Figure 1. Detail of Grolier page 4 showing underpainting. Photo: Justin Kerr.

Maya Archaeology Special Section

The Fourth Maya Codex

Michael Coe
Stephen Houston
Mary Miller
Karl Taube

Dedicated to Enrico Ferorelli and George Stuart

The three Maya manuscripts today known as Dresden, Madrid, and Paris had all been identified as written in Maya script by the middle of the nineteenth century, eventually coming to bear the names of the cities where they now reside. In 1971, the Grolier Club of New York City exhibited a fourth Maya manuscript, under its own name, hence the "Grolier Codex." Since its discovery, the Grolier has been controversial: found by looters rather than archaeologists, and possessed for a time by Josué Sáenz, a Mexican private collector, the manuscript has seen its share of advocacy and disparagement.

The purpose of this study is to bring together all known research on the manuscript and to analyze it without regard to the politics, academic and otherwise, that have enveloped the Grolier. Among the questions we seek to address are the origins of the manuscript, the nature of its style and iconography, and the nature and meaning of its Venus tables, along with its ring numbers (see also Carlson 1983; Bricker and Bricker 2011). The available data on the science of the manuscript are reviewed, along with the fundamental understanding of how the Maya made such a manuscript. We also evaluate the iconography of the deities in the codex.

Life-size, high-quality photographs are published here, providing the first facsimile replica (see inside back cover of volume), along with details for close examination and a full set of the codex images with underpaintings highlighted. For standard reference we also include a schematic rendering of the codex by Nicholas Carter. Early scholars of Prehispanic manuscripts did much the same for other such works. That precedent seemed useful to follow here. Carter's rendering appears in two versions (Figures 33–42). The first presents the manuscript in a clear, easily reproducible format. The second, with overlay, facilitates iconographic and glyphic identifications.

Some general observations are in order. The painted codex consists of ten pages, several of which remain hinged together today; as we shall see, once there must have been twenty pages. Patterns of loss and damage confirm that the established pagination is correct and continuous, as revised from Coe (1973) by John B. Carlson, who convincingly proposed that fragmentary pages 10 and 11 constitute a single folio (Carlson 1983:44). Persuaded by that emendation, we refer to the manuscript as Grolier 1 through 10. Comparisons to other codices will be made in short form: Dresden 60b, for example, refers to the Dresden Codex, second register.

According to Sáenz himself, the Grolier was found in a cave

2015 In *Maya Archaeology 3*, edited by Charles Golden, Stephen Houston, and Joel Skidmore, pp. 116–167. Precolumbia Mesoweb Press, San Francisco.

along with other Maya objects (Meyer 1973:17; Carlson 1983, 2012-2013; Coe 1992). Although not subject to further study here, these include:

1. A small wood mask covered with turquoise mosaic, now at Dumbarton Oaks (PC.B.557; Taube and Ishihara-Brito 2012);
2. A small, lidded wooden box carved with hieroglyphs, now in the Kislak Collection of the Library of Congress; purported to contain a greenstone figure (1434.64 no. 215; Coe 1974);
3. A sacrificial knife with flint or chert blade and wooden handle shaped like a clenched fist, now at the Princeton University Art Museum (y1974-8);
4. A larger wooden box with three compartments, now at the Israel Museum (B82.0222 a);
5. A fragment of twisted rope, now in the Israel Museum (B82.0222 b);
6. A child's sandal, location now unknown.

The absence of any type of incrustation, insect infestation, or animal dropping on the codex, or on any of the presumably associated objects, would suggest that this suite of materials was preserved for hundreds of years within some yet-larger container (compare Taube and Ishihara-Brito 2012:474, who nonetheless refer to an "accretion…commonly seen on wooden objects found in tombs, caves, or cenotes"). Alternatively, the Grolier had no such covering but was conserved by the stable environment of a dry cave. Other perishable Maya objects might have been part of such a cache, among them a wooden Maya mask with gold foil at the Art Institute of Chicago (Ada Turnbull Hertle Fund, 1965.782; n.b.: the piece is catalogued as "Mixtec," although its style and size are consistent with the mask at Dumbarton Oaks). There is precedent for such a find. A Late Postclassic cave at La Garrafa, Chiapas, included painted textiles, lacquered gourds, ceramics, basketry, and a rope (Landa et al. 1988). Some of these objects bear comparison to Mixtec and Aztec materials, although the context was surely Maya. In this respect, La Garrafa parallels the Grolier and its purported companions. The mixed date and ethnic affiliation may be more apparent than real, the result of our own inadequate knowledge of style in the Postclassic, especially in the Maya highlands. Yet the incomplete state of the Grolier remains a mystery. Perhaps its damaged condition led in ancient times to decommissioning, rather like the Hebrew texts stored in the medieval Genizah of Cairo, Egypt (Hoffman and Cole 2011). In that deposit, now mostly in Cambridge, England, texts containing the word of "God" could not be thrown away but needed reverential interment or placement in special storerooms.

The Grolier Codex is not a handsome manuscript selected by Spaniards to represent indigenous populations to a European audience, as might be the case for the Dresden. Nor is it an extraordinary object retained by Christian clergy engaged in the extirpation of native religion, as John Chuchiak (2006) has argued for the Madrid Codex. Rather, this book may well be the guide of a trained Maya ritualist, literate in both complex imagery and calendrics. Features of the codex—although not the glyphs—show great sophistication and knowledge of iconographic motifs. The Grolier is also, on present evidence, the oldest known manuscript of Mesoamerica, and thus of singular importance.

The survival of the Grolier is remarkable. Given its purported association with perishable objects of different time periods, it may have been sequestered intentionally in a secure place. If that were true, such a deposit could have been made after the Spanish invasion, during an intensive suppression of Maya traditional practice of the sort that Chuchiak (2006) has documented for the seventeenth century. It could also have been hidden away at any moment after its making in the thirteenth century. As Harvey and Victoria Bricker note, the Grolier Codex is the only ancient manuscript to have been recovered from a context chosen by the Maya, and, unlike the other three (which may have a provenience somewhere between Cozumel [Coe 1989] and Tabasco), the Grolier is said to derive from Chiapas, Mexico (Bricker and Bricker 2011:29).

The two radiocarbon dates for the manuscript yield median and calibrated dates of AD 1257 ± 110 and AD 1212 ± 40 (see below), which would make it the earliest extant paper manuscript in Mesoamerica. These dates correspond to the end of the Early Postclassic period (AD 900–1250), near the time when both Chichen Itza in Yucatan and Tula in Central Mexico fell into decline. Indeed, many of the conventions found in the Grolier correspond to imagery at Chichen Itza and Tula. The codex would have been an accurate document for ideal Venus reckonings for about a century (see below); thereafter, the book retained its value as a sacred work, a desirable target for Spanish inquisitors intent on destroying such manuscripts. Against all odds, the book survived.

Previous Publication

The Grolier Codex has been published in its entirety several times, beginning with its inclusion in *The Maya Scribe and His World* (Coe 1973), when the staff photographer at Meriden Gravure took the pictures. Subsequently, Carlson (1983) reprinted a version of the Coe images, which were further adapted by Bricker and Bricker (2011). Carlson has also published a set of

the black-and-white photographs that Josué Sáenz had taken when he first acquired the codex (Carlson 2012-2013). Thomas Lee reproduced Justin Kerr's photographs at life size in 1985.[1] Claude Baudez included Ramón Viñas's photographs in 2002. Ruvalcaba et al. (2007) took a full new set of photographs for the 2007 publication. In 1988, National Geographic Magazine secured new color photographs, published in 1990 at small scale (Carlson 1990:98-99); these photographs by Enrico Ferorelli are reproduced here, with his permission, in the format of the screenfold codex, both recto and verso.

J. Eric S. Thompson repeated the critiques that José Luis Franco Camacho had expressed privately to the original owner in the mid-1960s, spelling them out in print (Thompson 1975), and especially stressing Franco's belief that large quantities of unpainted Prehispanic *amate* bark paper were known to forgers and scholars in the 1960s. Franco had also informed Thompson of "at least six fake codices of the same type as the Grolier codex" (Thompson 1975:7). In fact, in the last 35 years, no such documents have come to light, nor have scholars ever confirmed Franco or Thompson's claim for readily available (if "rather crude") bark paper of the Prehispanic era. It is worth noting that Franco argued firmly for denouncing the entire cache that Josué Saenz had acquired (see above). Since then, all other objects in the cache have proven authentic and even of high aesthetic merit, such as the turquoise-covered wooden mask in the Dumbarton Oaks collection. Because of Franco's denunciation, these important Maya objects were all spirited out of the country. Otherwise they might be part of the Amparo Museum in Puebla, Mexico, the ultimate destination of Saenz's holdings.

Thompson also challenged the Venus table of Grolier, emphasizing its differences from the Venus table of Dresden, a subject to which both Susan Milbrath (2002) and Claude Baudez (2002b) returned. Coe (1973:150) identified key connections between Grolier and Central Mexican Venus tables. A decade later Carlson cited the gloss of the page in the Codex Telleriano-Remensis where Tlahuizcalpantecuhtli, conventionally known as lord of the Morning Star, presided over both Evening and Morning Star (Carlson 1983:50), thus refuting a chief charge of Thompson. Carlson's recent publication (Carlson 2012-2013) has reviewed such efforts, with particular attention to the photographic documentation of the codex over time. Aside from Carlson, Steinbrenner (2005) also investigated the Venus pages and generally concurred with Carlson's belief that the manuscript was ancient and authentic. In addition, he noted that based on the hybrid "Ring Numbers" to be discussed below, the

[1] These are also available on Justin Kerr's MayaVase website at www.mayavase.com/grol/grolier.html.

Figure 2. Recto and verso of hole between Grolier 5 and 6. Details of photos by Enrico Ferorelli.

codex could be read backwards from Page 10 as well as forwards from Page 1.

At least ten pages of the Venus calendar have been lost. Presumably, as mentioned above, these painted pages—the first eight and the final two—were missing before interment or perhaps torn off by looters to salvage the best-preserved and most saleable part of the manuscript, although looters would probably not wish to lose even a fragment of such a very valuable thing. The surviving pages show loss across many dimensions, and the relatively secure "hinges" survive only to link Grolier 4, 5, and 6. Although the lower part of Grolier 6 is among the best preserved of the manuscript pages, showing an area reserved for potential additional inscription, it also exhibits significant damage, including the lower portion of the glyph column. It is possible that the crisp cut running along the lower glyph column and truncating the blood flow from the decapitated head was made with a modern instrument, perhaps to tidy rough edges.

Some contributions (Baudez 2002b; Milbrath 2002; Ruvalcaba et al. 2007) have focused on a sharp cut *between* Grolier 5 and 6, a supposed mark of more recent, post-Conquest tools used to prepare the codex (Ruvalcaba et al. 2007:Fig. 5). That claim is unlikely. Figure 2 shows the verso and recto sides of this hole, demonstrating how the natural erosion of friable gypsum can break, forming sharp edges.

The manuscript has abundant evidence of water damage and wear. Consistent attributes are friable white gesso flecks at the margins. The gesso can be seen clearly in Figure 3; across the manuscript are specks of white in loose threads, a place likely to catch such debris. Some concern has been raised about the survival of the red paint in hinge areas, where the underlying

gesso is now lost altogether (Ruvalcaba et al. 2007:304). Ruvalcaba and his team did not identify the binders of the pigments, but typical binders in Mesoamerican painting are organic, often orchid bulbs and tree saps (Magaloni Kerpel 1998). Such materials have an inherently supple quality, unlike the friable gesso. The red pigment wears down, as can be seen in the join between Grolier 9 and 10, among many other locations, but it does not develop the crackled scatter pattern of the friable gesso. Even as the brittle gesso flaked away, the red pigment held on, clinging to the paper.

In a comprehensive study of Venus in the Maya codices, Harvey and Victoria Bricker have responded to all the objections raised against the calendrics, dismissing, for example, what might seem to be the anomalous use of ring numbers in Grolier. They spell out the two purposes of ring notations in Dresden—Thompson and his followers had only seen one—noting: "If there are two different functions of bundled numbers in the Maya codices, there could certainly be three" (Bricker and Bricker 2011:220). They further state: "we do not know for certain whether or not it is a genuine Precolumbian document, but in the absence of what we would regard as convincing proof to the contrary, we accept it provisionally as genuine and treat it as such" (Bricker and Bricker 2011:224). Their subsequent commentary attests to the authenticity of the manuscript.

How Was the Grolier Codex Made?

What were the materials necessary to make the Grolier? How did the Maya make one of their books? The process of its creation must have been routine, the knowledge widely shared, and the number of books substantial, given the intensive search to eradicate them in the sixteenth century. From AD 600 onward, such screenfolds were also frequently depicted in other media, especially on painted ceramics.

