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CLIVE RUGGLES AND GARY URTON

Introduction

In the twenty-first century, it is possible to consider archaeoastronomy one of fifty “key concepts” in the development of archaeological thinking and method (Renfrew and Bahn 2005). This is a long way indeed from the position in the 1960s and 1970s, when exploring the associations between ancient monumental architecture and objects and events in the skies was largely the preserve of professional and amateur astronomers, undertaken mainly as an entertaining sideline and producing conclusions that were treated with incredulity (and often derision) by all but a handful of mainstream archaeologists (see Kintigh 1992; Aveni 1992). Many factors have effected this transformation, but a vital one has certainly been the rise, since the 1980s, of a set of new approaches to archaeological practice and interpretation identified collectively under the banner of interpretive (or, as at first, “post-processual”) archaeology (Hodder 1986; Johnson 1999; Thomas 2000). By shifting the emphasis away

from environmental/ecological determinism and toward issues of perception and cognition, the interpretive archaeology agenda has offered studies of ancient perceptions of the skies more solid theoretical underpinnings (Ruggles 2005a). These render obsolete (what to anthropologists always were) embarrassingly ethnocentric images of ancient astronomers and observatories, while insisting that the sky must be recognized as part of the total perceived environment. As a result, they necessitate the integration of the sky into broader studies of “landscape” perception and indigenous cosmologies. The “anthropology of astronomy” (Platt 1991) has found its time.

A related factor that has come to characterize the transformation in archaeoastronomy during the last four decades is what one might call its “social contextualization”: the increasing awareness among its practitioners of the broader interpretive framework within which manifestations of sky knowledge in particular cultural settings need to be framed in order to have anthropological relevance and interest. Most would now accept without hesitation a definition of archaeoastronomy as, broadly speaking, “the study of beliefs and practices concerning the sky in the past . . . and the uses to which people’s knowledge of the skies were put” (see Ruggles 2005b: 19). The definition is also extendable into the indigenous present by the inclusion of ethnoastronomy, so as to cover “cultural astronomy” (Ruggles and Saunders 1993) in its entirety. This process of social contextualization has raised a variety of issues relating to theory, method, and practice. Many of these arise because of the need to integrate disparate types of evidence, and differing techniques and methodologies, deriving from a diverse set of historical disciplines (including the history of science, history of religions, and art history) as well as cultural anthropology, archaeology, linguistics, and, of course, astronomy (Carlson et al. 1999).

The first stages in the development of tools and approaches for tackling some of these problems took place in the Americas during the 1970s. It was here, rather than among “Old World” archaeoastronomers prepossessed at the time with issues of data selection and statistical verification, that the broader agenda began to be followed in earnest (Aveni 1975, 1977, 1982; Williamson 1981; Aveni and Brotherston 1983). Although early developments in North America had tended to follow the prevailing paradigms for tackling prehistoric evidence in Britain and Europe—at its worst, “alignment hunting” entirely divorced from its social context (Aveni 1988)—in Mesoamerica it made no sense to study architectural alignments without also considering inscriptions and codices, iconography, and ethnohistoric accounts. In Maya studies, where the importance and complexity of calendrical and astronomical information

was already evident from the historical sources, there was an especially promising interpretive context, subsequently strengthened even more following the general acceptance of Maya writing as a readable hieroglyphic script (Coe 1992; Montgomery 2002) containing rich resources of historical information (e.g., Martin and Grube 2000). Archaeoastronomy became an integral part of Maya studies, providing key insights into the nature of Maya sky knowledge and its social application (e.g., Aveni 1992). The wider “cultural astronomy” agenda was also relevant in the Americas from the outset (Aveni and Urton 1982; Chamberlain et al. 2005), since demonstrable threads of continuity meant that modern ethnography could still give valuable insights into historical and even pre-Conquest practices (e.g., Broda, Iwaniszewski, and Maupomé 1991; Urton 1981; Milbrath 1999; Tedlock 1999).

