of Maya graffiti was the nineteenth-century explorer Teobert Maler, whose signature can be seen scrawled into the walls of many Puuc sites! A detailed methodological chapter follows, which recounts the history of graffiti documentation and recent innovations. This will surely be of interest to all archaeologists working in areas with large stuccoed surfaces.

The final two chapters move beyond description into much needed analysis and interpretation. First, Zralka discusses the 14 major themes he identified—anthropomorphic images are most common by far (43.6 percent), and depictions of familiar Maya themes such as high status individuals, warriors, musicians, and captives are part of this theme. The remaining 66 percent of images are extremely varied, some are abstract and geometrical, others are more representational, such as animals and patolli game boards. The author does a good job of explaining these themes and why individual images are placed within a given theme. A fascinating data point from this analysis is that, even though sexual imagery and patolli boards each comprise 2.2 percent of the overall corpus, there is a vast literature on patolli, while almost nothing has been said about how to read sexual imagery. This handicaps Zralka, who relies on the interpretations of other scholars for these subject areas. The result is that his analysis of the remarkably diverse sexual imagery comes across as puritanical and narrow. Why can't images of vulvas be considered erotic sexual symbols (p. 140)? Why does the author think vulvas scratched into stucco walls were "most probably made by men" (p. 142)? The argument that phalli were meant to be viewed as "ugly and disgusting" just isn't convincing, given the frequent use of phalli as symbols of cultural values associated with masculinity and agriculture. The scientific study of other sexualities must be more nuanced and account for the many complexities presented by the topic—projecting modern Western values onto the material is not good enough.

Despite this one area of analytical weakness, *Pre-Columbian Maya Graffiti* deserves a wide readership. The detailed catalog and accompanying plates will be extremely useful to a wide range of scholars, especially given the huge range of topics depicted. Hopefully, other scholars excavating in architecturally rich areas will use the methodologies provided here to add to this captivating corpus of the most private and intimate of imagery.

Cosmology, Calendars, and Horizon-Based Astronomy in Ancient Mesoamerica. ANNE S. DOWD and SUSAN MILBRATH, editors. 2015. University Press of Colorado, Boulder, Colorado. xxviii + 380 pp. $80.00 (cloth), ISBN 978-1-60732-378-5.

Reviewed by Jesús Galindo Trejo, Universidad Nacional Autónoma de México

Esta obra constituye un valioso aporte a la arqueoastronomía en Mesoamérica. Después de varias décadas del trabajo pionero del astrónomo Anthony Aveni la arqueoastronomía forma ya parte sustancial de los estudios culturales precolombinos de esta región del continente americano. La introducción contiene no solo una sinopsis pormenorizada de la contribución de cada autor sino también algunas ideas originales de las editoras referentes a conceptos fundamentales como simbolismo, mitología de la creación y organización espacial a través de cosmogramas.

En el capítulo 2, Ivan Šprajc hace una detallada revisión histórica de cómo se ha desarrollado la investigación sobre la práctica de orientación de estructuras arquitectónicas en Mesoamérica, resaltando el papel tan importante que jugó Anthony Aveni en los primeros análisis. Šprajc recalca particularmente su propia contribución hacia una sistematización en la metodología para obtener la orientación de los edificios, así como las direcciones de accidentes del paisaje en los horizontes locales. Es necesario tener claro que la astronomía solo sirve para llegar a las preguntas, el verdadero reto intelectual consiste en plantear una explicación plausible que tenga que ver con ser humano y su cultura.

En el capítulo 3 Anne S. Dowd presenta un amplio panorama de las hierofanías en Mesoamérica. Se muestran ejemplos bien conocidos donde con efectos de luz y sombra se resalta la importancia de algún momento astronómico en el marco ritual. Dowd considera sobre todo hierofanías en momentos astronómicamente importantes. Sin embargo, a partir del hecho que gran cantidad de las principales estructuras arquitectónicas se alinean al Sol en fechas sin ninguna importancia astronómica (como 29 de abril y 13 de agosto), será interesante investigar también hierofanías en esas fechas relacionadas con la estructura del calendario mesoamericano.

El capítulo 4 presenta una propuesta de Ronald Faulseit sobre la distribución urbana de una ciudad zapoteca, Dainzú-Macuilxochitl, considerando la posición de un importante cerro, el Danush, al norte de la misma. El autor toma en cuenta que la orientación solsticial del templo-palacio en su cúspide está conectada simbólicamente con el cielo, la lluvia y el rayo. Además, la ciudad en su parte sur se vincula con el jaguar, es decir, con un símbolo del inframundo con asociaciones con la guerra y la muerte. Sobre la razón de la distribución urbana,

coincido con la explicación del autor: fue el resultado de la acción de la élite gobernante que se apropió del conocimiento y los símbolos de poder para vincular su obra material—la ciudad y su espacio—con las entidades sagradas.