Figure 3. Fibers in Grolier 5. Detail of photo by Justin Kerr.

The first step in the making of a codex was to obtain the proper amount of *amatl*, a paper crafted from the inner bark of any one of several species of wild fig (*Ficus* spp.) or mulberry (*Morus* spp.) found in southern Mesoamerica. Commonly corrupted to *amate* today, the generic term encompasses paper made from the bark of any number of members of the larger mulberry-fig family (*Moraceae*). A recent study of the fibers revealed that the particular paper of Grolier was prepared from *Morus celtidifolia* (Carlson 2012-2013:25), often known as "Texas Mulberry." Its range extends from the southern United States to western South America. Colonial and recent Tzotzil dictionaries mention this species as *saya-vun* [*hun*], "*saya* paper" (Breedlove and Laughlin 2000:142, 153; see also Houston 2012).

The deluxe 1943 edition of Wolfgang Von Hagen's definitive *The Aztec and Maya Papermakers* contains actual bark paper samples. We have examined these, and it is clear that the fibers of the *Morus celtidifolia* specimens are finer and lighter in color than the *Ficus* examples. We therefore believe it likely that the outer, horizontal layers of the Grolier Codex paper were mulberry, and the coarser, inner, vertical layer was *Ficus*.

To produce *amate*, freshly cut branches were stripped of their outer bark, and the latex scraped off. The inner bark was then soaked in running water or boiled in lime-water. Next, the resulting wet fibers were placed on an oblong drying board in three layers at more-or-less right angles to each other, and felted by pounding with a grooved stone bark beater.

Amate could have been bought in local markets, but perhaps also acquired as tribute or taxes rendered by some local ruler. For instance, during late pre-Conquest times, as many as 480,000 rolled-up bundles of bark-paper sheets arrived annually as taxation in the Aztec capital Tenochtitlan (Neumann 1970:149). Unlike Europe, where, prior to the fifteenth century, parchment—made from animal skins—was expensive and rare, *amate* was plentiful and cheap in Prehispanic Mesoamerica, and served many purposes, from personal adornments to the construction of lightweight headdresses; spattered offerings of blood, incense, and rubber on *amate* meant that these precious substances could be easily burned, to be consumed by deities and to conjure those gods in clouds of fragrant smoke. Most *amate* wore out or went up in smoke. By the time that the paper had reached the author of Grolier, it might already have been in its final form.

José Luis Ruvalcaba and his colleagues (2007; also Calvo del Castillo et al. 2007) have claimed that all fibers in Grolier are vertical, in distinction to the fibers in the other Maya codices, which are horizontal throughout. This is mistaken. A minute inspection of the Ferorelli photographs demonstrates that the paper throughout the codex was felted three-ply—the layers of fine horizontal fibers lie just under the gessoed surfaces of both the recto and verso sides, with a layer of coarser vertical fibers sandwiched between them (Figure 3). José Francisco Ramírez first noted in 1855 that fine fibers cover the thicker ones of the Paris Codex, and it may well be that this was standard preparation for book-quality *amate* (Ramírez, as cited in Zimmermann 1954).

The next step for the codex-maker was to cut the felted paper sheets to the projected dimensions of the finished manuscript, almost surely with a hafted, razor-sharp obsidian blade, as can be clearly seen by examination of the crisp edge of a piece of the *amate* that has become attached to Grolier 8 verso (see facsimile and renderings). The question is, what *was* the original size of Grolier? As it now exists, it measures 1.3 m in length, but only ten painted pages of an original twenty have survived intact. Thus, it must have once been at least 2.16 m long, making it necessary to glue several sheets together at their lateral edges, perhaps using gum extracted from orchid bulbs, an adhesive well-documented for the Aztecs (Baglioni et al. 2011).

As for page height, the jagged lower edges of all Grolier pages indicate that the bottom part of the manuscript is missing. Both Grolier 6 and 8 show that there was additional painting, now too fragmentary to be interpreted, well below the legible figural portion. Note the following, comparative statistics for the known Maya books.

Grolier
Average page width: 12.5 cm
Greatest page height: 18.0 cm
Probable page height: 23 cm

Madrid
Average page width: 12.2 cm
Average page height: 22.6 cm

Paris
Average page width: 13.0 cm
Average page height: 24.8 cm

Dresden
Average page width: 9 cm
Average page height: 20.5 cm

These measurements indicate that the widths of Grolier's pages conform to those of the Madrid and Paris codices, but not to the Dresden. Following the ratio evident in Paris and Madrid of width to height, we determine that the original height of Grolier was probably just over 23 cm, suggesting the possibility

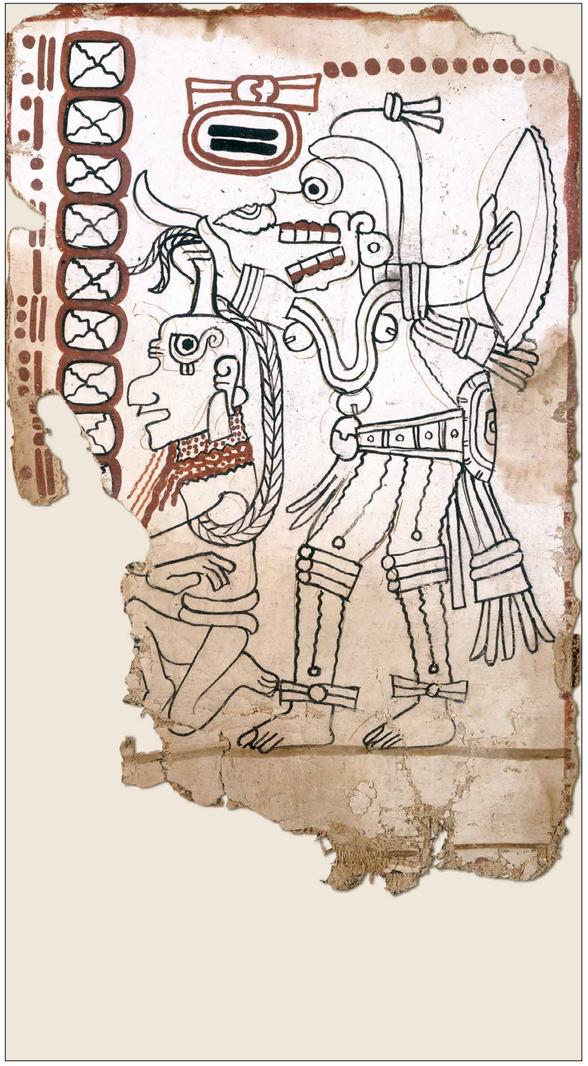


Figure 4. Grolier 4 restored to full height.
Photo: Enrico Ferorelli; illustration: Michael Coe.

that the missing 4 to 6 cm once presented further glyphic and iconographic information; a reconstruction of the original page size can be seen in Figure 4. As will be seen, this is also suggested in part by the panel drawn under the figure of Grolier 6 recto (Figure 4).

The proportional range of Maya manuscripts roughly conform to the proportions of the dressed human body, in that all are taller than wide. In this, the proportions of the Maya codex align closely with those of the Late Classic Maya stela and other art forms, including sculpted door jambs or columns, especially across the Puuc region, at Xculoc and Sayil, where representations of K'awiil abound; these are of particular interest given that there are two such representations among Grolier's 10 pages. Lintels from the earliest times through Chichen Itza may have been transcribed from books that adhere to the dimensions of Grolier. Although no books survive that can be confirmed to be earlier than Grolier, there is widespread evidence of shared art practices across media, among books, paintings, and sculpture.

In making a codex, the Maya scribe would have had ample *amate* paper at hand. Having cut and seamed the pieces, the scribe or his workshop would then have needed to bend it into screenfold pages (a "binding" that is variously called leporello, concertina, or accordion). This is a process that has not been satisfactorily investigated, but we here rely on Thomas J. Tobin, a librarian of Southern Illinois University, who has experimented with the steps involved in constructing an actual Maya codex. He suggests that the Maya had some kind of measuring device, a template that would allow them to mark off the precise widths of the pages (Tobin 2001): "I fashioned a block of inch-thick wood that was five inches wide and fourteen inches long, making certain that the sides were square. Using this as my template, I began folding the paper by placing the block atop the paper and folding upwards. This produced a clean, crisp fold without tearing the paper."

What we further note is that the horizontal-vertical-horizontal felting, visible in Figure 3, supported the folding process: the exterior layers of horizontal fibers kept the pages hinged together as a thinner but stable material after the coarser, heavier, interior vertical fibers had split along the folds. This construction allowed for substantial wear and tear before pages would finally separate from one another. Because of this horizontal-vertical-horizontal construction, sheets of *amate* would

have yielded durable pleats wherever the pages were folded.

The last step in preparing the codex for final painting was to lay down a smooth white coating directly onto the bark paper of each page. For the Madrid, Paris, and Dresden codices this has been shown to be calcium carbonate, readily available throughout the Maya lowlands. On the pages of Grolier, this was calcium sulfate, also known as gypsum plaster, plaster of Paris, or gesso (Ruvalcaba et al. 2007). As Domenici et al. (2014:103) observe, this aligns Grolier with the gypsum-based codices of central Mexico and the Mixtec area, such as the Cospi, Selden, Becker I, and Colombino. Commonly found across Mexico, gypsum is quarried today in both Campeche and Quintana Roo (Perry et al. 2009).

The process of producing the gypsum plaster of Paris base was not easy. The quarried gypsum mineral had first to be turned to white powder by heating it to about 150° C, after which it was mixed with water. After 10 minutes, it started to set, and after 45 minutes it could no longer be worked. This meant that the plaster specialist had to work fast if he was to cover a number of pages at a time. He also had to be careful *not* to apply plaster to the hinged areas between every two folded pages. Once set, it is possible that the gesso layer was polished with a smoothing stone or other instrument (see Coe and Kerr 1997:152 for a discussion of paper polishers). The fine, folded screen pages of the manuscript were now stable and ready to paint.

At this point, the artist sat down to do his work. How did he start? Some of the best evidence for how Maya painters worked comes from the careful documentation of Ann Axtell Morris (1931) at Chichen Itza, who found that painters sketched in two ways at the Temple of the Warriors and the buried structure within, the Temple of the Chacmool. At the latter, artists scratched into damp plaster, a technique common in European wall painting known as *sgraffito*; as Morris noted, not a *single* line from the original sketch was replicated in the final painting (Morris 1931:372) (Figure 5c). In the later Temple of the Warriors painting, artists sketched with red line on the damp plaster and frequently treated the original as a guide, but not as lines to be adhered to (Figure 5). Morris was surprised when, on occasion, she found the sketch lines were followed meticulously (Morris 1931:379), and she did not hesitate to identify poor workmanship (of one section she says, "this is the worst Maya mural that has ever come to light"; Morris 1931:415); she also comments that sketch and final lines are often produced with little pause between execution, and by a single hand, which may often be the case regardless of adherence to sketch lines. On the exterior of the Temple of the Warriors, on the twenty-second layer out of 131 coats of stucco paint, Morris once again found sketch lines that only roughed out what would be the finished painting of a death

a b c

Figure 5. Temple of the Warriors, details of individual warriors and captives: (a) final image, with underpainting visible in red; (b) underpainting; (c) final painting. This illustration was published with underpainting in grey but described by Morris as red in the text. Drawings: Ann Axtell Morris; color manipulation: Mindy Lu.

god very similar to Grolier 6. In this instance, it was apparently sketched in black, giving Morris's copy a strange appearance. Eerily, the death god seems to have two sets of skeletal teeth (Figure 6).

According to Susan Milbrath, "the red sketch lines [in the Grolier] show that the artist made numerous changes in the positioning of figures, a detail not often seen in pre-Columbian codices," and Milbrath cites Elizabeth Boone's work on the Codex Nuttall, a Mixtec manuscript, as her counter-evidence (Milbrath 2002:61). Milbrath goes on to assert that such changes in the Grolier are "where an inept artist moved parts of the figure or place sign without bothering to cover over the original lines." However, as far back as we know Maya paintings to have been made, and especially at Chichen Itza, artists worked in just this manner, some adhering to sketch lines more than others. They prepared smooth surfaces, and then executed red sketch lines,

Figure 6. Exterior painting, Temple of the Warriors. Reconstruction painting by Ann Axtell Morris of twenty-second layer of paint on north face of building.

probably working quickly with a brush. This, too, is what the author of the Grolier did.