Despite the process of maturation that has resulted in the broad acceptance of cultural astronomy, both globally and particularly within the Americas, its impact remains patchy among specialists within the different fields upon which it impinges. There are a number of reasons for this, not least the echoes of a less disciplined past that continue to reverberate to this day and the continued assaults from popularizers bent on sensationalism. Accordingly, we perceived a strong need for a collection of papers that would demonstrate, at an appropriate scholarly level, the relevance of cultural astronomy today to broader social questions, especially where these sit at the interface between cultural anthropology, history, and archaeology. This volume aims to fulfill that need. It arises from a symposium held on October 10–12, 2003, at Colgate University, Hamilton, New York, to celebrate and honor one of the field’s leading proponents—Anthony F. Aveni.

Tony Aveni is one of the world’s great interdisciplinarians, having contributed to a variety of fields of study during his forty-year academic career. He is widely acknowledged as America’s leading archaeoastronomer as well as the founding father of Mesoamerican archaeoastronomy (e.g., Milbrath 1999: 8; Broda 2000: 233). And it is no coincidence that the process of transformation that has permitted and characterized the development, maturation, and acceptance of archaeoastronomy during the past four decades mirrors Aveni’s personal development in a very direct way. Over the years, he has moved from studying “ancient astronomy” to broader issues of cosmology, perception, and indigenous concepts of space, time, number, and other related concepts. He has characterized this himself as a move from studying the “how” to studying the “why” (Aveni 2001: 7). Rather than remaining the astronomer working on the fringes of anthropology, he has constantly moved forward, ensuring that his

work is increasingly contextualized in anthropological and archaeological theory and practice, with the result that he has created entirely new ways of comprehending ancient cultures through their knowledge and perceptions of the skies. It is particularly appropriate that he occupies the cross-faculty post of Russell B. Colgate Professor of Astronomy and Anthropology at Colgate University.

The studies that make up this book reflect this progression of ideas and methods and in a number of cases have been directly influenced by it. The symposium was intentionally a low-key affair rather than a high-profile adulation: an exchange of ideas among close friends and colleagues with academic interests that meshed with Aveni's own. This book was intended from the outset to provide a set of published papers that would knit together to form a cohesive whole. Hence the inclusion of the chapters by Edward Calnek and by John Justeston and David Tavárez, none of whom was at the workshop. The various papers approach issues relating to cultural cosmologies from a variety of disciplinary standpoints, while highlighting the anthropological and cultural component of Aveni's overall contributions to the field of archaeoastronomy.

The first six papers concern Mesoamerica. This geographical and historical focus not only reflects Aveni's principal (though not sole) focus of interest over the years but also makes sense because the richness of the archaeological, historical, and indeed ethnographic record in this area continues to provide particularly strong exemplars and case studies of the application of cultural astronomy to broader social questions.

The opening chapter demonstrates how historical and linguistic evidence relating to indigenous ritual calendars existing in early colonial times may be combined effectively in order to reach conclusions about the earlier spread of calendar reforms. There exists an extraordinarily rich collection of colonial transcriptions of the indigenous Zapotec ritual calendar as it existed in the northern Sierra of Oaxaca, Mexico, near the end of the seventeenth century. More than a hundred local versions were recorded from towns to the northeast of the city of Oaxaca. Justeston and Tavárez use these records to identify a range of statements (some of which are reported here for the first time) that combine to establish, quite definitively, a single correlation between dates in the colonial Zapotec and Gregorian calendars.

It is tempting to imagine the indigenous 260-day cycle—the “ritual calendar” or “sacred almanac,” a common feature of Mesoamerican calendars—to have been synchronized across Mesoamerica and to have extended without adjustment from Postclassic (AD 900–1500) into colonial and even modern times. However, if variations did exist from one place to another, and if adjustments

and reforms were made from time to time, then this information promises insights into a range of social processes that, directly and indirectly, led to the formation of different variants and gave rise to particular adjustments.

Justeston and Tavárez argue that their correlation for the colonial Zapotec ritual calendar is unlikely to be valid for the time of the earliest Zapotec inscriptions and conclude that the ritual calendar in this region must have undergone an adjustment. They suggest that this happened after AD 1000 as a result of cultural influences from Nahua peoples following military successes even before the rise of the Mexica (Aztecs). This could explain why the colonial Zapotec ritual calendar, along with indigenous ritual calendars among a variety of modern-day Maya communities farther south, are found (when extrapolated back in time) to be synchronized with the traditional Aztec 260-day cycle.

