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SPECIAL SECTION: MESOAMERICAN CULTURAL ASTRONOMY AND THE CALENDAR

INTRODUCTION

The practice of positional astronomy is as old as humanity itself. Historical texts tell us that the ancient civilizations of Mesopotamia, Egypt, India, Greece, Nubia, Persia, China, and Mesoamerica engaged in systematic observation of the sun, moon, planets, and stars. Archaeological, ethnohistoric, and ethnographic researches indicate that indigenous peoples throughout the Americas avidly studied the night skies and incorporated their observations into their daily lives, cosmologies, and religions. The interdisciplinary, comparative study of these ancient or traditional astronomies is commonly referred to as archaeoastronomy, defined as "the extent and practice of astronomy among ancient cultures" (Aveni 2001:2).

This issue's Special Section consists of a group of innovative papers on Mesoamerican archaeoastronomy, or indigenous astronomy and calendrical development, coordinated by Anne S. Dowd. The section is based on a selection of papers presented in a symposium organized by Dowd for the 78th annual meeting of the Society for American Archaeology in Honolulu, Hawaii, in 2013 to honor the dean of American archaeoastronomy, Anthony F. Aveni, on the occasion of his receipt of the Fryxell Award for Interdisciplinary Research in Archaeology, Earth Sciences. The papers presented at that session and those that follow here touch on a wide range of Aveni's interests, especially Mesoamerican calendars, architectural planning, and cultural astronomy with special reference to the Epi-Olmec, Teotihuacan, and Maya cultures.

The section opens with an introductory essay by **Anne S. Dowd** which frames the papers and places them in context. Her reference to the intensity of the starry night sky at Calakmul will resonate with anyone who has experienced similar moments in remote places of Mesoamerica (or any other part of the world where one can escape the glare of electric illumination), gazing at the heavens glimmering with millions of tiny pinpoints of light, punctuated by the brighter beams of first-magnitude stars and the planets, and occasionally by the brief flash of a comet trail.

The second paper, by **Gabrielle Vail,** focuses on the appearance and disappearance of Venus in the mythology of Maya divinatory and astronomical texts. She examines the links between the morning star aspect of Venus with the bearded hunting deities identified in the hunting almanacs of the Madrid Codex. She also notes that Venus appears as the rain deity Chaak and God M, the patron deity of merchants. These she compares with the Venus references presented in the Dresden Codex as further evidence for Venus's association with these fundamental aspects of Maya culture. She draws an intriguing analogy through a correspondence between the Maya Hero Twins of the *Popol Vuh* and the War Twins of the Zuni of the Southwestern U.S., patrons of war societies which correspond to the morning and evening star. Vail also sees a connection through Venus, warfare, and sacrifice with the Skidi Pawnee morning star sacrifice which expressed the duality of the morning and evening star aspects of Venus and the other visible planets.

The next paper, by **Susan Milbrath**, presents the case that the tzolkin dates found with eclipse glyphs in the Madrid Codex correlate with the eclipses visible in Yucatan during the Postclassic period. Specifically, Milbrath examines pages 12b-18b in the Madrid Codex, which constitute an *in extenso* almanac. She argues that the almanac relates to the 260-day agricultural cycle which runs from February to October, timed by lunar phases. The visibility of Venus in the sky at the time of the eclipse may have led to a belief that the two were related. More importantly, she proposes that the eclipses were viewed in pairs that corresponded with the Dresden Codex eclipse table. She finds that the documented eclipses correspond with eclipse events at the end of the fifteenth century, recorded in the codex at the time of their occurrence. In other words, the almanac refers to contemporary eclipse events. This conclusion challenges previous ideas that the Madrid Codex was composed as a record of eclipses past, and it makes the Madrid Codex more compelling for its use in agro-astronomy.

John Justeson follows, presenting a new way of understanding the science behind Maya divination science. Justeson proposes the use of the concept of "eclipse family." This idea builds upon previously used theories of eclipse stations in which a family is composed of a series of these eclipse groups. These families fall into one of three zones in the codex and are structured according to an 88-month cycle, thus arguing for a simultaneously cyclical and linear conception of time in the Maya divinatory calendar. He further argues that, empirically, the Dresden eclipse table falls within a temporal range from between 100 B.C. and A.D. 1500, but only one eclipse family fits the lunar stations of the Dresden Codex, and it likely dates to an interval between A.D. 1083 and 1116.

In the fifth paper, **María-Cristina Pineda de Carías, Nohemy Rivera**, and **Cristina Argueta** highlight the importance of Copan Stela D, located at the north end of the Main Plaza of Copan, through the observation of hierophanies in the form of shadows projected by the stela on different dates considered special in the tropical year. By recording the position of these shadows relative to the

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associated architectural features, including an altar and several structures, and the position of the sun, they demonstrate that the Mayas of Copan likely used the stela to keep track of days, beginning on the winter solstice. They argue that the shadows would have been important not only for keeping track of time, but that they were also symbolic, with movements analogous to those of the snakes carved on the stelae.

Dowd, Aveni, and **Ramón Carrasco** follow with a detailed presentation of evidence from the E-group complex at Calakmul to argue against previously held ideas that E-group structures were used exclusively for ritualistic purposes. The authors make the case that they functioned as platforms for empirical astronomical observation as well as for ritual purposes. Architectural features were used to mark various solar alignments; more specifically, they examine the positioning of the structures relative to shadows cast on the solstices. The Calakmul E-group is thus viewed as an example of the fusion of the ritual with the practical, serving as a means of recording 20-day intervals according to the haab calendar.

In the final paper, **Aveni** summarizes and synthesizes the other papers. He makes the important observation that Dowd's essay and the five papers that follow provide good illustrations of the reasons why the interdisciplinary study of archaeastronomy should be referred to as "cultural astronomy," emphasizing the relevance of astronomy in the culture and the daily lives of ancient peoples.

William R. Fowler
Terren Proctor

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