeling of a manifestation of the divine, which finds a dequate expression in the notion of a Supreme Being.⁵

* * *

In 1894, the prominent Victorian astronomer and father of archaeoastronomy, J. Norman Lockyer, in his the Dawn of Astronomy: A Study of the Temple Worship and Mythology of the Ancient Egyptians, was the first to describe the importance of astronomy to the ancient Egyptians and to show that the pyramids were astronomically oriented with a surprising degree of accuracy. His discovery was largely overlooked until the middle of the twentieth century when Gerald S. Hawkins (Stonehenge Decoded, 1963), Alexander Thom (Megalithic Sites in Britain, 1967; and Megalithic Lunar Observatories, 1970), and others began to publish studies of the astronomical alignments they perceived at Stonehenge and other megalithic monuments. Georgio de Santillana and Hertha von Dechend, in their controversial but inspired Hamlet's Mill: An Essay on Myth and the Frame of Time (1969), conjectured that astronomical knowledge was anciently encoded and transmitted in myth.⁶ In 1972, Alexander Marshak published his groundbreaking study The Roots of Civilization: Cognitive Beginnings of Man's First Art, Symbol, and Notation, suggesting the possibility that ancient inhabitants of Europe during the Ice Ages may have been recording lunar phases in rudimentary fashion as early as the Upper Paleolithic.

Archaeoastronomy has matured as a discipline, especially due to the exemplary efforts of leading scholars like Anthony Aveni, Juan Antonio Belmonte, John B. Carlson, Von del Chamberlain, Michael Hoskin, Stanislaw Iwaniszewski, Steven McCluskey, Kim Malville, Michael Rappenglück, Clive Ruggles, Feng Shi, Lionel Sims, Rolf Sinclair, Ray White, Ray Williamson, Tom Zuidema, and many, many others. The more speculative early ideas have gradually been winnowed out, and increasing stress is being placed on the ethnographic evidence and cultural context, on methodological and theoretical rigor, and on the anthropological interpretation of the findings. This is in line with efforts to better define the multidisciplinary approach that archaeoastronomy demands, combining some or all of the methods of anthropology, astronomy, ethnology, history, statistics, and landscape archaeology.⁷ With the rapid improvement in digital tools, including accurate astronomical software, computer animation, GPS, satellite imaging, etc., it is now much easier to reliably

⁵ Pettazoni (1959, 59). Of course, in his essay Pettazoni goes on to qualify this, "on the other hand, the notion of a Supreme Being is not exhausted in the image of the Celestial Being," but his point about the experience of a theophany is by now well established.

⁶ E.g. Barber and Barber (2004); for the emergence of spiritual consciousness and mythic thinking, see e.g. Joseph (2011); Donald (1991).

⁷ Ruggles (2011).

4

Astrology and Cosmology in Early China: Conforming Earth to Heaven

simulate ancient observing conditions and to better understand the relationships among celestial bodies, constellations, zenith and horizon phenomena, and terrain throughout the year and over the centuries.

Along with the increased focus on history and ethnography, a broader discipline of cultural (or ethno-)astronomy has emerged, concerned with the modern and premodern periods for which considerable ethnographic evidence exists; as, for example, in the case of Polynesian celestial navigation or the accounts of the Spanish chroniclers of Inka and Maya astral lore and calendrics. Scholars worldwide have published on hundreds of impressive architectural sites and cultural phenomena whose designs are manifestly astronomical, so that the geographical coverage by now extends from the Indian subcontinent to China, from Europe to Mesopotamia, from the American Southwest to Central and South America, from Australia to the islands of the Pacific.⁸

In China, the study of astronomy in archaeological contexts is still the province of historians of astronomy, who are seldom equipped to explore adequately the cultural and historical ramifications. Recent landmark studies are Feng Shi's Zhongguo tianwen kaoguxue (Chinese Archaeoastronomy, 2007), a comprehensive survey of recent archaeological discoveries, practices, and artifacts, and Jiang Xiaoyuan's Tianxue zhenyuan (True Origin of the Study of Heaven, 2004). As overviews of the vast richness of China's astronomical legacy, however, they lack contextualization from a cultural perspective. A recent exception to this trend is Sun Xiaochun and Jacob Kistemaker's The Chinese Sky during the Han: Constellating Stars and Society (1997), which begins to explore the ideological significance of astronomy-astrology under the early empire. In contrast with megalithic Britain and Europe, Egypt, or the Maya and Inka worlds, with their abundance of monumental stone structures and ancient urban agglomerations, the paucity of surviving architectural remains from ancient China, Korea, and Japan means that archaeoastronomical studies in the East Asian cultural sphere will be distinctly different.