Meanwhile, Calnek, in the following paper, addresses the question of whether different calendars could have been in use concurrently in the Aztec capital, Tenochtitlan, and its sister-city, Tlatelolco, at around the time of the Conquest. By reexamining a particular Aztec text, the *Codex Borbonicus*, Calnek reopens a debate that had seemed to be cut and dried ever since a suggestion by Paul Kirchhoff in the early 1950s had been forcefully rejected by Alfonso Caso a decade later. Kirchhoff had argued that Tenochtitlan and Tlatelolco operated 260-day sacred almanacs that were twenty days out of step with each other, but Caso held that the 260-day cycle was inviolable. Caso's view was supported by the impressive consistency of the 260-day counts in Maya and Aztec calendars recorded at the time of the Conquest, a consistency that extends, as already mentioned, to surviving indigenous calendars in modern Maya communities.

Calnek argues, however, that a nineteen-month year evidenced in the *Codex Borbonicus* actually demonstrates that a new calendar was adopted in Tenochtitlan while the original one was retained in Tlatelolco. He concludes that a calendar reform was instituted in 1507 at Tenochtitlan, which resulted in the calendar at the Aztec capital being adjusted whereas Tlatelolco maintained the traditional Aztec calendar.

These two papers clearly demonstrate how studies of calendars and correlations can have a key role in moving us toward a less idealized conception of the Mesoamerican calendar, taking greater account of how its endless cycles were actually manipulated in practice. This emphasis on practice resonates with a number of recent investigations concerning what is undoubtedly the most valuable source of information regarding astronomical knowledge in the entire Mesoamerican world—the *Maya Dresden Codex*. In moving beyond the mere content, impressive as it is, of the astronomical tables within this book,

Maya scholars face challenging questions concerning when and how the tables were actually compiled and used. It is generally accepted that the famous eclipse and Venus tables functioned primarily as divinatory almanacs, although there has been more debate as to whether they were effective as actual ephemerides generating predictions of empirically observable events. If so, then corrections would have had to be applied to the table before it could be recycled and re-used after a 104-year run, and this fact adds further complexity to the interpretation.

Harvey and Victoria Bricker reexamine the issue of when the Venus table in the Dresden Codex was actually used, based on a new analysis of how the events predicted in the table correlated with actual observable phenomena. Their argument is predicated on the assumption that the table was indeed used to predict actual observable events: as they point out, the iconography of the table makes it clear, for example, that the day of heliacal rise (first predawn appearance) of Venus was regarded as a time of significant danger. But whereas previous scholars have sought the closest correlations between predicted and actual events, the Brickers argue that if the purpose of the table was to forewarn of impending danger so that action could be taken to avoid it, then the predicted event must *precede* the actual one, and by no more than a few days. Thus, they conclude that the Venus table was created about a century earlier than previously thought, placing its origins in the Terminal Classic period (with a starting date of AD 934), with revised versions being used during the Early Postclassic.

Dennis and Barbara Tedlock's paper is also concerned with the Dresden Codex, but with twelve almanacs that precede the Venus and eclipse tables. In these almanacs, the lunar goddess ("Moon Woman") engages in a series of face-to-face encounters with other characters. The almanacs are interpreted as chronicles recording Moon Woman's passage among various celestial deities populating the sky and thus tracking the actual movements of the moon in relation to various asterisms. The Tedlocks offer us a closely argued interpretation of these tables in which the counterparts of Moon Woman are variously described as her herald, meaning that they rise ahead of the moon; as a burden she carries on her back, meaning that the stars in question appear above the horizon just after moonrise; and as having her as their wife, meaning that they appear alongside the moon. In formulating details of Moon Woman's passage through the stars, the Tedlocks provide identifications of deities with asterisms that draw on their extensive knowledge of Maya written sources, ethnohistory, and ethnography, bringing in evidence from the Dresden Venus table,

almanacs in other codices, Classic period Maya art, Maya vocabulary from colonial times, the Popol Vuh, and astronomical practices among contemporary Maya groups.