Some comparisons among other Maya paintings bear mention. At San Bartolo, almost 1500 years before the making of Grolier, the finished and final pigments adhere closely to the sketch, but with occasional lapses (Hurst 2005). Palenque artists sketched in red or black paint, for stone and stucco sculpture, as well as for paintings (Robertson 1983:18-19); for many stuccoes, artists incised the walls with a sharp implement (Robertson 1985a:44). At both Bonampak and Calakmul, the red sketch line has bled through white pigment of high-ranking ladies' dresses, which were painted with thin pigment, as if to indicate the expensive gauzy fabric. Although the pigment may have once obscured the red line, the sketch line is now readily visible, revealing the artist's attention to the female body, especially breasts and thighs. The sketch anchors the body, much the way that the stucco bodies and undergarments of the Palenque Palace were fully finished, despite the knowledge of the makers that the body would be fully covered in subsequent stucco layers (Robertson 1975). Sketch lines range from loose and approximate at Bonampak to precise, if freely drawn, guides at Palenque.

The practice of outlining glyphic grids continued for generations, including roughed-out panels for carved hieroglyphs on stone monuments and red underdrawing

for the superposition of stucco glyphs. Several artists painted the Dresden Codex, the masterpiece among the surviving Maya books, and all depended on red outlines (for all Dresden illustrations, see Dresden n.d.a and n.d.b). Starting on Dresden 10, traces survive of red lines behind the glyphs; on the better-preserved Dresden 11, a clear grid of strong verticals and weaker horizontals is visible in red wash, and so continues the grid more strongly from this point onward in the manuscript. Dresden 38 includes faint glyphs that were never painted with the final, darker pigment. Less orthogonal and more heavily weighted to the horizontals are the red wash grid lines of the Madrid Codex (e.g., Madrid 17; for all Madrid illustrations, see Madrid n.d.). Faint black lines blocked the frames for glyphs in the Paris Codex. For none of the other three Maya manuscripts do sketch lines survive but rather only the grid outlines. The strong and confident artist of Dresden 39 depended on multiple grid lines to organize scale and iconography of the painted deity figures.

The painter of Grolier used both grid and sketch lines, revealed in a series of drawings by Houston based on the Ferorelli photographs (Figures 7–9). Once the surfaces of both the obverse and reverse were fully prepared with gesso, the entire frame was outlined in thin red wash, only to be covered later with the thick red pigment; careful examination reveals the lighter red line underneath the thicker one. Then, at left on each page, guidelines roughed out the glyphic column: two lines drawn from top to bottom, with multiple,

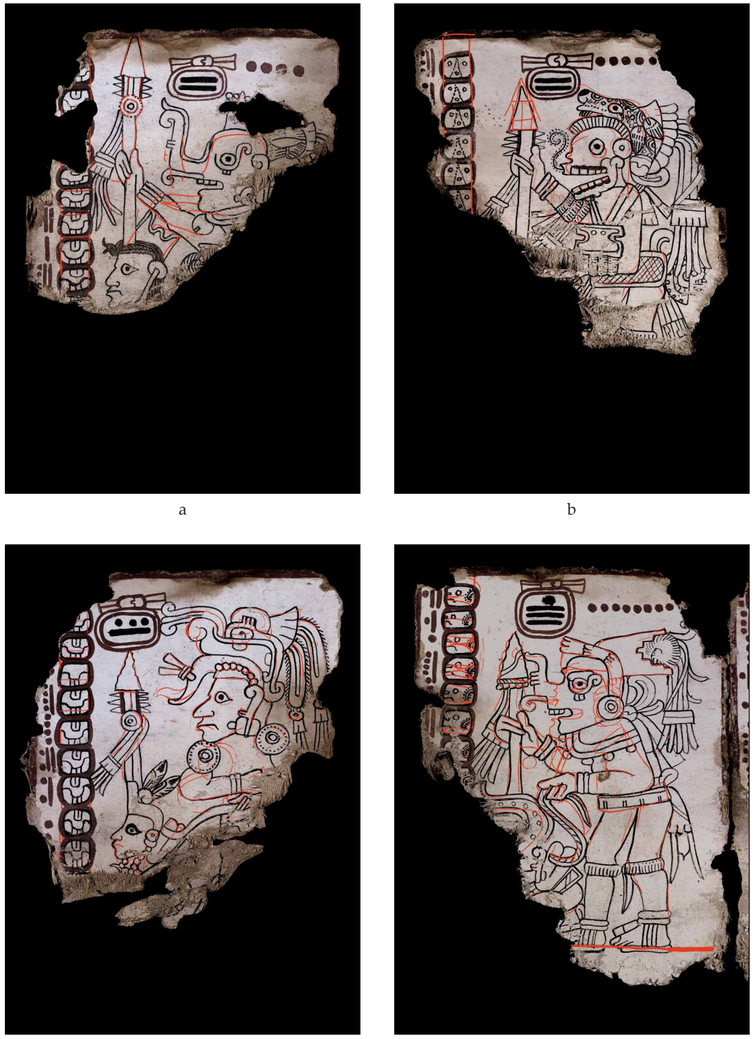
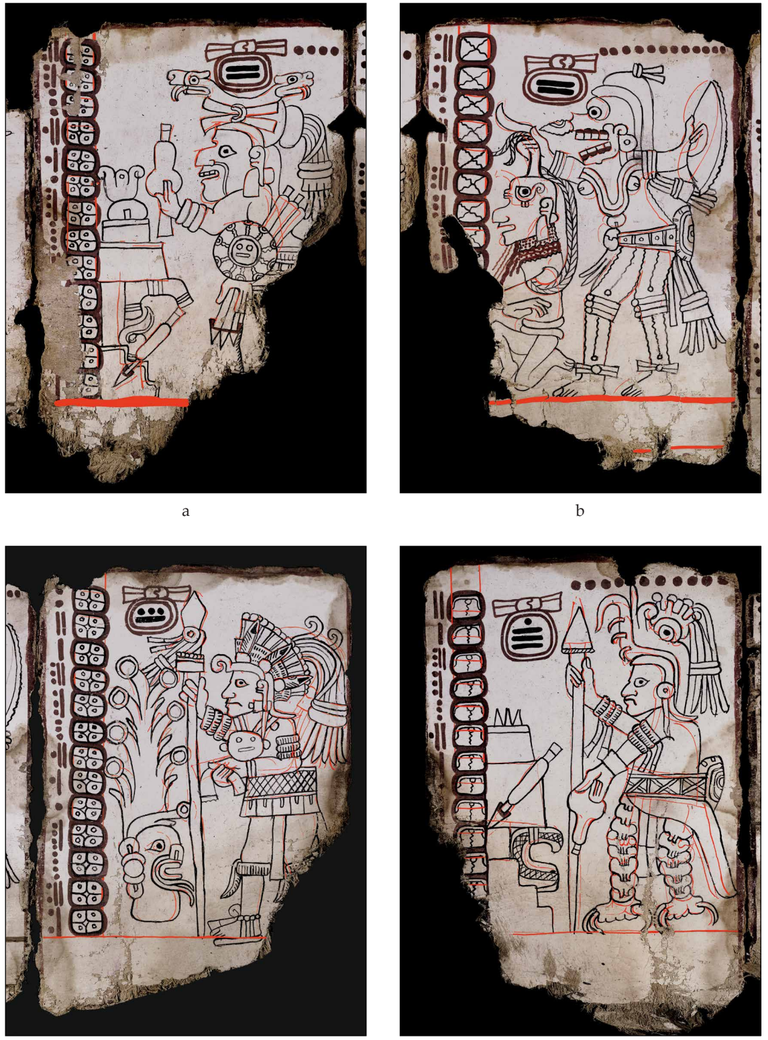


Figure 7. (a-d) Grolier pages 1, 2, 3, and 4 with underpainting highlighted in red. Photos: Enrico Ferorelli; drawings of underpainting: Stephen Houston.

thinner lines drawn from left to right, creating boxes for the glyphs that were widely disregarded. Yet the guidelines had nevertheless done their work, setting aside the column for the text. The paired broader wash lines of the glyphic column continue across the bottom, as visible on Grolier 6, as well as other pages (Figure 8b). This was presumably for additional, unfinished text, the upper line forming a ground for the standing figures. On Grolier 8, two thin lines run directly under the temple, drawn from left to right, converging at the temple's edge (Figure 8d). The basic guidelines are so straight as to suggest the use of a straightedge to achieve them, perhaps similar to the tool used along with the knife to cut sharp edges of paper (see facsimile verso). Even the ring numbers were sketched out, although the final paint covers them almost completely: on Grolier 10, the single dot of the bar-and-dot 11 can be seen to have a light black sketch line under it, and the bars seem to have a thin red underdrawing (Figure 9b). Here, as with the hieroglyphic column texts, the artist used a very thick (and different) brush for the final effort. By comparison, at Río Azul, traces of grid lines survive, despite efforts to scrape them away after the final painting was completed (Figure 10). Few painters wanted the armature of their work to be seen; the painter of Grolier did not care.

Once the grid was mapped, a single hand took up a fine brush for the figures; Houston's drawings reveal the loose and remarkably casual execution of the



a b c d

Figure 8. (a-d) Grolier pages 5, 6, 7, and 8 with underpainting highlighted in red. Photos: Enrico Ferorelli; drawings of underpainting: Stephen Houston.

a b

Figure 9. Grolier pages 9 and 10 with underpainting highlighted in red. Photos: Enrico Ferorelli; drawings of underpainting: Stephen Houston.

sketches. The artist worked with a loose, quick, red sketch line to draw the figures, occasionally turning to a thin gray wash, as on the figure and captive of Grolier 1 but with consistent scale from page to page, and without hesitation (Figure 7a). The lines are short and scratchy, as if from very light pressure, and possibly from a pen. The artist needs to do no more than suggest the deployment of figures,

Figure 10. Río Azul, detail of text with guideline. Photo: George Stuart.

especially evident in the unusual headdress of the captive of Grolier 1. The two depictions of K'awiil, on Grolier 1 and 4, show that the artist gave the underpainting of Grolier 4 far more detail, and essentially finished the headdress flower closest to the ear with the red sketch, perhaps accounting for the absence of the black overpaint. On Grolier 9, the sketch attends carefully to the craggy chin of the deity and the stone in his hand, along with the bird emerging from the captive's head: these were essentials that he did not want to omit or fail to leave room for in a final draft (Figure 9a). At times, the disparity between the sketch line and the finished work might seem to be the work of a different painter. On Grolier 8, for example, the squared dart tips of the sketch yield to rounded forms in the final version, in one of the most divergent executions from draft to final form (Figure 8d). Yet most characteristics, such as the distinctive single feather that crosses the headdress flourish, pass readily from the initial to final version, with some exceptions: on Grolier 6, the sketch of the death deity's back is a single quick line, while the final version is a tight and jagged squiggle, consistent with the skeletal and stony aspect of the god (Figure 8b). The sketch line is no more than a working guide, and the artist took greater care with the final execution. What might be thought from isolated examples like the darts of Grolier 8 to be the work of two artists is almost surely the work of a single individual (Figure 8d).

Some lines, such as the angled black line toward the bottom of Grolier 8, suggest that there was an additional painted program intended at some point. Throughout, the painter skillfully managed pigments of black, brown, red, and blue; the hue and intensity are consistent from page to page, the work of a practiced craftsman. He may have alternated between red and black as he worked, but a thick, dark red was the final pigment, overlying the black on every page, and thus completing the manuscript with the same color with which he had begun it. The painter of Grolier completed the painting on one side of the plastered *amate* manuscript and let it dry. He did not paint the reverse; the painter of the Codex Cospi, a Borgia-group manuscript, left pages blank on both recto and verso; and there are three unpainted pages on the verso side of the Dresden. Painted on only one side, the Grolier was considered sufficiently complete to put into use.

Scientific Study of the Grolier Codex

At the time of the arrival of the codex in New York City, in 1971, Gordon Ekholm, curator at the American Museum of Natural History, was reportedly given a single, gessoed but otherwise unpainted page for scientific study. The museum cannot find this page today and has no knowledge of its examination. In 1973, Coe submitted a small fragment of the unpainted paper accompanying the codex to Dr. James Buckley of Teledyne Isotopes, Westwood, New Jersey. The result was published in the same year in the journal *Radiocarbon* 15(2):293, as follows:

I-6107. Maya Codex 720 ± 130 BP[2]
AD 1230

In 2014, utilizing the online quickcal 2007 ver 1.5 program of the Cologne Radiocarbon Calibration and Paleoclimate Research Package, we calibrated thus:

AD 1257 ± 110. 1σ AD 1147–1367 (68.3% probability)

The 2007 report of the non-destructive examination of the Grolier Codex by the Ruvalcaba team starts out with this somewhat equivocal preface: "Because of its rare iconographical content and its provenience from non-authorized archaeology, specialists are not keen to assure its authenticity that would set it amongst the other three known Maya codices in the world (Dresden Codex, Paris Codex and Madrid Codex)" (Ruvalcaba et al. 2007:299). To conduct their study, Ruvalcaba and colleagues used Particle Induced X-ray Emission (PIXE) and Rutherford Backscattering Spectrometry (RBS). They did not take material samples of the codex itself but were able to identify the coating of the pages as gypsum (Ruvalcaba et al. 2007:299). They also confirmed the three main pigments or inks used by the artist-scribe who painted this manuscript: black and red throughout, and, additionally, and on Grolier 10 only, blue. Ruvalcaba and his team were unable to find any modern pigments, inks or compounds that would indicate a recent origin. Rather, evidence pointed to the contrary: the black was carbon black, the red was hematite or red ochre, with the usual high Fe (iron) content. These are exactly the pigments used on the three codices in Europe and in the codex-style slips for painting ceramic vessels of the first millennium AD.