El capítulo 5, a cargo de Clemency Coggins, analiza exhaustivamente el papel del Polo Norte Celeste en el diseño urbano durante la época del Formativo. En apariencia, la mayoría de las ciudades de esa época posee una traza urbana dirigida hacia una dirección cercana al norte celeste. Considera que el Dios C de los mayas, que se asocia al norte celeste, es una manifestación que se deriva de la Deidad Ave Principal que representó al reino septentrional de los ancestros deificados en el Formativo. Resulta admirable cómo Coggins desarrolla su propuesta utilizando el análisis formal de diversas obras de los habitantes de las ciudades que estudia.

El capítulo 6 de Susan Milbrath nos presenta un análisis iconográfico y arqueoastronómico de las páginas 29–46 del códice Borgia tomando en cuenta diversos fenómenos venusinos, solares y lunares en "tiempo real". Es necesario señalar que los eventos helíacos calculados en este capítulo son en general imprecisos debido a la falta de información sobre los coeficientes de extinción lumínica de la atmósfera cercana al horizonte local. Esto provocará una inexactitud de algunos días que no hace posible utilizar las fechas resultantes para precisar cuentas calendáricas. Finalmente, de seguir utilizándose estas páginas para describir el comportamiento de Venus en el marco climático-calendárico en los años siguientes se hubiera obtenido un enorme desfase con la realidad astronómica por lo que la conmensurabilidad entre el Sol y Venus tendría que usarse al siguiente orden de 243 años.

El capítulo 7, de Gabrielle Vail, muestra con gran detalle los abundantes registros de eclipses, tanto en los códices como en las crónicas coloniales y en los estudios etnográficos de diversos pueblos mayas actuales. La autora describe iconográficamente numerosas escenas de los códices, interpretándolas como eclipses implícitos aunque ciertamente podrían darse otras interpretaciones alternas. Vail hace notar que para los mayas actuales y los de la época colonial los eclipses se asociaban a momentos sumamente peligrosos, que podrían desfigurar a los bebés por nacer, ocasionando muerte y la destrucción del mundo.

En el capítulo 8 John B. Carlson presenta numerosos argumentos para demostrar que la famosa página 74 del códice de Dresde no representa el fin del mundo por un diluvio sino que se trata más bien de la eterna regeneración del mundo. El flujo de agua azul que surge del hocico del Dragón Celeste, de los jeroglíficos de eclipse de Sol y de Luna que cuelgan de la banda celeste y de la jarra de agua de la Diosa O representaría simplemente la bienvenida de las tormentas primaverales de rayos que saciarán a la sedienta tierra.

El capítulo 9, escrito por Flora Clancy, se dedica al tema de la Luna entre los mayas y su connotación calendárica. El gran interés de los mayas por la Luna puede reconocerse claramente por el uso de las llamadas series lunares representadas en estelas de la época clásica. Clancy presenta el caso de dos estelas de una misma ciudad maya que muestran la misma fecha en Cuenta Larga, sin embargo, con series lunares diferentes. Los mayas aparentemente habrían introducido un período de uniformidad, es decir, un acuerdo para conmensurar el calendario lunar y el período sinódico de la Luna. Una estela habría sido elaborada antes de dicho acuerdo y la otra estela después.

David Freidel y Michelle Rich en el capítulo 10 llaman la atención hacia el aparente uso múltiple de los círculos punteados o marcadores teotihuacanos. En particular, estos autores analizan un entierro real con rica ofrenda en el sitio de El Perú-Waka' en el Petén. En una figurilla femenina recuperada que porta un escudo circular sobre su brazo izquierdo, acompañado por un posible instrumento de escritura, usado también para algún juego o para la adivinación, reconocen varias líneas pintadas en dicho escudo. El diseño pintado parece semejante a los encontrados en una serie de círculos punteados teotihuacanos. Interpretan esa figurilla interpretan como una representación de la mujer que fue responsable de realizar la adivinación en el funeral, y su presencia indica que el difunto fue equipado para realizar la adivinación en la otra vida.

Prudence Rice analiza en el capítulo 11 un artefacto singular conocido como el Espejo de Las Bocas, de probable origen olmeca. Con base en un hipotético completamiento del número de teselas en el espejo, Rice concluye que el mosaico habría sido un artefacto efectivo para facilitar el cálculo de varias unidades de tiempo relacionadas con diversos fenómenos celestes y con el calendario mesoamericano.