The Tedlocks are concerned with an aspect of Maya astronomy that is poorly understood, namely, the use of the “fixed” asterisms to provide spatial referents in relation to which the motions of the sun, moon, and planets could be perceived and described. Although it may be clear that specific asterisms are being named in inscriptions and texts, identifying them is a process fraught with complexities, mainly because of the breadth of choice available in the sky. It is notoriously easy to obtain impressively good fits for suggested identifications of asterisms by making arbitrary choices; without independent verification, this information proves little or nothing about what was actually significant to the Maya, as is evident from some of the widely differing interpretations of the same sources. It is only by carefully combining and integrating evidence from multiple sources that the Tedlocks have been able to produce a plausible and supportable case for their interpretation of the Dresden lunar almanacs. In passing, they also offer us a definitive choice between two different methods that have been suggested for reading the text in the Dresden lunar almanacs, and hence for interpreting the given dates and time intervals. Only one of these methods permits an astronomical interpretation of these intervals.

Up to this point the contributors have been concerned with the calendar and the interpretation of astronomical texts in terms of perceived celestial events and relationships, focusing on both temporal and spatial aspects. Susan Milbrath combines all of these approaches in a radical reexamination of the astronomical imagery contained in pages 29–46 of the Codex Borgia, a key document from the Postclassic period in central Mexico. This sequence of pages describes the passage of Venus through the underworld. Milbrath argues that earlier attempts to provide a “literal” interpretation of the pages in question in terms of the 584-day synodic cycle of the planet do not fit the evidence. Her contention is that these pages actually depict Venus events in the context of the festival cycle of a single year. However, as we have no direct knowledge of the festival cycle before the time of the Conquest, support for the idea can only come from combining strands of indirect evidence.

The pages in question contain iconographic representations surrounded by day signs. According to Milbrath’s analysis, the images depict Venus events in the context of successive twenty-day “months” (*veintenas*) within the 365-day cycle (“vague year”). The images contain iconography interpreted as relating to rituals performed as part of the festival cycle as well as astronomical

imagery. One of them shows gods attacking sun disks with knives and appears to represent an eclipse event. The sequence of images shows that this event occurred six “months” earlier than a fire ceremony, and post-Conquest accounts attest that fire ceremonies only occurred in certain *veintenas*. These constraints suggest that the festival calendar recorded on these pages relates to the year 1496, a year that could have been all the more significant, Milbrath contends, because the new Venus cycle began roughly at winter solstice, added to which there was a dramatic solar eclipse. If Milbrath is right, these pages represent a “literal” (in other words, a historical) record of actual events in a particular year, the cycles of the seasonal calendar, and the associated festivals, providing the backdrop against which the various celestial events were perceived. In addition, the day signs record intervals of time that relate not only to the eclipse interval but also quite possibly to visible events in the synodic cycles of Mercury and Venus.

Clemency Coggins’s paper, although also about Mesoamerica, spans the whole of Mesoamerican history right back to the Middle Formative period in the first millennium BC. It traces the theme of basic systems of bodily measurement and their relationship to the calendar, a topic given poignancy by the extraordinary persistence of the Mesoamerican calendar’s broad structural characteristics through the turbulent history of Mesoamerican city-states. According to Coggins, this persistence reflects a deeper cognitive framework in which there are ingrained relationships between body, geometry, time, and space. In support of this idea, Coggins considers various apparent representations of the twenty-day count found within monuments and on portable artifacts.

This study introduces a broad swathe of evidence deriving from the material rather than the historical record—built architecture, natural features, symbols, spatial and numerical relationships—which includes as just one part the orientations and architectural alignments that have come to epitomize archaeoastronomy as practiced in prehistoric contexts around the world. It has been a major part of Aveni’s contribution, through much of his work in Mesoamerica, to set an example whereby such evidence is neither ignored nor overstressed but simply considered in due proportion within the broader context. Something that has intrigued Aveni greatly over the years is the symbol known as the pecked cross or pecked cross-circle.