What was the blue of Grolier 10? The well-known "Maya blue" pigment consists of a combination of indigo blue dye fixed on palygorskite; the latter is a rare clay mineral known from a cenote in Yucatan, another in Campeche, and a third that may be in Oaxaca but has not yet been pinpointed (Magaloni Kerpel 2004; Arnold et al. 2008; Houston et al. 2009; López Luján 2010:72). The PIXE apparatus used for the study was ineffective in detecting the presence or absence of organic indigo. However, the "PIXE spectra of the blue shade show in fact a composition that would match that of 'palygorskite.'" The authors further state that "we are able to conclude that no modern synthetic pigments have been found in the blue paint" (Ruvalcaba et al. 2007:303). Having been identified in the 1960s (Gettens 1962), Maya blue defied modern synthesis until the 1980s (Littman 1982; see also Arnold et al. 2008). There is thus no reason to think that the blue of Grolier 10 is anything other than Maya blue, the traditional pigment used widely in ancient Mesoamerica.

Carlson has recently reported (2014) that, "beginning in 1982, using small samples of the Codex that I had obtained for study from its [original] owner, I have worked with several professional consultants to exactly identify the bark paper fiber, determine the chemical composition of the stucco coating, and obtain two Accelerator Mass Spectrometer (AMS) Radiocarbon dates from small samples of Codex Grolier 2 and 11" (page 11 = page 10 lower). According to Carlson, AMS Radiocarbon dates were obtained at the National Science Foundation University of Arizona AMS facility. The sample from Grolier 11 (page 10 lower) yielded an uncalibrated C14 age of 809 ± 49 years BP (to 1 sigma deviation) or 1063–1291 CE (and 1132–1292 for 2 sigma deviations) (Carlson 2014; see also Carlson 2012-2013:26).

Here, then, is a summary of the radiocarbon analyses:

Sample 1: Fragment of unpainted paper accompanying the codex. Submitted 1973.

720 ± 130 yrs BP

Calibrated with quickcal2007 ver. 1.5:

1257 ± 110 AD
1 sigma 1147–1367 AD (68% probability)
2 sigma 1037–1477 AD (95% probability)

Sample 2: from Page 11 (page 10 lower) of the codex. Submitted 2002.

809 ±49 yrs BP

Calibrated with quickcal1007 ver. 1.5:

1212 ± 40 AD
1 sigma 1172–1252 AD (68% probability)
2 sigma 1132–1292 AD (95% probability)

No further scientific study has been conducted on the manuscript, yet to judge from these dates there is categorical radiometric evidence, not easily explained away, that the Grolier was created in-or-around the thirteenth century AD (Buckley 1973; Carlson 2012-2013, 2014).

[2] Before "present" defined as AD 1950.

Style of the Grolier

For hundreds of years before the author of Grolier took up his brush, Maya artists had worked with multiple formats and at many different scales. Whether painting ceramics or inscribing a stela, many artists may have worked from a paper source, almost certainly a codex, a fundamental medium to all painting and indeed all art-making. Some wall painters, like those of Bonampak, seem to have also been sculptors (Miller and Brittenham 2013:57-59); a full-scale project like the Bonampak murals may have been worked out on paper before transposition to the wall, especially given the repetition of figural forms known elsewhere and configured anew for the many walls. Some wall painters, like those of Chiik Nahb Structure Sub 1-4 of Calakmul, were probably also vase painters, based on the way that they render the human form and the dimensions of the painted panels, which are analogous to the dimensions of rolled-out Maya cylindrical vases—were they also painters of books?

No Classic book with intact *amate* paper survives, although Thomas Lee (1985:28) cited a list of possible codices at such sites as Uaxactun, Nebaj, and Altun Ha, sadly now only fragments of painted stucco (see also Smith 1950; Smith and Kidder 1951; Pendergast 1969). Some of these may have been painted gourds or other stuccoed perishables, yet Nicholas Carter and Jeffrey Dobereiner (personal communication 2015) have recently examined the Uaxactun codex, fragments of which reside at the Peabody Museum at Harvard. Microscopic examination appears to confirm an *amate* backing. Michael Coe (1977) also noted that codices frequently appear in Late Classic Maya vessel scenes (see also Coe and Kerr 1997). Books are commonly shown with jaguar pelt covers, probably also evoking concepts of thrones and rulership. No covers survive for any Maya book, but Ludo Snijders (2014) has recently demonstrated that pelt from the head of a jaguar served as the front cover of Codex Laud while pelt from the back or hind quarters functioned as the back cover, making the painted pages within into the feline's body. In addition, wood, stone, and ceramic boxes would have provided an extra layer of security for a book.

Style was in flux for the Maya artist of Grolier, working in what was a period of decline and syncretism across Mesoamerica. The great stylistic shift that had taken place in the ninth century would continue through the time of the Spanish invasion. Across Mesoamerica, following the abandonment of the Maya cities of the first millennium, the anthropomorphic figure would be depicted in highly conventionalized fashion. This abandoned the move toward naturalistic human representation and depiction of space that had particularly characterized Maya art of the eighth century but which had rarely found favor in Central Mexico, appearing only at regional sites such as Xochicalco and Cacaxtla. Typical of Central Mexico were human and deity representations in which bodies were represented predominantly in profile or frontal formats, although sometimes with a torso that suggests a three-quarters view, and in which most body parts—especially legs but also frequently arms—were depicted. Grolier's body proportions and conventional depiction of the figures conform to typical works that span a several-hundred-year period, from Chichen Itza to the Spanish invasion. This is when artists placed emphasis on what is known of the human body, rather than how it is seen—that is to say after the eighth-century Maya had mastered the deployment of human representations in space. That particular achievement would survive only in an exceptional work like the Dresden Codex.

One of the first dated works in this conventionalized style in the Maya region is the Great Ball Court Stone of Chichen Itza of AD 864 (Wren et al. 1989). By the end of the tenth century, any lingering attention to the old-fashioned deployment of foreshortening and naturalistic rendering was probably reserved for conservative formats dependent on copying—again, perhaps as seen in the Dresden Codex, where a fluent rendering of the body is displayed by its host of scribes. The style of Central Mexico, from Teotihuacan to Tula to Tenochtitlan, was far more dominant than the multiple styles of the Maya. By the end of the Early Postclassic era, if not sooner, style across Mesoamerica had become far more homogenous and would remain so until the Spanish invasion.

The author of Grolier was fluent in Maya style of this later period, especially with respect to iconographic subject matter and the rendering of hands, but he also adopted some forms and features characteristic of contemporary Mixtec manuscripts and other works that may belong to the era from across Mesoamerica, and particularly as executed by Toltec artists of Tula, Hidalgo. The proportions of the standing figures on Grolier are typical of the Maya of this period, as best we can judge. The figures range from 1:4, head to body, to 1:5, and they vary in height altogether: the death deity of Grolier page six is taller than the aged solar deity of page five. The standing figures of Dresden run 1:4; Madrid, 1:3.5 to 4.

But Grolier's best comparisons lie not only with the three other Maya codices but also with portable objects, including *oyohualli* (carved shells of *Patella mexicana*, the giant limpet) and carved ceramic vessels. The depiction of K'awiil on a footed, fine orange ceramic vessel, probably from the late ninth or tenth centuries, reportedly from Yucatan, may be usefully compared, particularly in the rendering of the snouted form and in the body proportions (Yale University Art Gallery 1958.15.22); other vessels of this period provide

Figure 11. X Fine Orange vessel, Emiliano Zapata, Tabasco, now at Carlos Pellicer Museum, Villahermosa, Tabasco. Photo: Michel Zabé.

evidence of the Maya tradition in the X Fine Orange vessels (Figure 11). The latest dated examples of these vessels come from Offering 14 of the Templo Mayor (López Luján 2005:174-178), where the format would seem to be archaistic. The point here is not to make too much of body proportions across media: rather, it is the conventional deployment of the figure in two-dimensional representations that is consistent in Maya, Toltec, Mixtec, and Aztec art during the Postclassic. This system is altogether different in three-dimensional sculptures, some of which achieve the body proportions characteristic of living adults, 1:6 to 1:7, in Aztec art. Chichen Itza and Tula both show lanky and attenuated proportions, particularly on pillars, to fill out the format of the tall, narrow, stone shafts where warriors at both sites are typically depicted at 1:8. As if crushed and constrained by the limited height, works of the same era, the conventionalized figures on the benches at Tula conform to a 1:2.5 ratio; bench or dais figures from the Mercado, perhaps among the last carvings at Chichen, conform to 1:4. Several incised *oyohualli* feature profile figures that, like those of Grolier, show both a three-quarters torso and profile legs that do not overlap until nearly at the groin; these objects also belong to the Early Postclassic and can be seen as ornaments of warriors and others at Chichen Itza. Like these works, the figures of Grolier conform to the vertical space available, determined in this case by the *amate* itself.

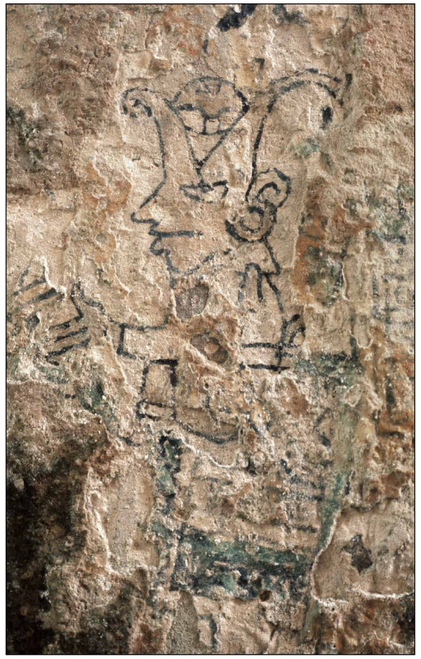
The rounded line drawn at the interior bend of some of the Grolier figures' elbows suggests a lingering familiarity with the foreshortening of eighth-century Maya renderings, as evident on Grolier 3, 4, and 5; all the artists of Dresden use the same convention, often in a fashion more comfortable and nimble than the execution in Grolier. The hands grasp spears and ropes with the distinctive rendering of the fleshy pad of thumb and palm visible; the best comparisons here come from Chichen Itza in general and the Josefowitz stela in particular (Miller and Martin 2004:Pl. 107), although one can return to the earlier Bonampak murals and eighth-century Yaxchilan inventory for similarities. The artist has a practiced and learned skill in rendering the arm and hands, showing depth and movement, while the depiction of the face is consistently flat and uninflected with any sense of depth, except for the slight curl to indicate the nostril. The occasional portrayal of the right hand where left should be depicted, as on Grolier 4, 7, and 8, is common on Maya vases as well as in the paintings of Cacaxtla, and nowhere else.

Grolier's artist had a number of practices that characterize his work, linking both to works made before his day and what would come after him. Most circular and oval forms were completed in two strokes: typically, for the eye, the artist draws one long stroke starting at the upper left, dropping down, and continuing out to the far edge of the eye; a second stroke drew the upper edge of the eye (Figure 12). The final line is thicker and usually steady, but simultaneously workmanlike and cautious; he may have used the same brush as for the sketch, the brush now heavier with paint and applied with greater pressure. This is true for the day signs as well: all feature a characteristic left curve, followed by a right curve, to complete an ovoid form. On Grolier 9, the two human eyes have been rendered similarly, but the finer and swifter whiplash underpainting of the deity's eye, above, remains visible. On Grolier 6, to make the large, dark pupil of the captive's eye, the artist has pressed the brush down multiple times, working in a circle to spread the paint, resulting in a large, rough circle (Figure 13).