Although monumental architectural remains from China's pre-imperial past and the early empire are limited to ancient rammed-earth building foundations, city walls, and tombs, the study of Chinese archaeoastronomy benefits from the time depth and richness of China's written record. For this reason Chinese archaeoastronomical research calls for a combination of sinological expertise and a good grasp of astronomy, Western as well as Chinese. As I hope this book will demonstrate, however, one need not be a formally trained astronomer to pursue this line of research. Given the inherently multidisciplinary character of archaeoastronomy, active engagement in the ongoing conversation among scholars is crucial in order to attune oneself to the many ways astronomy is

⁸ Ruggles and Cotte (2010); Kelley and Milone (2011); Magli (2009).

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Introduction

reflected in culture.⁹ For countless millennia our ancestors in all corners of the world observed the majestic phenomena nightly on display in the sky, most especially after dark when it was not safe to move about and the starry sky was all there was to see beyond a small circle of flickering firelight. Invaluable insights can be gleaned from the great variety of human cultural responses to the spectacle of the heavens as well as from the striking commonalities. One has to become sensitized to the range of possibilities essayed by the ancients.

It is no doubt obvious by now that this book is not a history of Chinese astronomy in the ordinary sense. Nor is it a textbook on the methodology of archaeoastronomy; both have been written by more competent authorities.¹⁰ The present work is instead the product of three decades of basic research in "archaeoastronomy with Chinese characteristics," to coin a phrase. It is intended as an introduction to diverse aspects of an understudied field rather than a work of synthesis. Otto Neugebauer called astronomy the "first of the exact sciences." Here I provide an account of the many profound ways in which astronomy and its earliest application to architecture, astrology, the calendar, cosmology, divination, political ideology, mythology, and religion have shaped Chinese civilization from the very first. As elsewhere in the ancient world, in China there was no positive distinction between astronomy and astrology – even in the West the two did not definitively part company until the late eighteenth century.¹¹ So astrology (or, more precisely, astral omenology) as it was practiced in early China, and cosmology, will be the focus. Thirty years on, my initial discovery of the historical connection between the impressive planetary cluster of 1059 BCE and the founding of the Zhou Dynasty (1046-256 BCE) is accepted by many, if not by most, as established fact. The historical linkage between astronomical phenomena and the ancient politico-religious concept of the Mandate of Heaven is clear, as is the practice of astral divination from the early Bronze Age on.

In China, co-ordination of human activity with the Sun, Moon, and stars, including the cardinal orientation of structures in the landscape, can be traced back to the Neolithic cultures of the fifth millennium BCE. According to

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⁹ The following are good sources of information: the Center for Archaeoastronomy and the International Society for Archaeoastronomy and Astronomy in Culture (ISAAC); the European Society for Astronomy in Culture (SEAC); the International Conferences on the Inspiration of Astronomical Phenomena (INSAP); Ruggles and Cotte (2010); and the UNESCO world heritage study, available at http://issuu.com/starlightinitiative/docs/ astronomy-and-world-heritage_thematic-study.

¹⁰ E.g. Ruggles (1999); Aveni (2008b); Magli (2009); Kelley and Milone (2011); Campion (2012). A popular but informative online sketch of archaeoastronomical methodology is www. greatarchaeology.com/archaeostronomy.htm#2. For a critical survey of the progress of the discipline in recent decades, see Ruggles (2011).

¹¹ As Nathan Sivin (1990, 181) explained, "The difference between astronomy and astrology was a contrast of emphasis on the quantitative as opposed to the qualitative and on objective motions as opposed to the correlation between celestial and political events."