The pecked crosses provide a central plank of Coggins’s argument. These pecked crosses, she argues, provide evidence of the persistence of a ritual from the time of the foundation of Teotihuacan until a millennium or more later, reflecting the importance of the number twenty in laying out both the city itself

and outlying sites. More generally, and drawing on a variety of other evidence, she argues that, through Mesoamerica and from Formative until colonial times, the human body was understood as providing the fundamental count of twenty that underlay not only the conception and expression of numerals but also the calendar (i.e., time), the measurement of length and distance, and even orientation. The fundamental significance of the number twenty was metaphorically expressed in a variety of ways.

In the study of the landscape situation, orientation, and especially the numerological/calendrical symbolism of the pecked cross-circles, we see, as with the work of the Tedlocks on the identification of named asterisms in the Dresden lunar almanacs, critical approaches being applied to the sorts of problems that can so easily attract wild speculation and that many serious scholars might abandon as hopeless. The way forward can only be through meticulous scholarship and the consideration of the widest possible range of historical, ethnographic, and archaeological evidence.

Gary Urton's paper also uses the investigation of numerological relationships as a means to explore the possible storage of calendrical and other information. In shifting the focus to the Inka world, we encounter a context where information was recorded in a very different form from the inscriptions and books of Mesoamerica. Here, where the most highly valued medium was cloth rather than stone or parchment, it is not immediately evident that it was even possible to record and display complex calendrical, or calendrically related, information. And yet, Urton argues, such information was recorded just as keenly; it was simply expressed in a different, and less durable, material form.

The use of the knotted string devices known as *kipus* to record calendrical information is a topic that Urton has written about extensively elsewhere. Here, however, he is concerned with a very different medium: large tapestry mantles divided into squares bearing geometrical designs known as *tukapus*. In this paper he examines a particularly impressive rectangular mantle, strikingly patterned, arguing that it was actually designed and produced as a commemorative five-year calendar. The calendrical nature of the design is revealed in the spatial arrangement of the squares themselves; the different *tukapus*, Urton suggests, could have represented around 26 distinct entities (such as individuals or kinship groups), showing how they assumed particular roles or performed particular actions on particular dates. The "haphazard" nature of the distribution of these symbols among the pattern suggests that this temporal pattern was historically rather than structurally defined.

Remaining in the Inka world, Tom Zuidema elaborates on his work with Aveni concerning the “ceque calendar,” examining possible connections between lunar observations and the observations of sunrise and sunset on the dates of zenith and antizenith passages, respectively. Zuidema has long claimed that such connections served as the foundation for a calendar based on direct observations supported by a tightly integrated system of ritual movements within the landscape of the Cusco valley. Here he argues that the year in Cusco was divided into two periods of unequal length: one when the sun was said to be low and the (full) moon high and the other when the sun was high and the moon low. This basis, he suggests, led the Inka to construct a calendrical system that was quite distinctive from others on the two American continents, although it also contained some features similar to Mesoamerican calendars, such as the use of twenty-day periods.

The remaining papers in this volume reflect not so much the cultural focus of Aveni’s interests but the pivotal contributions he has made to method and practice in cultural astronomy. Aveni single-handedly pioneered, during the 1970s, what subsequently—by his own nomenclature (Aveni 1989a)—became known as “brown” archaeoastronomy,¹ an approach that sought to embed studies of monumental alignments in a solid context of cultural evidence deriving from firsthand written sources (inscriptions and codices), ethnohistory, and ethnography. It would be a decade or more before the other, “green” arm of the discipline—focused on prehistoric Europe and hence devoid of written, historical, and ethnographic evidence of any conceivable relevance—fully embedded its own alignment studies within the broader context of archaeological evidence and theory, thereby facing its own new methodological issues (Ruggles 1999, 2000).