Before AD 900, the upper stroke of the painted Maya eye was almost always rendered as a straight and swift light line, quickly tapering to little more than a thread. But by the time of Grolier, the Maya eye had taken on a characteristic rounded upper brushstroke, punctuated by the large black dot of the pupil. This is the common representation of the eye at Chichen Itza, particularly in the Temple of the Warriors (Figure 5), along with the coastal paintings of Tancah, which, as we shall see, offer a crucial piece of evidence

Figure 12. Detail of eye on Grolier 7. Photo: Michael Coe.

Figure 13. Detail of eye on Grolier 6. Photo: Michael Coe.



a

b

Figure 14. Maize mountain: (a) Tancah, Structure 44 (photo: Michael Coe, 1974); (b) Pasión del Cristo graffiti (drawing: Stephen Houston).

for authenticating the manuscript (Figure 14): one of the earliest known examples comes from the Josefowitz stela, securely dated to 864 (Miller and Martin 2004). The Dresden eyes, although executed by multiple authors, are also rounded, but the way in which they are deployed on faces at an angle makes the viewer read them as more almond in shape.

Ears in Grolier follow conventions also seen in Dresden, with large and sometimes squared upper lobe and a long, drooping lower lobe. Many of the deities wear ear ornaments that cover the ear itself, but the deities of Grolier 1, 3, 5, 7, and most particularly those of Grolier 9 reveal the ear as if stretched out for ear ornaments that have been explicitly removed for the time being; some are replaced by cloth strips. In the Venus pages in Dresden, every deity on Dresden 50 shows just this sort of ear. Distended lower lobes of ears can be seen among Maya captives of the Classic era, but the upper lobe is the widest part of the deity's ear on Grolier 9; this does not occur in Classic depictions.

Subject Matter and Content of the Grolier Codex

Venus Calendars in Mesoamerica

The Grolier Codex is one of five Precolumbian manuscripts with Venus calendars. All five are demonstrably Postclassic, but only Grolier has radiocarbon dates. Three of these (the Borgia, Vaticanus A, and the Cospi) are on deer vellum, while the remaining two—Grolier and Dresden—have bark paper (*amate*) as a base. On the Borgia, Vaticanus B, Cospi, and Grolier, the white coating over the base is gesso (calcium sulfate), but on the Dresden it is lime plaster (calcium carbonate).

The Mesoamerican Venus calendar was first recognized in the late nineteenth century by Ernst Förstemann in his studies of the Dresden Codex (1880, 1906). In 1898, his compatriot Eduard Seler (1898, 1904) demonstrated the close affinity between the Venus calendar of the Dresden and those of the so-called "Borgia Group" of codices (Borgia, Vaticanus A, and Cospi).

The basic discovery made by these early Mesoamerican peoples rested on the observation of the number of days elapsing between a first appearance or heliacal rising of Venus as Morning Star (that is, just ahead of the sun) and the next heliacal rising. They calculated this as 584 days, remarkably close to the true synodic period of 583.92 days. No Mesoamerican culture dealt with fractions, not even the mathematically sophisticated Maya. What they were constantly searching for were super-cycles of time that could link lesser ritual and/or astronomical cycles to accommodate these values. Recent work by Bricker and Bricker goes beyond the fundamental relationships of Venus (Bricker and Bricker 2011); we review here and augment what is relevant to Grolier (Coe 1973; Carlson 1983).

Five 584-day Venus periods exactly equal eight approximate solar years of 365 days (5 x 584 = 8 x 365 = 2,920 days). Here are other equations that enter into the surviving Venus calendars:

5 x 13 x 584 = 104 x 365 = 146 x 260 = 65 x 584 = 37,960 days

This super-cycle managed to accommodate: (1) the sacred cycle of 260 days, based on the permutation of the numbers 1–13 with a cycle of 20 named days; (2) the calendar round of 52 years; (3) the grand solar cycle of 104 years;

Page (Grolier)									1	2	3	4	5	6	7	8	9	10		
Column	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Position*	SC	ES	IC	MS	SC	ES	IC	MS	SC	ES	IC	MS	SC	ES	IC	MS	SC	ES	IC	MS
Ring number									90	250	8	236	90	250	8	236	90	250		
Day sign	Kib	Kimi	Kib	K'an	Ajaw	Ok	Ajaw	Lamat	K'an	Ix	K'an	Eb	Lamat	Etz'nab	Lamat	Kib	Eb	Ik'	Eb	Ajaw
	3	2	5	13	2	1	4	12	1	13	3	11	13	12	2	10	12	11	1	9
	11	10	13	8	10	9	12	7	9	8	11	6	8	7	10	5	7	6	9	4
	6	5	8	3	5	4	7	2	4	3	6	1	3	2	5	13	2	1	4	12
	1	13	3	11	13	12	2	10	12	11	1	9	11	10	13	8	10	9	12	7
	9	8	11	6	8	7	10	5	7	6	9	4	6	5	8	3	5	4	7	2
	4	3	6	1	3	2	5	13	2	1	4	12	1	13	3	11	13	12	2	10
	12	11	1	9	11	10	13	8	10	9	12	7	9	8	11	6	8	7	10	5
	7	6	9	4	6	5	8	3	5	4	7	2	4	3	6	1	3	2	5	13
	2	1	4	12	1	13	3	11	13	12	2	10	12	11	1	9	11	10	13	8
	10	9	12	7	9	8	11	6	8	7	10	5	7	6	9	4	6	5	8	3
	5	4	7	2	4	3	6	1	3	2	5	13	2	1	4	12	1	13	3	11
	13	12	2	10	12	11	1	9	11	10	13	8	10	9	12	7	9	8	11	6
	8	7	10	5	7	6	9	4	6	5	8	3	5	4	7	2	4	3	6	1

* SC, Superior Conjunction. ES, Evening Star. IC, Inferior Conjunction. MS, Morning Star.

Table 1. The Grolier Codex and the Maya Venus Cycle. The surviving pages of the Grolier, labelled 1–10 in this table, begin on what would have been page 9 of a Venus Cycle. Columns labeled A–H and S–T are now missing from the manuscript but are reconstructed in the table.

and (4) the synodic period of the brightest planet in the sky. All of the calendars, including the Grolier, are based on this grand scheme; its origin must reach far back into the Mesoamerican past.

The Dresden Venus table is laid out on five pages, 46–50 (see Dresden n.d.a, n.d.b). The calculations feature 65 times 584 days; as a consequence, the starting Maya date of a heliacal rising on 1 Ajaw 13 Mak is reached again once the super-cycle (and the grand solar cycle of 104 years) has been completed. The Maya compilers of the Dresden took their observations of the planet Venus even further than did those of the Borgia Group. Each count of 584 days was divided into 236 days as Morning Star (MS), 90 days disappearance at Superior Conjunction (SC), 250 days as Evening Star (ES), and 8 days disappearance at Inferior Conjunction (IC), immediately followed by the heliacal reappearance of the Morning Star on the following page. Of these figures, only the eight-day invisibility interval preceding heliacal rising of the Morning Star comes close to reality, the other intervals being "official" approximations.

The Grolier Codex follows the same scheme as the Dresden, with the exception that each and every interval within all five 584-day periods comprising the 104-year Venus cycle is given its own page and picture, something unknown in the Dresden and in the Borgia Group codices. There were thus 20 pages in the original manuscript, of which only 10 remain, some in poor condition (Table 1).

There are three pictures arranged vertically on each Dresden Venus page (Dresden 46–50). At the top is an enthroned god, a "regent" of the Morning Star: (1) a crocodilian deity, Itzam Ahiin; (2) the Death God; (3) the old god Kan Itzamtuun; (4) the Moon Goddess; and (5) 1 Ajaw, one of the Hero Twins (for reading of *Itzam*, see Stuart 2007a). The last figure is enigmatic, however, for the image depicts the Maize God, clutching a drum, and 1 Ajaw wears a skull headdress. In the middle is a Morning Star deity who "shoots" (**JUL[lu]**) an atlatl-propelled dart into a victim in the lower panel. In each case, he is said to be "rising," **K'AL-ja**.

Dresden	Shooters	Victims
K'an	God L	K'awiil
Lamat	10 Sky	Jaguar
Eb	Monkey-man	Maize God
Kib	Xiuhtecuhtli	Turtle God
Ahaw	Kakatunal	God Q (?)
Borgia		
Cipactli (Crocodile)	Black Death God	Chalchiutlicue (Water Goddess)
Coatl (Snake)	Eagle-headed God	Black Tezcatlipoca
Atl (Water)	Dog-headed God	Maize God
Acatl (Reed)	Rabbit-headed God	Throne (kings)
Ollin (Movement)	White Death God	Shield and darts (warriors)
Vaticanus B		
Cipactli	(all identical	Maize God
Coatl	Venus Gods,	Chalchiuhtlicue
Atl	quincunx-	Mountain, eagle on top (town or city)
Acatl	marked faces)	Throne
Ollin		Jaguar (warriors?)
Cospi		
Cipactli	Black Death God	Maize God
Coatl	White Death God	Chalchiuhtlicue
Atl	Yellow Death God	Mountain, tree on top
Acatl	Brown (?) Death God	Throne
Ollin	Blue (?) Death God	Jaguar

Table 2. Dresden and Borgia-Group Venus pages.

Anales de Quauhtitlan list	Maya equivalent
1 Cipactli (Crocodile): "the old men and women"	Ajaw (MS)
1 Ocelotl (Jaguar): not specified	13 Men
1 Mazatl (Deer): not specified	13 Kimi
1 Xochitl (Flower): "the little children"	13 Imix
1 Acatl (Reed): "the kings"	13 Eb (SC)
1 Miquiztli (Death): not specified	13 Chikchan
1 Quiahuitl (Rain): "the rain"	13 Etz'nab (ES)
1 Ollin (Movement): "the youths and maidens"	13 Kib (SC, IC, MS)
1 Atl (Water): (results in "universal drought")	13 Lamat (MS, SC, IC)

Table 3. Anales de Quauhtitlan list.

These "shooters" are: (1) God L (a god of war and trade); (2) a deity named "1-10 Sky," with certain elements not yet deciphered; (3) the Mexican Morning Star god Tlahuizcalpantecuhtli (**ta-wi-si-ka-la**) in the form of one of the monkey-men scribes; (4) Chak Xihuitl (**CHAK xi-wi-te-'i**?), an aspect of the central Mexican Fire God, Xiuhtecuhtli, spelled out on Dresden 48b; (5) a blinded central Mexican god, here called Kakatunal (**ka-ka-tu-na-la**)—the Mexican names were first pointed out by Gordon Whittaker in 1986. As for the victims depicted in the bottom panel, these are: (1) K'awiil, the god of sustenance, lightning, and royal lineage; (2) a jaguar or puma god; (3) the Maize God; (4) a turtle god; and (5) God Q (**tz'u**-?), of unknown function (Table 2).

A unique feature of the Dresden is that each section of each 584-day Venus cycle has its own, glyphically named regent—a figure seated atop a celestial throne—so that there are twenty such regents, each associated with a world-direction. The last-named on a particular page is the Morning Star in the east, and this deity appears enthroned in the picture at the top of the following page. Only one of these belongs to a "Shooter," the glyph of God L (at Dresden 49b). A few others among these name glyphs are identifiable, such as Kan Itzamtuun, the Moon Goddess, the Death God (appearing twice, once as the Morning Star and again as the Evening Star), the Hero Twin 1 Ajaw, and the Maize God; but others are not.

In contrast to the complex Dresden and Grolier, the three Venus tables of the Borgia Group are only concerned with successive appearances of the Morning Star, which occur at intervals of 584 days; the initial days on which Venus is first seen at dawn arising with the sun are Cipactli (Crocodile), Coatl (Snake), Atl (Water), Acatl (Reed), and Ollin (Movement), along with their coefficients. On each page or section is a fearsome god hurling a dart or spear with an atlatl at a victim. In the Cospi, all five shooters are Death Gods of various colors; they wear ruff-like headdresses of squared-off feathers, a feature found on Venus gods of Vaticanus B and the Borgia codices, and on Grolier 7 (Table 2).

Seler linked these Borgia Group and Dresden Venus tables with textual passages in the early colonial document Anales de Quauhtitlan, describing the shooting of rays from the newly risen Morning Star against various classes of victims, on specified days (Seler 1904:384-385) (Table 3).

It can be seen that only four of these days correspond to Morning Star pages in the Borgia Group; and further, that of these, only 1 Acatl, on which kings are slain, closely corresponds to what we see in the Prehispanic codices. Anthony Aveni (1999) has made the case that the Venus table of the Borgia Codex is derived from that of the Dresden (or from a prototype). If one transfers the Quauhtitlan days to Maya equivalents, it is clear that there is little similarity to days in the Dresden Venus Table on which the Morning Star (MS) appears. In fact, it is clear that the dates provided in the Quauhtitlan are not directly based on the Venus cycle but are simply a list in proper order of the first nine *trecenas* of the 260-day calendar, beginning with 1 Cipactli. Furthermore, there is little agreement between the iconography of shooters and victims in the Dresden and that of the Borgia Group.