China's first great historian, Sima Qian (fl. 100 BCE), "ever since the people have existed, when have successive rulers not systematically calendared the movements of Sun, Moon, stars, and asterisms?" By the early Bronze Age, toward the very end of the third millennium BCE, attention had already begun to focus on the circumpolar region as the abode of the sky god Di, and from this time forward the north celestial Pole increasingly became a locus of spiritual significance. The polar-equatorial emphasis of ancient Chinese astronomy took shape, which meant that the ancient Chinese remained largely indifferent to the ecliptic (path of the Sun, Moon, and planets across the sky) and much less interested in heliacal phenomena (such as the first predawn rising of Sirius) than were the Egyptians or Babylonians. A prominent feature of this polar focus was the use of the handle of Ursa Major as a celestial clock hand and the identification of cardinal asterisms with the seasons and their unique characteristics - the Blue-Green Dragon with spring, the Vermilion Bird with summer, the White Tiger with autumn, the Dark Warrior (turtle and snake) with winter.

Massings of the Five Planets, the Supernal Lord's "Minister-Regulators," solar and lunar eclipses, and other astronomical and atmospheric phenomena were seen as portents of imminent, usually ominous, events. There is only a smattering of astronomical records in the earliest written documents, the oracle bone divinations from the late Shang Dynasty (thirteenth to mid eleventh centuries BCE), though meteorological phenomena are abundantly represented. In the divinations a theory of astral-terrestrial reciprocity prefiguring later Chinese astrological thinking begins to appear. Because it was the abode of the Supernal Lord and the royal ancestors, what transpired in the heavens could and did profoundly influence human affairs, and, conversely, human behavior could and did provoke responses from the supra-visible realm beyond the limits of human perception. There was no real separation: the two "realms" were continuous. Shang divination was reactive and opportunistic and never focused on individuals beyond the royal person, his consort, and his officials. Of chief interest were affairs of state such as the sacrifices to the royal ancestors, the harvest, warfare, illness, and the like.

By the late Zhou Dynasty (1046–256 BCE), *tian wen*, "sky-pattern reading," had taken as its frame of reference the twenty-eight lunar lodges (later twelve equatorial hour-angle segments) into which the sky was divided. As Sima Qian would later say, "the Twenty-Eight Lodges govern the Twelve Provinces, and the handle of the *Dipper* seconds them; the origin [of these conceptions] is ancient." In classical "field-allocation" astral omenology of mid to late Zhou, these twenty-eight segments of uneven angular dimensions were correlated with terrestrial domains according to different schemes. Allocated among the astral fields for purposes of prognostication were either the Nine Provinces into which China proper was anciently thought to have been divided, or the twelve

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warring kingdoms of the late Zhou Dynasty whose successive annihilation by the most ruthless among them, the Qin, led to the establishment of the unified empire in 221 BCE.

The classical job description of the post of Astrologer Royal is found in the third-century BCE canonical text, *The Rites of Zhou*:

[The *Bao zhang shi*] concerns himself with the stars in the heavens, keeping a record of the changes and movements of the stars and planets, Sun and Moon, in order to discern [corresponding] trends in the terrestrial world, with the object of distinguishing (prognosticating) good and bad fortune. He divides the territories of the nine regions of the empire in accordance with their dependence on particular celestial bodies; all the fiefs and territories are connected with distinct stars, based on which their prosperity or misfortune can be ascertained. He makes prognostications, according to the twelve years [of the Jupiter cycle], of good and evil in the terrestrial world.¹²

In this scheme, movements of the Sun, Moon, and five visible planets formed the basis of prognostication, taking also into account their correlations with *yin* and *yang* and the Five Elemental Phases (Mercury–Water, Venus–Metal, Mars–Fire, Jupiter–Wood, Saturn–Earth). While sparsely documented in contemporary sources, in part due to the hermetic nature of astral prognostication, the available evidence shows that the influence of astral omenology was deep and pervasive. As a common aphorism put it, not long after the founding of the empire, "perspicacious though the Son of Heaven may be, one must still look to where Mars is located." Although a century ago it was claimed that Chinese astrology was influenced by Mesopotamia, research since then has shown that there is no basis for that claim.¹³ Ancient Chinese cosmology and astrology are distinctive in so many respects that it is now clear that throughout its formative period Chinese astronomy–astrology developed in isolation from external influences. When it comes to China's immediate neighbors the transmission of ideas was mainly centrifugal.