Victoria y Harvey Bricker en el capítulo 12 ilustran de una manera clara la utilización del doble Tzolkin, que ellos llaman Número de Teeple, equivalente a tres veces el medio año de eclipses, para comprender cómo los mayas registraban en sus códices la sucesión de eclipses y otros ciclos astronómicos como los períodos sinódicos de la Luna, Venus y Marte. Una conclusión de gran trascendencia de estos autores es la demostración de que los astrónomos mayas habrían empleado la temporada de eclipses, que se obtiene a partir del número de días (37) centrados en el día del paso de la Luna por el nodo de su órbita, para definir los ciclos de eclipses.

En el capítulo 13, John Justeson plantea cómo, a partir de los datos calculados en la NASA de los eclipses observados en Mesoamérica del 100 a.C. al 900 d.C., se puede elaborar un procedimiento para identificar y predecir eclipses en el marco del calendario ritual de 260 días. Para ello, Justeson demuestra que los eclipses con-

siderados suceden en tres regiones bien definidas de números de día del calendario ritual. Sin embargo, mayormente la distancia en días de un eclipse a otro se da en múltiplos de 520 días, que equivalen a tres veces el período del paso de la Luna por el nodo de su órbita. En particular, el múltiplo más frecuente, el 23, corresponde a 11.960 días, que es igual a la longitud de la tabla de eclipses del códice de Dresde y es equivalente a 405 períodos sinódicos de la Luna. La propuesta de este autor, según la cual los sacerdotes-astrónomos mesoamericanos habrían utilizado este procedimiento para caracterizar y anticipar cada eclipse a lo largo de 1000 años, parece plausible pero por desgracia no es comprobable.

Finalmente en el último capítulo Anthony Aveni comenta brevemente los capítulos del libro y resalta los aportes de cada autor, refiriéndose a sus propios análisis pioneros. La larga carrera de Anthony Aveni representa un notable ejemplo de cómo un astrónomo reconoce la importancia de la cultura y dedica su carrera a mostrar qué tan importante fue el firmamento para ser humano del pasado.

Mates: Corpus Iconográfico Perú Prehispánico. ENRIQUE VERGARA MONTOYA. 2015. Imprenta Gami s.a.c., Lima. 509 pp. Hardcover. ISBN and price not available.

Reviewed by Margaret A. Jackson, University of New Mexico

Mates: Corpus Iconográfico Perú Prehispánico puts forward a very rarely invoked art form that was widespread in the ancient Andes. Gourds (also referred to as mates) are among the oldest domesticated plants in the ancient Americas, and, as dried containers, they have the distinction of bearing some of Peru's oldest known complex imagery—the incised line and pyroengraved gourd jars discovered at Huaca Prieta, dated by Junius Bird to roughly 1950 B.C., are a famous case in point.

The primary strength of the publication, and presumably its main point, is the presentation of an enormous cohort of images. In its sheer volume of examples, the work is impressive. The author has attempted a detailed sampling of engraved gourds primarily representing coastal cultures; the production of such a large number of illustrations represents a considerable amount of effort. As a group, the images do not dwell on anthropological or art historical concerns, but, rather, they highlight the playfulness and variety of prehispanic Andean gourd motifs across time and distance. Various photographs of truly exceptional pieces bear mention, among the most highly unusual, a Paracas gourd embellished with polychrome resin paint, very much like the distinctive elite wares made of ceramic. This small vessel depicts a range of characters perfectly attuned to Paracas iconography.

The introductory essay by Jeffrey Quilter complements the material and raises important questions about the ubiquity of carved gourd containers, as well as the status associated with them. It is often suggested that highly refined pictorial motifs are one of the signatures of elite arts. In many of the traditions reflected in this book, Moche, Nasca, and Inca, for example, complex iconography is generally found in combination with more precious materials or fine and delicate workmanship. Gourds, in contrast, are considered to have been absolutely pedestrian, among the most common of materials, and, yet, many of the incised and pyroengraved gourds depicted here reflect knowledge of sophisticated motifs. This fact suggests not only that complex motifs were in common circulation, but that they were not strictly limited to elite contexts.