Thus, beyond the basic mathematics of Venus calendars in Postclassic Mesoamerica, there was a great deal of variation in the iconography and underlying mythology related to the planet. At the time when the Grolier was produced, and in the Classic age that preceded it, there must have been many codices with Venus calendars, each reflecting the culture and ideology of the particular political entity for which it was produced. The finest of these would have been of the complexity and completeness of the Dresden, which probably required the patronage of a royal court. But, for an ordinary small temple on the western periphery of the Maya area, a Venus codex like the Grolier would have been more than sufficient for their ritual life.

The message of the Grolier is that *all* of the twenty named days of its Venus calendar were malevolent and dangerous: every single god pictured is holding a weapon—spear, atlatl dart, or in the case of Grolier 6, an "eccentric flint" used as a beheading knife. On Grolier 9, the deity raises a stone as his weapon. On five of the surviving pages, the deity has taken a captive. On Grolier 5 and 8, the "victim" is a temple structure (seen in side elevation), and on Grolier 10 a body of water. The Death God is depicted three times as the Evening Star (Pages 2, 6, and 10), a position he also holds among the Venus Regents on Dresden 49b. K'awiil appears twice, once on Page 1 at Superior Conjunction, and then at Page 4 as Morning Star; on Dresden 49b, he is a regent at Inferior Conjunction. The stone-throwing mountain god who bears maize on Grolier 9 appears at Superior Conjunction, but at Inferior Conjunction on Dresden 50b.

Apart from repeating all of Thompson's 1975 reasons for dismissing the authenticity of the Grolier Codex, and adding stylistic ones of her own, Susan Milbrath (2002) makes much of the lack of fit between the Venus regents of the Dresden and the surviving pages of the Grolier. This would assume that the Dresden was canonical throughout the Maya world, a point that Bricker and Bricker also address (2011). We suggest that the Dresden was not only later than the Grolier, but that it was produced in a different tradition. Even with only the small sample of Mesoamerican Venus calendars that has come down to us (along with the flawed information in the Anales de Quauhtitlan), there was far greater variability among Maya codices than critics like Milbrath and Thompson have taken into account. Milbrath assumes that Venus could only be malevolent on heliacal risings of the Morning Star. The evidence of the Grolier indicates otherwise.

An idealized guide to the heavens, Grolier was predetermined rather than observational, a canonical declaration of what *should* occur rather than what could be seen through the variable cloud-cover of eastern Mesoamerica. With its span of 104 years, the Grolier would have been usable for at least three generations of calendar priest or day-keeper.

Glyphs of the Grolier

The Grolier differs from all other surviving Maya books in one critical respect: the glyphs appear solely as day signs, without a hint of the verbs and syntax found in the Dresden, Paris, and Madrid. There could be two reasons for this. The first is that the book was intended for polyglot use as a hybrid production, an astrological manual poised between two cultures, one Maya, the other Toltec. Day signs are identifiable after casual acquaintance with Maya writing, but not so an array of word signs and syllables configured into meaningful sentences. The Grolier would suit a very particular kind of readership or user, one that was almost pan-cultural or bi-cultural. The other possibility is that the stripped-down glyphs, reduced to the basic temporal notations—days, bar-and-dot numbers, and so-called ring numbers—accord with what might be expected of a day-keeper, a specialist, sometimes of relatively modest status, in reckonings of time and divination (Colby and Colby 1981; Stuart 2012). The other codices offer fuller accounts, replete with explanatory texts and dense imagery compressed in multiple fields on a

Figure 15. Ring numbers, Dresden 62 and 63.

single page. Presumably, their users were of high-to-moderate literacy. The Grolier points more to the sort of record used by less skilled literati, marking time, noting relevant gods and their interlocutors, and linking the whole to the synodic cycles of Venus.

The calendrical details of Grolier are uncontroversial. As mentioned before, debunkers such as Thompson (1975:2, 3, 7) took issue with its use of "ring numbers." These deserve closer scrutiny. In the Dresden such notations tabulate the amount of time between one date, 13.0.0.0.0 4 Ajaw 8 Kumk'u, Aug. 14, 3114 BC, and an earlier position in the Long Count. The first is the most important base for the Maya calendar, the second seemingly (but only seemingly) a haphazard choice. Ring numbers are thus a kind of distance number, with higher units in place notation that always lead backwards in time. As a label, "ring number" has stuck, but it is misleading.

On Dresden 62 and 63, such notations tabulate the amount of time. Only the count of days appears within the circle, and that circle is not a "ring," but the depiction of bundle tied up with a tidy bow (Figure 15). The numbers appear inside that bundle. It is possible that this is nothing other than a depiction of a day-keeper's bundle, in which, as in highland Guatemala today, seeds or stones are kept for the calculation of days (see Tedlock 1982). Indeed, David Stuart (personal communication 2014) has even proposed a reading of *tsol*, "place in order," for these bundles when they appear in Classic glyphs. This suggestion may well explain a key spelling in many the ring number passages, **tso**?/**TSOL**?-**le** (Dresden 62 and 63; Figure 15). Another tally of time, called "companion numbers" by Linton Satterthwaite (1964:51-53) and "long reckonings" by Thompson (1972:21), involves a third date, often lying in the Classic period or perhaps slightly later (Bricker and Bricker 2011:497-500, Table 11-2).

Most specialists tend to record these two distance numbers in Dresden, the ring and companion numbers, in analytical terms. That is, they make sense of the sequence in coherent, tabular form, presenting them in the linear order favored by epigraphers (Bricker and Bricker 2011:498-499). That is misleading too, for the actual sequence is highly complex and not easily rendered by any modern rubric. Each column begins with the earlier, pre-era date calculated in the previous column. Then there is, on Dresden 62 and 63, mention of ancient events, the positioning (**wa-la-ja**, *walaj*) of the "holy foot" (**K'UHUL-OOK-ki**, *k'uhul ook*) of a male (**mu-MUN**?-**XIB-bi**, *xib*) or, alternatively, a female (**IXIK-ki**, *ixik*) version of Chahk (**cha-ki**); the *mun*, from Yukatek "muchachos de poca edad," is cued by the **mu** syllable (Ciudad Real 2001:416). Much is mysterious here. There is even an intriguing hint that Chahk, the rain god, could be bi-gendered. The remainder of the column has two parallel but distinct segments. The first consists of a distance number (the "long reckoning") and the date, expressed as a calendar round, from which that amount of time is to be subtracted. The second segment displays the same configuration: a distance number (the "ring number") and the date, the 4 Ajaw base, from which that tally of days is to be taken way (Figure 15).

The pattern could thus be summarized as: "count backwards such-and-such an amount of time from *this* date; and count backwards such-and-such an amount of time from *that* date." The column that follows is then headed by the result of the final calculation. Thanks to Floyd Lounsbury (1972:212, 214), we know why the latest and earliest dates were devised in these columnar sequences. The time between them was "contrived," divisible "without remainder…by significant Maya calendrical numbers," from 260-day counts to Mars cycles. The aim was to create "like-in-kind" dates, often sharing the same position in the 260-day calendar (Lounsbury 1972:215). The discovery of a ring number incised on the internal chamber of Structure 10K-2 at Xultun, Guatemala, takes this form of record back to the Late Classic period (Saturno et al. 2012:715, Fig. s5). Here we note that reading the "rings" as representing the bundles of day-keepers accords with their fundamental meaning, as containers for physical tokens and calculators of days as part of divination rituals.

For Thompson, the problem with the Grolier was that ring numbers, which appear at or near the top center of each page, simply record dates between two calendar rounds. They do not involve the elaborate calculations of Dresden. But this is not a decisive criticism. The Dresden itself contains other uses of ring numbers, including passages, as on Dresden 71–73a, where they designate the coefficient of implied days (Coe 1973:151; see also Satterthwaite 1964:53; Lounsbury 1972:211 n. 1). As noted by Bricker and Bricker (2011:22), distance numbers certainly served more than a single purpose, even in the Dresden itself. Another negative comment by Thompson (1975:2, 7) and others (Baudez 2002b:76; Milbrath 2002:57) targets the unusual, higher-order numbers that sometimes accompany the day count in the "rings." In the Grolier, these occur in non-Maya fashion, denoted by strings of dots rather than the bar-and-dot notation within the rings nearby. Grolier's hybrid nature—largely Maya, but partly Central Mexican—makes such features not only explicable but expected. Thompson should have known better, too, as someone thoroughly trained in Mesoamerican archaeology. The Codex Cospi of the Borgia Group similarly combines both dot and bar-and-dot notations (see its pages 23, 25, 26, 27, and 31).

The final feature worth highlighting in the Grolier is its paleography, recalling some of the themes noted for its figural style. One scribe certainly produced the surviving pages. They

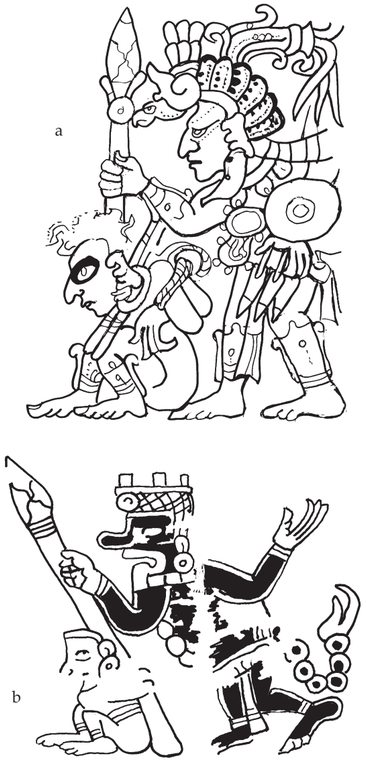


Figure 16. Late Postclassic Maya codical scenes of victors with spears presiding over captives: (a) victor with bound captive, Dresden 60b; (b) merchant deity (God M) with spear and bound captive, Madrid 83–84a. Drawings: Karl Taube.

are uniform in style and in the minutiae of execution. The larger number of scribes in other codices, especially the Dresden and the Madrid, is consistent with their great length and complexity (e.g., Zimmermann 1956; Lacadena 1995, 2000). The day signs in the Grolier are all Postclassic in date, with none of the temporal mixing that characterizes most faked Maya codices, which, in our experience—we have seen many—often draw on a mélange of different periods and styles, mostly monumental or carved in origin. The K'an sign is among the most unvaried of Maya day signs, and its use here is no exception, close indeed to examples in the Dresden, Paris, and Madrid. The Eb is simpler than all other versions, however, without the embedded eye found on Madrid 10 or variable outline on Dresden 13. That simplicity also characterizes the Kib sign, which does not have the small, doubled ticks on the "cap" of the sign (e.g., Dresden 57a). As for the Lamat, it differs from the other codices by combining a small space at the center (cf. the lopsided example on Dresden 58) with a regular orientation. The Ik' resembles those drawn in the Madrid (pages 13, 14, 26), but without the doubled beads at the bottom of the central loop; in this the Grolier is closer to the Paris (page 15) and the Dresden (page 27a). Wholly variant is the Ajaw and its curious feature of internal, dotted lines. Other codical examples (Dresden 56b, Paris 2) are far more consistent with each other, containing two vertical lines in place of the nose. The Grolier thus exhibits a distinctive style that shares some elements with other codices but also departs from them in idiosyncratic ways. The glyphs are not copied from any known source yet retain full legibility. There is simplification and a lack of scribal embellishment, but they conform to the overall impression of an undistinguished codex, not, perhaps commissioned by the most discerning patron nor created by the most accomplished scribe. There must have been many such manuscripts.

Gods of the Grolier

The Grolier Codex features ten distinct deities, the survivors of what was once a set of twenty, with particular repetitions, as would be appropriate for a document that in and of itself charts the repetitious movements of the planet Venus. Nothing here replicates any existing manuscript, particularly the Venus tables noted above, even as all individual elements make sense and find resonance among the later documents, and even more sense than any previous study has been able to demonstrate. We underscore that the Grolier Venus table is the oldest surviving such document, and as such, gives evidence of the variety such records took. And despite the novelty of Grolier, there is here, as there is with the glyphs, the sense that these are the workaday gods, deities who must be invoked for the simplest of life's needs: sun, death, K'awiil—a lordly patron and personified lightning—even as they carry out the demands of the "star" we call Venus. Dresden and Madrid both elucidate a wide range of Maya gods, but in Grolier, all is stripped down to fundamentals.