In the early imperial period, Han Dynasty (206 BCE–220 CE) cosmologists melded field-allocation astral prognostication with hemerological concepts, *yin-yang* and Five Elemental Phases correlative cosmology, as well as the trigrams of the *Book of Changes*, to develop the systematic and highly complex method of divination embodied in the *shi* or mantic astrolabe so representative of that period. Examples of the latter excavated from Han tombs typically consist of a round heaven-plate with Ursa Major depicted in the center along with the twenty-eight lunar lodges, months of the year (solar chronograms) inscribed in bands around the circumference. The pivot of the heaven-plate is conventionally placed in or near the handle of the *Dipper* in recognition of

¹² Trans. Needham (1959, 190, modified). ¹³ Pankenier (forthcoming).

its symbolic centrality and perceived numinous power, while the square earthplate underneath is graduated around the perimeter in concentric bands showing the lodges, the ancient ordinal graphs marking the cardinal and inter-cardinal directions, the twenty-four fortnightly "*qi*-nodes" of the tropical year, and so on. Some examples substitute for the heaven-plate an actual ladle fashioned from magnetic lodestone, designed to revolve within a highly polished circular enclosure representing the circumpolar region.

As originally conceived, the lodges did not technically constitute a zodiac, since, with the exception of comets, novae and the like, the Sun, Moon, and planets did not actually appear among their constituent stars; many of the latter in ancient times actually lay closer to the celestial equator than to the ecliptic. Rather, astronomical phenomena occurring within the range in longitude of a given astral field were connected with noteworthy events in the terrestrial region identified with it. In terms of astral omen theory this was because the astral and terrestrial realms were continuous and composed of the same quasi-matter/quasi-*pneuma* called qi.¹⁴ Theory held that disequilibrium at any point in the continuum could potentially provoke imbalance throughout by a mysterious process somewhat analogous to a disturbance in a magnetic field of force or sympathetic resonance. In case of disruption it was essential to identify the cause, based on *yin-yang* and Five Elemental Phases phenomenological correlations, and to take action to remedy the situation by restoring equilibrium (or, in physiological terms, homeostasis). Unlike the Ptolemaic scheme, which has aptly been dubbed "astrological ethnology," despite modifications designed to take account of historical changes in political boundaries and the relative balance of power between the empire and its non-Chinese neighbors, from the outset field-allocation astrology was resolutely sinocentric. For the most part the non-Chinese world remained unrepresented in the heavens and in astral omenology except as a reflex of Chinese concerns.

Though the casting of nativities (horoscopic astrology or genethliology) did not figure in ancient China's astrological repertoire, the increasing complexity of astromantic theory in Han times was accompanied by a proliferation of calendrical prohibitions and devotions directed toward quasi-astral deities and spirits. The ancient cult of Taiyi, "Supreme One," the numinous cosmic force resident at the Pole, was elevated to a prominent place in the imperial state sacrifices, being imaginatively linked in contemporary iconography with the image of the Supernal Lord driving his starry carriage (Ursa Major) around the Pole:

¹⁴ This term qi is often left untranslated in view of the difficulty of devising a satisfactory English equivalent that captures its protean properties. I have adopted *materia vitalis* as an expedient in an attempt to express the combination of quasi-material yet *pneuma*-like animating qualities inherent in qi.

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The *Dipper* is the Supernal Lord Di's carriage. It revolves about the center, visiting and regulating each of the four regions. It divides *yin* from *yang*, establishes the four seasons, equalizes the Five Elemental Phases, deploys the seasonal junctures and angular measures, and determines the various periodicities: all these are tied to the *Dipper*. (Sima Qian, "Treatise on the Celestial Offices")

The protection of Taiyi and lesser astral spirits was invoked both in local cults led by magicians and by imperial officials, in the latter case even before initiating major military campaigns, when

a banner decorated with images of the Sun, Moon, *Northern Dipper*, and rampant *Dragon* was mounted on a shaft made from the wood of the thorn tree, to symbolize the Supreme One and its three stars... The banner was called "Numinous Flag." When one prayed for military success, the Prefect Grand Scribe-Astrologer would hold it aloft and point in the direction of the country to be attacked.