One of the reasons why these approaches remain so different is that in the Mesoamerican context the historical evidence not only exists but dominates. One only has to look, for instance, at the well-known example of the alignment of the Governor’s Palace at Uxmal (Aveni 2001: 283–288) for confirmation: the idea that this one-off alignment relates to Venus² is rendered plausible, indeed likely, by Venus iconography on the building itself (Aveni 1997: 139–142) together with a broad range of evidence testifying to the general significance of Venus in Maya society (Milbrath 1999: 157–217) and indeed throughout Mesoamerica (e.g., Carlson 1993, 2005; Šprajc 1996). In the absence of such evidence, and given that the alignment was not repeated elsewhere, it would have been unthinkable to claim with confidence that this particular building was deliberately aligned upon an extreme rising or setting point of Venus.

Clive Ruggles's paper on ancient Hawai'i presents a case study where archaeological, and particularly archaeoastronomical, evidence has to be considered alongside evidence from "oral literature"—stories, creation myths, formal chants, and accounts of former practices recorded after European contact. Although abundant, these represent evidence of uncertain provenance: they have to be treated with due caution but cannot simply be ignored. Ancient Hawai'i, then, represents a methodological "halfway house" between the green and brown approaches. How do we best combine oral evidence relating to navigational astronomy, calendrical practices, the significance of specific places, and the function of various types of temple and shrine (*heiau*) with data on the form, spatial layout, location (within the natural and cultural landscape), and astronomical potential of heiau remains so as to gain new insights into religious practices and cosmological principles? Tackling these questions has produced some important new results: for instance, in remote districts of Maui and Moloka'i evidence emerges of four distinct types of temple orientation that can be linked to cardinal directions and calendrical events as well as to agricultural practices and the four principal Hawaiian gods.

In a volume focused mainly on New World cosmologies, the inclusion of a contribution on church orientations in medieval England might seem particularly incongruous. However, as we seek to improve methodologies for combining historical evidence and alignment data in different cultural contexts, the paper by Stephen McCluskey sheds important new methodological light as well as addressing a set of questions that have remained surprisingly neglected until recently: who determined the orientation of a medieval church, how did they do it, and what were the criteria they used? For a long time the matter seemed trivial—churches being assumed, simply, to face east—although more specific ideas surfaced from time to time. Chief among them was the idea that churches faced sunrise on a particular day: perhaps the day that construction began, the feast day of the church's patron saint, Easter Sunday in the first year of construction, or the equinox as determined according to the Julian calendar. Although some of these ideas might hold true in certain localities and epochs, none of them fits a broader range of the data. Instead, as McCluskey finds, what we actually have is a set of diverse local practices that, when examined more closely, can reveal elements of social interaction (between landowners, local priests and craftsmen, and ordinary villagers) that underlay the practical implementation of liturgical norms.

In addition, as McCluskey points out, we now know from the work of Aveni and others that in Mesoamerica numbers and dates were not abstract

entities and measures of time but symbols laden with cosmic meaning. This is a theme that McCluskey finds he can tease out in a very different context. Drawing on historical sources, such as Bede of Jarrow, he suggests a paradigm shift in which we might view church orientations upon sunrise on specific days in a similar light, those days having ritual, eschatological, and numerological significance. In other words, this example shows how broad inferences from work in the Americas can have interpretive influence much farther afield.

This observation applies equally well to the theme addressed in the final paper, by Edwin Krupp. In Mesoamerica, as elsewhere, the primary motivation for acquiring astronomical knowledge—even where taken to the extraordinary levels of detail and complexity evident in the Dresden Codex—is frequently astrological (Thompson 1972: 77; Aveni 2001: 173). More generally, sky knowledge was typically interwoven with the broader ability to access supernatural power from the spirit world and from powerful forces of nature. The specialists concerned often considered themselves, and were considered, as operating not so much in the realm of science as in that of magic. Yet we should not see an inherent dichotomy between these realms so much as different (and not necessarily exclusive) cultural perceptions of ways of perceiving the cosmos. Studying perceptions of the history and meaning of occult magic offers, in other words, the opportunity for broader insights into the cultural context of different perceptions of reality (Aveni 1996). Picking up on this theme, Krupp examines the roots of the modern conception of magicians, sorcerers, and wizards and the place of astrological lore and astral symbolism in the processes that came to form and shape that image in the nineteenth century.