Several aspects of the publication inhibit deeper research, making the work problematic as a reference tool. The text is brief and the author includes very little critical analysis. More extensive research on ethnohistoric sources would have been welcome—for example, the brief mention that north coast women planted gourd seeds at the time of the full moon, apparently because of a conceptual parity between the fullness of the moon, female fertility, and the round fullness of ripe gourds, is intriguing but unexplored. Readers are left to wonder about the source of the information and its implications. Likewise, the text would benefit from greater contextualization of the gourd motifs themselves. The central placement of approximately 420 consecutive pages of drawings of engraved gourd motifs essentializes cultural differences, given that these gourd motifs represent more than a dozen different culture groups, across a span of 3,500 years. Such a large cohort of images needs more conspicuous differentiation between groups. Inconsistencies in the order of presentation are unexplained, as are the author's reasons for presenting particular collections of material. The fact that dozens of illustrations represent the Late Intermediate central coast culture of Ischma needs clarification. Among the most problematic aspects of the book is the absence of citations for the 426 gourds illustrated. Information provided in captions is inconsistent—in some cases, names of archaeologists or museum collections are mentioned but, lacking citations or call numbers, it is unclear how a researcher might further contextualize a particular gourd. With no mechanism to cross-reference the illustrations, the examples featured here cannot be properly joined to larger scholarly resources. A list of sources for the plates is sorely needed.

Despite these issues, the work serves to bring well-deserved attention to an underrepresented art form, perhaps offering an invitation for future investigations. The

Cosmology, *Calendars*, *and Horizon-Based Astronomy in Ancient Mesoamerica*. ANNE S. DOWD and SUSAN MILBRATH, editors. 201.5 University Press of Colorado. Boulder, Colorado. Xxviii+380 pp. $80.00 (cloth), ISBN 978-1-60732-378-5

Reviewed by Jesús Galindo Trejo, Universidad Nacional Autónoma de México.

This work constitutes a valuable contribution to archaeoastronomy in Mesoamerica. After several decades of pioneering work by astronomer Anthony Aveni, archaeoastronomy now forms a substantive part of the study of the pre-Columbian cultures of this region of the American continent. The introduction offers not only a detailed synopsis of each author's essay but also certain original ideas of the editors with reference to such fundamental concepts as symbolism, creation myths, and spatial organization by means of cosmograms.

In chapter 2, Ivan Sprajc undertakes a detailed historical review of how research into the practice of orienting architectonic structures evolved in Mesoamerica, highlighting the critical role played by Anthony Aveni in the initial analyses of this phenomenon. Sprajc places special emphasis on his contribution toward methodological systematization to gauge the orientation of buildings, as well as the natural disruptions in the landscape of local horizons. It is essential to keep in mind that astronomy serves only to arrive at questions; the true intellectual challenge lies in setting forth a plausible explanation that bears on human beings and their culture.

In chapter 3, Anne S. Dowd offers a wide panorama of hierophanies in Mesoamerica, citing well known examples wherein, via the effects of light and shadow, the ritual importance of some astronomical moment is made distinctly clear. Above all, Dowd deals with manifestations of the sacred that pertain to instants in time that are important astronomically. Nonetheless, given that a great number of the principal architectonic structures are aligned with the Sun on dates devoid of

astronomical importance (such as 29 April and 13 August), it would be interesting as well to investigate hierophanies for dates that are connected to the structure of the Mesoamerican calendar.

Chapter 4 contains a proposal made by Ronald Faulseit on the urban layout of a Zapotecan city, Dainzú-Macuilxochitl, regarding the position of an important mountain, the Danush, situated to the north of the city. Faulseit takes into account that the solstitial orientation of the temple-palace is symbolically connected, at its apex, with the sky, rain, and thunder. Moreover, in its southern part, the city is linked to the jaguar, to a symbol, that is, of the underworld and its associations with war and death. As to the reason or motive for the urban layout, I agree with Faulseit's explanation: it resulted from action on the part of the governing elite who appropriated this knowledge and the symbols of power to link their material workings—the city and its space—with sacred entities.

In chapter 5, Clemency Coggins exhaustively analyses the role played by the Celestial North Pole in the design of urban centers during the Formative period. The urban layout of the majority of cities in that period was seemingly oriented in a direction close to the celestial north. Coggins takes into account that the God C of the Mayas, who is associated with the celestial north, is a manifestation that derives from the principal Bird Deity, which represented the northern kingdom of ancestors deified in the Formative period. The manner in which Coggins develops her thesis, through a formal analysis of various works carried out by the inhabitants of the cities that she examines, is praiseworthy indeed.

In chapter 6, Susan Milbrath provides an iconographic and arqueoastronomical analysis of pages 29-46 of the Codex Borgia, bringing to bear different "real time" Venusian, solar, and

lunar phenomena. It needs to be pointed out that, in general, the heliacal events examined and calculated in this chapter are imprecise, owing to the lack of information on the coefficients of the extinguishing of light within the atmosphere on the local horizon. Such imprecision will lead to inaccuracy in the calculation of some days, which in turn makes it impossible to use the resulting dates to nail down calendrical accounts. Finally, were one to continue utilizing these pages of the codex to describe the climatic-calendrical performance of Venus in subsequent years, one would encounter a great gap between that and the astronomical reality, such that the commensurability between the Sun and Venus would have to be adjusted by 243 years.