The manuscript will be addressed page by page, in order to discuss the individual figures portrayed and their characteristics, and to demonstrate, through comprehensive detail, the authenticity of the manuscript. All of the gods are bellicose. They wield weapons and in a number of cases grasp captives as well, a theme entirely consistent with the Venus pages known for both the Dresden and parallel passages in the Borgia Group. In all the pages where the legs are visible, the gods stride, the right leg extending forward. Coe's 1973 identifications have been subject to revision. But still intact is his fundamental view of the manuscript as a unique Maya manuscript of the early thirteenth century, and the oldest surviving Prehispanic manuscript. Throughout this section, the reader will want to consult not only the facsimile but also the

schematic versions of the manuscript, as redrawn by Nicholas Carter (Figures 33–42).

Grolier 1

The principal standing figure on page 1 is K'awiil (God K of the codices; see Schellhas 1904; Taube 1991) with his characteristic, upturned snout. At first glance, the treatment of the eye seems odd, as it is open at the top. However, the artist may simply have neglected to supply the framing underpaint; on Grolier 4, both underpaint and completed brow are in place. Like other Maya codices, the Grolier K'awiil lacks the cranial celt or torch characteristic of Classic Maya art depictions, a feature that generally disappears by the late ninth century, including at Chichen Itza (Taube 1992b:69). The deity displays humanlike teeth in his upper jaw; based on this dentition, which he believed absent in Maya art, Thompson (1975:7) considered the Grolier to be a modern forgery. However, an X Fine Orange vase of the Early Postclassic period portrays K'awiil with a similar row of teeth (Taube 1992b:69, Fig. 33b).

On Grolier 1, K'awiil takes a captive whose body partly blocks the spear of the triumphant god, a format also found on the following three pages (Grolier 2–4). These four scenes are all similar to the beginning 11 Ajaw page of an otherwise now missing K'atun series on Dresden 60b (Figure 16a), where it may refer to a historical event. The Dresden victor finds parallels in the art of Chichen Itza, including the descending *xiuhtotol* bird worn on his brow (Taube 2012). Although in a much cruder style, a similar composition appears on Madrid 83 and 84, where the black merchant deity, God M, wields a spear behind a seated captive (Figure 16b).

The spears of Grolier 1, Grolier 3, and Dresden 60b all have a circular, flower-like element, similar to those of Tula Stela 3 and examples from the Temple of the Chacmool at Chichen Itza (Morris et al. 1931:Pls. 36-37; de la Fuente et al. 1988:No. 100). All spears wielded by the victorious gods on Grolier pages 1 to 4 have highly mannered feathers associated with a planted spear in Classic Maya Art (see also Yaxchilan Stela 18, La Mar Stela 3, and the Josefowitz Stela; Miller and Martin 2004:Pl. 107). In the Early Postclassic period, the convention has overtaken naturalistic representation or observation, with the feathers sharply flying forward.

Pointed elements line the upper shaft of the lance on Grolier 1, 2, and 3, much like those found on Yaxchilan Stela 18 and Lintel 8, as well as on the panel from Temple 17 at Palenque; an early example of such a lance appears in the Late Preclassic rock carving at the entrance to Loltun Cave, Yucatan. The discovery at Chiapa de Corzo, Chiapas (Lowe and Agrinier 1960), of a lance with embedded shark teeth in a Preclassic royal tomb makes it possible to identify the weapon archaeologically that Taube (1991:65) has long posited. Such a jagged spear could puncture, tear, and rip flesh; jabbed deeply enough, it could inflict a mortal wound. For the Grolier spears, a pair of vertical red bands line the shaft next to the probable shark teeth, probably to indicate blood.

On Grolier 1, K'awiil wears a collar or bib with a prominent circular element; from Grolier 6 and 10 we can see that originally there were three of these. In his discussion of the Maya death deity, or God A, appearing in the Maya codices, Paul Schellhas (1904:11) considered similar elements as "globular bells or rattles." However, in view of their association with the death god, Rivard (1965) argued that for the Late Postclassic codices, such elements were probably human eyeballs, an interpretation entirely consistent with Coe's (1973) discussion of "death eyes" on morbid figures appearing in Late Classic Maya vessel scenes. Despite the fact that these appear on two skeletal deities in the Grolier (Grolier 6, 10), the Grolier examples are probably metal bells, much like examples discovered in the Sacred Cenote at Chichen Itza (Lothrop 1952:85-93). In contrast to the round pupils characteristic of "death eyes," the Grolier forms are quadrangular and have the typical vertical slit of a bell. Strands of metal bells appear in recently reconstructed facades in the upper chamber of the Palace of the Phalli in the Initial Series Group at Chichen Itza (Figure 17a; see also Arellano Hoffman et al. 2002:Figs. 31-32). In addition, a pair of Cotzumalhuapa-style columns from Golon, Guatemala, depicts saurian beings wearing necklaces rimmed with metal bells (Figure 17b).

K'awiil wears a plumed headdress bearing what appears to be a bifacial blade, and despite extensive loss, the remains of two more can be discerned. Although we are not aware of other examples of K'awiil wearing such blades in his headdress, it is in accord with the identification of K'awiil with chert, including the common Classic-period presence of axe blades in his brow and his frequent appearance on chert eccentrics (for eccentrics and K'awiil, see Miller and Martin 2004:Pls. 79-82; Clark et al. 2012a, 2012b; Agurcia et al. in press).

Very little remains of the Grolier 1 captive; what survives bears no sign of god attributes. An enigmatic board-like object fills the space between his head and K'awiil's arm, possibly something like a Hopi *tablita*. The captive also wears a prominent earspool with a long, protruding bead. Although common in Classic Maya art, this is the only Grolier figure to wear such an earspool assemblage. While Classic Maya captives are typically stripped of their jewelry, three in Grolier retain it: Grolier 1, 3, and 9. What seems to be brown braided hair on the Grolier captive may be a headband or perhaps the twined rope of a tumpline, like examples in the Dresden and Madrid. The rope

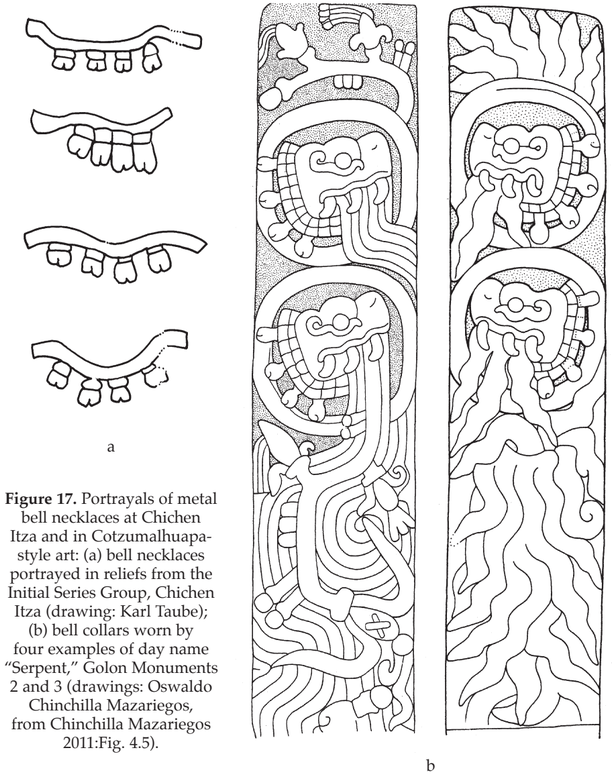


Figure 17. Portrayals of metal bell necklaces at Chichen Itza and in Cotzumalhuapa-style art: (a) bell necklaces portrayed in reliefs from the Initial Series Group, Chichen Itza (drawing: Karl Taube); (b) bell collars worn by four examples of day name "Serpent," Golon Monuments 2 and 3 (drawings: Oswaldo Chinchilla Mazariegos, from Chinchilla Mazariegos 2011:Fig. 4.5).

drawn on Grolier 6 and 9 has not been colored in with the same brown pigment.

Grolier 2

With his skeletal features, the victorious god on Grolier page 2 is the death deity known as Kimi and Kisin among the ancient Maya and analogous to Mictlantecuhtli of Late Postlassic Central Mexico (Taube 1992b; also Grube and Nahm 1990). Similar skeletal beings also appear on Grolier pages 6 and 10, but they are probably distinct manifestations of Venus as Evening Star with body markings denoting sharp stone. The Grolier 2 deity wears the "Mohawk" crest common to Mesoamerican death gods, a motif appearing as early as roughly 100 BC in reconstructed mural fragments from the Ixim temple at San Bartolo (Hurst et al. 2014). The skeletal deities on Grolier 6 and 10 probably also had similar coiffures.

The death god exhales a scroll from his nostrils, usually the sign of speech or breath. This same breath volute is exhaled by the Maya death deity on Dresden 22c, again a curving line of dots (Figure 18d). Kettunen (2006:249, Table 111) notes that Madrid 83c portrays the death god exhaling similar lines of dots, and this is also the case on pages 79, 87, and 88 of the same manuscript. Similar lines of dots emerge from smoking cigars, suggesting perhaps that the Grolier being is exhaling some form of fiery breath (Figure 18b). Because the comma-shaped scroll on Grolier 2 is lined by dots that typically indicate liquid in Classic Maya art, it is more likely that the dots denote a noxious spray of blood, such as exhaled by an ill and dying

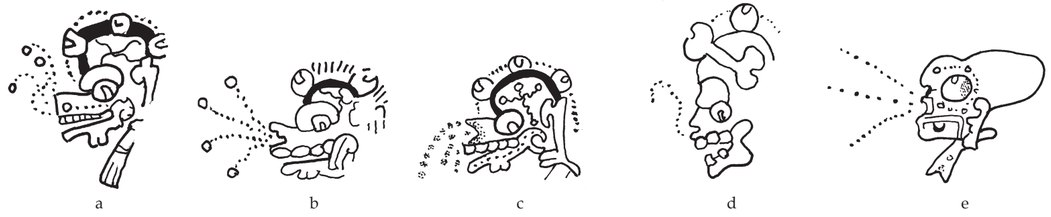


Figure 18. Portrayals of Maya death deities with nasal spray elements: (a) death god with three dotted lines emerging from nostrils, Madrid 111c; (b) death god with four dotted lines emerging from nostrils, Madrid 83c; (c) death god with three red dotted blood streams falling from nostrils, Madrid 23c; (d) death god with dotted line rising from nostrils, Dresden 22c; (e) death god with three lines spraying from nostrils, detail of Late Classic Maya vase (after photograph K5017 by Justin Kerr). Drawings: Karl Taube.

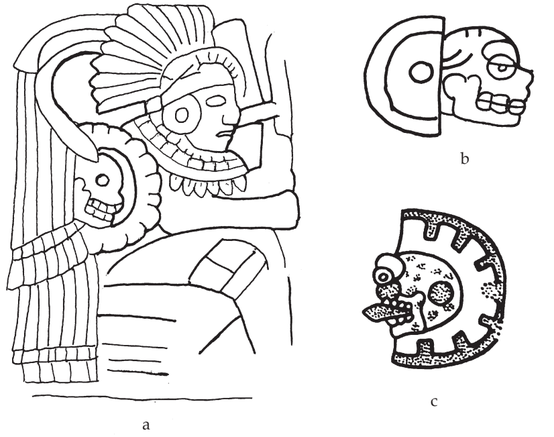


Figure 19. Portrayals of skulls atop back mirrors in Postclassic Mesoamerica: (a) Early Postclassic stone relief of seated figure wearing back mirror with skull, Tula (after de la Fuente et al. 1988:No. 117); (b) back mirror and skull worn by supernatural bat, Codex Vaticanus B, 24; (c) turquoise back mirror and skull worn by Tonatiuh, Codex Borbonicus, 10; (d) Mixtec back mirror and skull, Codex Vindobonensis, 18; (e) Mixtec turquoise mosaic skull and back mirror, Codex Nuttall, 39; (f) Mixtec skull atop back mirror, Codex Nuttall, 30; (g) copper rendering of skull atop mirror (after Musée Rath Genève 1998:Pl. 269). Drawings: Karl Taube.

individual and depicted on eighth-century vessels (Figure 18e).

On Grolier 2, the death deity wears a jaguar headdress. Although the sharply pointed ears are not in the trilobate form of Classic Maya portrayals of jaguars, Grolier 2's depiction is quite common in Mixtec manuscripts and Late Postclassic highland Mexico (e.g., Codex Borgia 12, 63). In fact, in terms of the Codex Borgia introductory pages of the 260-day *tonalamatl* (pp. 1–8), the representations of ears for the day names Jaguar (Ocelotl) and Deer (Mazatl) are essentially identical. The spotted markings of jaguar spots across the head suggest flowers and closely resemble elements appearing on plumed serpents on Madrid 15–16 and 18. In this regard, it is possible that this feline headdress relates to the afterlife "Flower World" paradise defined by Jane Hill (1982) for Mesoamerica and the Greater Southwest.