Just as this book starts in the intellectual heartland of cultural astronomy—Mesoamerica—and broadens both geographically and thematically, so studies of cultural perceptions of the skies have broadened dramatically over the past forty years from a narrow preoccupation with “alignment studies” of little interest to anthropologists at large to a situation in which serious anthropologists generally acknowledge the importance of perceptions of the sky to ancient, historical, and modern indigenous societies. Nowadays they are seriously interested in how the sky influences broader cosmologies and the relevance of such studies to wider cultural questions. Aveni’s career has not only reflected but helped to propel this transformation, and his work will continue to inspire those who seek to understand how perceptions of the sky have influenced, and can influence, human thought and action. Archaeoastronomers and anthropologists researching the myriad ancient and modern cultures around the world owe Tony Aveni a deep debt of gratitude.

NOTES

1. The expressions “brown archaeoastronomy” and “green archaeoastronomy,” coined by Aveni (1989a), derive from the colors of the covers of two volumes arising from the first Oxford International Symposium on Archaeoastronomy held in 1981. The brown volume (Aveni 1982) contained papers relating to the New World whereas the green volume (Heggie 1982) covered the Old World.
2. This statement disregards arguments about its specific directionality (Šprajc 1993: 272–273; Aveni 2001: 286), which are irrelevant to the point being made here.

REFERENCES

Aveni, Anthony F.

- 1988 The Thom Paradigm in the Americas: The Case of the Cross-Circle Designs. In *Records in Stone*, edited by Clive Ruggles, pp. 442–472. Cambridge University Press, Cambridge.
- 1989a Introduction: Whither Archaeoastronomy? In *World Archaeoastronomy*, edited by Anthony F. Aveni, pp. 3–12. Cambridge University Press, Cambridge.
- 1992 Nobody Asked, but I Couldn't Resist: A Response to Keith Kintigh on Archaeoastronomy and Archaeology. *Archaeoastronomy and Ethnoastronomy News*, 6: 1, 4.
- 1996 *Behind the Crystal Ball*. Times Books, New York.
- 1997 *Stairways to the Stars: Skywatching in Three Great Ancient Cultures*. Wiley, New York.
- 2001 *Skywatchers*. University of Texas Press, Austin.

Aveni, Anthony F. (editor)

- 1975 *Archaeoastronomy in Pre-Columbian America*. University of Texas Press, Austin.
- 1977 *Native American Astronomy*. University of Texas Press, Austin.
- 1982 *Archaeoastronomy in the New World*. Cambridge University Press, Cambridge.
- 1989b *World Archaeoastronomy*. Cambridge University Press, Cambridge.
- 1992 *The Sky in Mayan Literature*. Oxford University Press, New York.

Aveni, Anthony F., and Gordon Brotherston (editors)

- 1983 *Calendars in Mesoamerica and Peru: Native American Computations of Time*. BAR International Series, 174. British Archaeological Reports, Oxford.

Aveni, Anthony F., and Gary Urton (editors)

- 1982 *Ethnoastronomy and Archaeoastronomy in the American Tropics*. Annals of the New York Academy of Sciences, 385. New York Academy of Sciences, New York.

Broda, Johanna

- 2000 Mesoamerican Astronomy and the Ritual Calendar. In *Astronomy Across Cultures: The History of Non-Western Astronomy*, edited by Helaine Selin, pp. 225–267. Kluwer, Dordrecht.

Broda, Johanna, Stanisław Iwaniszewski, and Lucrecia Maupomé (editors)

- 1991 *Arqueoastronomía y Etnoastronomía en Mesoamérica*. Universidad Nacional Autónoma de México, Mexico City.

Carlson, John B.

- 1993 Venus-Regulated Warfare and Ritual Sacrifice in Mesoamerica. In *Astronomies and Cultures*, edited by Clive Ruggles and Nicholas Saunders, pp. 202–252. University Press of Colorado, Niwot.
- 2005 Transformations of the Mesoamerican Venus Turtle Carapace War Shield: A Study in Ethnoastronomy. In *Songs from the Sky: Indigenous Astronomical and Cosmological Traditions of the World*, edited by Von Del Chamberlain, John B. Carlson, and M. Jane Young, pp. 99–122. Ocarina Books, Bognor Regis, UK, and Center for Archaeoastronomy, College Park, MD.