In chapter 7, Gabrielle Vail presents in great detail the abundant record of eclipses, as found in the codices as well as the accounts of chroniclers from the colonial period and the ethnographic studies of different present day Mayan communities. She describes, iconographically, numerous scenes from the codices, interpreting them as implicit eclipses, although alternative interpretations could certainly be offered. Vail points out that for the present day Maya, as was the case for their predecessors in the colonial period, eclipses are associated with moments of supreme danger that can cause the disfigurement of babies emerging from the mother's womb, and bring on death and the destruction of the world.

In chapter 8, John B. Carlson mounts a series of arguments to demonstrate that the well-known page 74 of the Dresden Codex does not represent the end of the world through a flood, but, rather, has to do with the regeneration of the world. The flow of blue water that pours from the snout of the Celestial Dragon, from the hieroglyphs of the solar and lunar eclipse that hangs from the celestial band, and from the water jar of the Goddess O would simply represent the welcoming of thunderous springtime storms that will slake the thirst of the dried-out earth.

Chapter 9, written by Flora Clancy, is devoted to the subject of the Moon among the Maya and its calendrical connotation. The great interest that the Maya took in the Moon can be clearly seen through the so-called lunar series represented in stelae of the Classic period. Clancy offers the case of two stelae, from the same Mayan city, that show the same date in Maya Long Count, yet with different lunar series. The Maya, ostensibly, had introduced a period of uniformity, that is, an accord that would bring into equal measurement both the lunar calendar and the synodic period of the Moon. One stelae would have been elaborated prior to such an accord and the other one afterwards.

In chapter 10, David Freidel and Michelle Rich call attention to the apparent multiple use of pointed circles or Teotihuacan markers. In particular, Freidel and Rich analyze a richly-adorned royal entombment located on the El Perú-Waka' site in the Petén region. On a recovered female figurine sporting a circular shield (or escutcheon), accompanied by what is possibly a writing instrument—also used in some game or for soothsaying—they recognize various lines painted on the shield (or escutcheon). The painted design appears similar to those found on a series of pointed circles from Teotihuacan. They interpret the figurine as being a representation of the woman who bore responsibility for prophesying at the funeral, and her presence indicates that the deceased was equipped to carry out the prophecy in the next life.

In chapter 11, Prudence Rice analyzes a unique artifact known as the Espejo de Las Bocas (the "Las Bocas Mirror"), likely of Olmec origin. On the basis of a hypothetical filling out of the number of tiles in the mirror, Rice concludes that the mosaic would have been an effective object in facilitating the calculation of various units of time related to different celestial phenomena and to the Mesoamerican calendar.

In chapter 12, Victoria and Harvey Bricker illustrate in a very clear way the utilization of the Double Tzolkin, which they term Teeple Number, equivalent to three times the half year of eclipses, to understand how the Maya, in their codices, recorded the succession of eclipses and such other astronomical cycles as the synodic periods of the Moon, Venus, and Mars. They demonstrate—and thereby reach a conclusion of great significance—that the Maya astronomers would have employed the eclipse season, obtained starting with the number of days (37) centered on the day of the Moon's passage through the node of its orbit, to define the cycle of eclipses.

In chapter 13, John Justeson sets forth how, beginning with the data that NASA has calculated for the eclipses observed in Mesoamerica from 100 a.C to 900 d.C, one can work out a process through which to identify and predict eclipses within the framework of the 260-day ritual calendar. To that end, he demonstrates that the eclipses under consideration take place in three well defined regions in the numerical spread of days of the ritual calendar. Nonetheless, the spread in days from one eclipse to another occurs predominately in multiples of 520 days, which equates to three times the period of the Moon's passage through the node of its orbit. Of particular note, the most frequent multiple, 23, corresponds to 11,960 days, which is equal to the length of the table of eclipses in the Dresden Codex and, in addition, is equivalent to 405 synodic periods of the Moon. While it seems plausible, Justeson's submission, according to which the priest-astronomers of Mesoamerica would have utilized this process to characterize and anticipate each eclipse over a period of 1,000 years, is unfortunately not verifiable.

Finally, in the last chapter, Anthony Aveni offers brief comments on the book's preceding chapters, highlighting the contributions made by each author while also referring to his own path breaking analyses. Anthony Aveni's long career represents a notable example of how an

astronomer recognizes the importance of the cultural backdrop and likewise devotes his career to showing just how important the firmament was to human beings in the past.