Prognostication based on the appearance of the stars of the *Dipper* appeared, as well as that based on the color, brightness, movements, etc. of comets, guest stars (novae or supernovae), eclipses, occultations of planets by the Moon, cloud formations, and a variety of atmospheric phenomena.

Ancient precedent dating from the Three Dynasties (Xia, Shang, Zhou) of the Bronze Age in the second millennium BCE led to the establishment by Han times of certain astrological resonance periods, especially dense clusters of the five visible planets at roughly 500-year intervals, as the pre-eminent sign of Heaven's-Shangdi's conferral of the Mandate to rule on a new dynasty. Other alignments of the Five Planets, or simply their simultaneous appearance in the yang half of the sky, were later popularly held to be beneficial for China. Not surprisingly, given the close theoretical link in Han imperial ideology between anomalies, portents, and the conduct of state affairs, the popularization of prognostication by omens led to the politicization of astral portentology. It was exceedingly rare for observations of astronomical phenomena to be faked that would have been suicidal since court rivalries virtually guaranteed that false reporting would be discovered - rather, after the fact, the prognostics were "spun" for effect, sometimes long after, when the lessons of history became clearer. Because of the connection between astrological omens and state security, only certain imperial officials were permitted to make observations and study the historical precedents in omen texts, and by imperial decree unauthorized dabbling in astrological or calendrical matters was proscribed, and at times made a capital offense.

Along with the pervasive spread of Buddhism in the centuries following the collapse of the Han Dynasty, efforts were made by Buddhist writers during the Six Dynasties period (CE 316–589) to integrate Indian Buddhist cosmological and astrological concepts and to reconcile incommensurable numerological categories, for example matching the Buddhist *mahābhūtas* (Four Elements)

with the Chinese Five Elemental Phases. Subsequently, attempts were made to establish even more complex correspondences between Chinese and Indian astrological sets such as the twenty-eight lunar lodges with the twelve Indian zodiacal signs derived from Hellenistic astrology, the Nine Planets of Indian astronomy with the seven astral deities of the *Northern Dipper*, and so on. On the whole, however, these syncretic efforts had almost no influence on long-established Chinese astrological theory, especially given the drastic decline of Buddhism following the Tang Dynasty suppression in the mid ninth century and the subsequent resurgence of Neo-Confucianism. Assimilation was also hindered by the difficulty of rendering foreign concepts and terminology into Chinese, which was often accomplished by means of bizarre or idiosyncratic transliterations.

At the popular level, Chinese astrology continued to absorb influences (Iranian, Islamic, Sogdian) via the Central Asian and maritime trade routes. Certain Western numerological categories (e.g. the seven-day week) are represented in the enormously popular and widely circulated *lishu* or almanacs documented from the ninth century, and individualized horoscopic astrology appears in late horoscopes (from the fourteenth century). But in general Hellenistic concepts had no discernible impact on the practice of astral divination at the imperial court. Until modern times the most common popular forms of divination employed ancient prognostication techniques connected with lucky and unlucky denary and duodenary cyclical characters, paired to generate the sequence of sixty unique designations used to count the days since at least the Shang Dynasty, and fate calculation based on the eight characters (*bazi*) designating the exact day, hour, etc. of birth.

During the Song Dynasty (960–1279), astral portentology entered a period of routinization and gradual decline, in part as a result of over-exploitation by sycophants and careerists as a means of enhancing their status or prospects for advancement at court, and in part because of the resurgence of Neo-Confucianism and a return to a more rational and anthropocentric outlook. Along with an increasing emphasis on human affairs and moral self-cultivation, the archaic belief in an interventionist Heaven which communicated by means of signs in the heavens faded into the background, and *tian wen* or "sky-pattern reading" shifted focus from a genre of prediction fraught with risk to a safer and more manageable interpretive mode.

As a consequence, the objective status of natural phenomena declined, and the practice of astrology by imperial officials on the whole reverted to routine observing and recording of observations, focusing on the anomalous. The interpretation of "sky-patterns" was Confucianized – one might say domesticated – and only isolated instances of inductive generalization from observation are to be found, rather than interpretation more or less tendentiously based on historical precedent. Given its subservience to the state ideology, Chinese astrology