Carlson, John B., David S.P. Dearborn, Stephen C. McCluskey, and Clive Ruggles

- 1999 Astronomy in Culture. *Archaeoastronomy: The Journal of Astronomy in Culture* 14(1): 3–21.

Chamberlain, Von Del, John B. Carlson, and M. Jane Young (editors)

- 2005 *Songs from the Sky: Indigenous Astronomical and Cosmological Traditions of the World*. Ocarina Books, Bognor Regis, UK, and Center for Archaeoastronomy, College Park, MD.

Coe, Michael D.

- 1992 *Breaking the Maya Code*. Thames and Hudson, New York.

Heggie, Douglas C. (editor)

- 1982 *Archaeoastronomy in the Old World*. Cambridge University Press, Cambridge.

Hodder, Ian

- 1986 *Reading the Past*. Cambridge University Press, Cambridge.

Johnson, Matthew

- 1999 *Archaeological Theory: An Introduction*. Blackwell, Oxford.

Kintigh, Keith

- 1992 I Wasn't Going to Say Anything, but Since You Asked: Archaeoastronomy and Archaeology. *Archaeoastronomy and Ethnoastronomy News*, 5: 1, 4.

Martin, Simon, and Nikolai Grube

- 2000 *Chronicles of the Maya Kings and Queens: Deciphering the Dynasties of the Ancient Maya*. Thames and Hudson, London.

Milbrath, Susan

- 1999 *Star Gods of the Maya: Astronomy in Art, Folklore, and Calendars*. University of Texas Press, Austin.

Montgomery, John

- 2002 *Dictionary of Maya Hieroglyphs*. Hippocrene Books, New York.

Platt, Tristan

- 1991 The Anthropology of Astronomy [review of Aveni 1989b]. *Archaeoastronomy* no. 16 (supplement to *Journal for the History of Astronomy* 22): S76–S83.

Renfrew, Colin, and Paul Bahn (editors)

- 2005 *Archaeology: The Key Concepts*. Routledge, London.

Ruggles, Clive

- 1999 *Astronomy in Prehistoric Britain and Ireland*. Yale University Press, New Haven.
 2000 The General and the Specific: Dealing with Cultural Diversity. *Archaeoastronomy: The Journal of Astronomy in Culture* 15: 151–177.
 2005a Archaeoastronomy. In *Archaeology: The Key Concepts*, edited by Colin Renfrew and Paul Bahn, pp. 11–16. Routledge, London.
 2005b *Ancient Astronomy: An Encyclopedia of Cosmologies and Myth*. ABC-CLIO, Santa Barbara, CA.

Ruggles, Clive, and Nicholas Saunders

- 1993 The Study of Cultural Astronomy. In *Astronomies and Cultures*, edited by Clive Ruggles and Nicholas Saunders, pp. 1–31. University Press of Colorado, Niwot.

Šprajc, Ivan

- 1993 Venus Orientations in Ancient Mesoamerican Literature. In *Archaeoastronomy in the 1990s*, edited by Clive Ruggles, pp. 270–277. Group D Publications, Loughborough.
 1996 *La Estrella de Quetzalcoatl: El Planeta Venus en Mesoamérica*. Editorial Diana, Mexico City.

Tedlock, Barbara

- 1999 Maya Astronomy: What We Know and How We Know It. *Archaeoastronomy: The Journal of Astronomy in Culture* 14(1): 39–58.

Thomas, Julian (editor)

- 2000 *Interpretive Archaeology*. Leicester University Press, London.

Thompson, J. Eric S.

- 1972 *Maya Hieroglyphs Without Tears*. British Museum Press, London.

Urton, Gary

- 1981 *At the Crossroads of the Earth and the Sky: An Andean Cosmology*. University of Texas Press, Austin.

Williamson, Ray A. (editor)

- 1981 *Archaeoastronomy in the Americas*. Ballena Press, Los Altos, CA, and Center for Archaeoastronomy, College Park, MD.