The Grolier death deity also wears a pectoral resembling a vessel in outline. However, as noted by Coe (1973:154), it is more likely a stylized form of the butterfly pectoral appearing widely with Early Postclassic, Toltec-style warrior figures from both Tula and Chichen Itza, probably an object fashioned of wood covered with turquoise mosaic (see Taube 1992a, 2012). In addition, he wears a large Toltec back mirror, or *tezcacuitlapilli*, in the style widely known for both Tula and Chichen Itza—an item typically covered with fine turquoise tesserae. Similar back mirrors can be seen for the presiding deities on Grolier 6 and 8; such devices are absent from the other three known Maya codices. The presence of these large *tezcacuitlapilli* makes the Grolier context consistent with the Early Postclassic.

In contrast to the other two Grolier examples, the back mirror on Grolier 2 bears a human skull in the center, a motif that also appears on a monument from Tula, which, like Grolier, has the skull squarely placed in the middle of the mirror (Figure 19a). In addition, for the *tonalpohualli* series of the Codex Borbonicus, page 10 features the sun god Tonatiuh wearing a turquoise-colored *tezcacuitlapilli* with a skull in profile (Figure 19c). The Vaticanus B also portrays a skull atop a back mirror, in this case worn by a bat grasping severed human heads in both hands (Figure 19b). Turquoise back mirrors with skulls often appear in Mixtec codices, with no fewer than 11 portrayed in the Codex Nuttall (Figure 19d–f), where apart from a single example that is bone-white, all the others are the same blue as the back mirrors, indicating that they were covered with turquoise mosaic, like the

skull discovered in Tomb 7 at Monte Alban (Caso 1969:62-69). Attributed to highland Oaxaca, an actual copper back mirror in "Toltec" style features a skull in the center, underscoring how common this motif was in Postclassic Mesoamerica (Figure 19g).

Across the waist of the death deity there is a large horizontal element marked with crosshatching, suggestive of a box or bag. However, it is probably a belt element, similar to one worn by K'awiil on a Terminal Classic vessel from Moxviquil, Chiapas (Taube 1992b:Fig. 33a). Given that Grolier 1 and 3 bear similar weapons as Grolier 2, there was almost surely a captive in the lower frontal portion of the scene. However, aside from some elements just below the vertical spear, and possibly indications of the tied upper arms, nothing remains to further identify this death god.

Grolier 3

The presiding god of this page is enigmatic, with no facial features to determine his identity. He wears an elaborate zoomorphic headdress, quite possibly a plumed serpent, with a small feather crest above the eye, a common convention for plumed serpents in Classic and Postclassic Maya art that suggests the crest of the male quetzal (Taube 2010:Figs. 25-26). Rendered in a loose style, the headdress recalls Postclassic portrayals of feathered serpent heads in graffiti from Tikal (Trik and Kampen 1983:Figs. 17a-c). The figure also has a headband of beads crossing his brow, and although lacking lines, the elements above and below this strand probably portray his hair, with a prominently protruding forelock bound with a knot, like the hair of the skeletal god on Grolier 6.

The pair of long, pendant elements at the back of the headdress are tipped with beads and a pair of tassels, a common convention in Classic Maya monumental art, particularly on warrior headdresses at Yaxchilan. Although possibly feathers, they are wide, unlike the long and narrow quetzal plumes appearing in the same headdress area of other gods in the Grolier series. In addition, they are edged

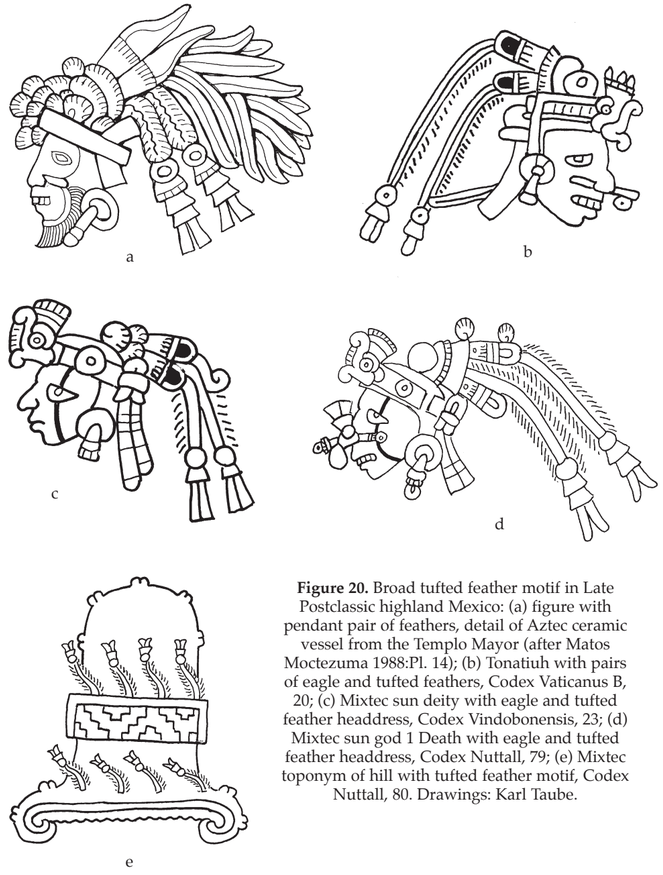


Figure 20. Broad tufted feather motif in Late Postclassic highland Mexico: (a) figure with pendant pair of feathers, detail of Aztec ceramic vessel from the Templo Mayor (after Matos Moctezuma 1988:Pl. 14); (b) Tonatiuh with pairs of eagle and tufted feathers, Codex Vaticanus B, 20; (c) Mixtec sun deity with eagle and tufted feather headdress, Codex Vindobonensis, 23; (d) Mixtec sun god 1 Death with eagle and tufted feather headdress, Codex Nuttall, 79; (e) Mixtec toponym of hill with tufted feather motif, Codex Nuttall, 80. Drawings: Karl Taube.

with short diagonal lines without delineation and edge, thus resembling fur more than feathers. Similar broad, down-curving elements—including even the bead and tassel assemblages at the tips—appear on an archaizing Aztec vase recalling the X Fine Orange vessels of the Toltec at both Tula and Chichen Itza (cf. Figure 11 for shape) (López Luján 2005:174-178). In the case of Grolier 3, the central lines undulate, indicating that they are not feather quills, but with a texture that suggests fur. In short, these headdress devices may represent mammalian tails; unlike the Classic Maya jaguar tails used in this fashion, however, the Grolier and Aztec examples might denote coyote tails. That said, they may represent a particular plant, and the challenge remains of identifying this striking but largely unstudied

motif.

Pairs of the same tasseled elements also appear in the Borgia Group manuscripts, often but not exclusively with the sun god, Tonatiuh, where they emerge from a pair of eagle feathers (Figure 20b, c). In addition, this same headdress motif is also commonly worn by the Mixtec sun god calendrically named 1 Death, including examples in the Codex Vindobonensis and the Codex Nuttall (Figure 20d, e). In the Codex Nuttall, the "furry tail" element is even used to label a particular community, the toponym being a hill bearing a series of them as if they were growing, pliant plants.

Perhaps the most noteworthy and prominent costume element worn by this figure is the pair of large circular elements on the shoulders, very similar to the one appearing on the spear on Grolier 1. These items may represent flowers, but probably fashioned from feathers or in metal. In fact, the Sacred Cenote at Chichen Itza yielded circular gold plaques with beaded rims, quite similar to the shoulder disks on Grolier 3 but smaller in scale (Lothrop 1952:Fig. 50d-e). The flower elements on his shoulders are also like those of Jaina figurines (Schele 1997:63, 99). Similar floral shoulder elements appear on a pair of elaborately incised Early Classic belt celts (Berjonneau et al. 1985:Pls. 330-333), and for still more ancient Late Preclassic Maya art, rulers appear with floral earspool elements strapped to their upper arms, including an accession scene from the West Wall mural at San Bartolo as well as a finely incised plaque at Dumbarton Oaks (Taube et al. 2010:Figs. 39a, 43a). The Grolier deity wears a massive earspool with a projecting bead, and like other jeweled items in this scene, it is probably of jade. In terms of costume elements, of all the series of deities in Grolier, the presiding figure on Grolier 3 has the richest attire, much of which can be readily traced back to the Classic period. This deity embodies concepts of Maya kingship and wealth.

In the Grolier 3 scene, the captive retains considerable jewelry in the form an earspool assemblage and large necklace bearing a central pendant, possibly a univalve shell, despite the fact that captives were commonly despoiled of wealth in Maya scenes of conquest. This diminutive, tightly bound captive floats in the scene as if loosely tethered to the rope of the triumphant god. Oddly, the vertical spear behind the captive stands on its own and is not held by the presiding being, who instead has his right forearm pointing across to his other arm, closely resembling the Late Classic pose denoting submission and respect.

Here the captive has darkened eyes, like the very similar composition on Dresden 60b, where the captive also has black eye marking (Figure 16a). This facial painting recalls the "Lone Ranger-style" blackened eyes of Chichimec peoples appearing in Postclassic codices of highland Mexico, including the Mixtec codices as well as the Early Colonial Historia Tolteca-Chichimeca and the Mapa de Cuauhtinchan II (Byland and Pohl 1994:141-145). However, it is by no means certain that either the Grolier or Dresden alludes to foreign individuals from highland Mexico in this instance: blackened eyes also appear in Late Classic Maya art, including a homoerotic figure in the Naj Tunich cave paintings as well as deities appearing in Codex Style vessel scenes (Robicsek and Hales 1981:Vessels 12, 18, 111; Stone 1995:Pl. 12; for an Ik' site comparison, see K1453 at MayaVase.com). The brow of the Grolier deity is topped with an element resembling the *xiuhuitzolli* turquoise crown known for both Early Postclassic, Toltec-style iconography as well as later Aztec royalty (Nicholson 1967b; Taube 2012). However, this may simply be his hair, but lacking the fine parallel lines typical of hair elsewhere in the Grolier.

The spiral element atop the captive's head probably denotes eagle down; like a similar object in the headdress of K'awiil on Grolier 4, it has short lines at the outer edges, entirely consistent with portrayals of downy feathers in highland Mexico, including the Borgia Group. From this downy mass a pair of feathers emerges. With the clean, blade-like outlines of their black tips, they can be identified as eagle plumes. The "Maya Eagle Warrior" figure from the south mural of Cacaxtla Structure A has eagle plumes similarly tipped in black. However, on Grolier 3 the overlap between blades and eagle plumes goes further. The upper left sides of the plumes have cartouches recalling the "god markings" first discerned by Coe (1973:13) in the same volume where the Grolier was first published. The mural fragment from the Temple of the Warriors at Chichen Itza also features a figure in eagle costume with red chert blades on his wings, much as if they were feathers (Figure 6). These knives also have the same oval cartouche appearing on the Grolier feathers, there with the short double tab elements commonly found with portrayals of the day name Flint in the Late Postclassic Borgia Group. The convention of blades on eagles continues in Aztec art, including on the *huehuetl* (drum) from Malinalco, which has a dancing eagle with obsidian knives on its wings and tail features (Saville 1925:Pl. 45). In addition, "feather" blades of flint and obsidian also appear on the wings of supernatural birds much earlier in Late Classic art (see Robicsek and Hales 1981:Vessel 53; Martin and Grube 2008:39). Overall, the Grolier 3 deity incorporates many avian aspects, from crest to eagle down to feathers.

Grolier 4

Here K'awiil presides, again showing his teeth with the mouth partly open, perhaps indicating speech or shouting. However, in this case he wears a different headdress and wears a headband of horizontal flowers, much like a daisy chain. Similar floral

headbands appear on Dresden 13b and 19c, in the first case worn by the Maize God and the second a goddess bearing that god's glyphic appellative. Projecting behind this floral band is an item probably of paper or stiff cloth, recalling the priestly "miters" described in the Relación de Valladolid and appearing with portrayals of Itzamnaaj in the Codex Madrid and a probable portrayal of K'uk'ulkan (the Maya form of Quetzalcoatl) from the murals at Santa Rita, Belize (Taube 1992b:34-35; see also Taube 2010:171-172 for the K'uk'ulkan identification at Santa Rita). In the case of Grolier 4, however, the headdress is cut to make a stepped outline, recalling the cleft head of the deity on Grolier 9. A large down ball appears within the stepped headdress, from which emerges a series of pendant quetzal plumes.

In addition to the headdress, K'awiil wears a shoulder mantle outlined with beads or bells bound at the back of the neck with a massive knotted assemblage, evoking the elaborate concern with textiles and binding in Late Postclassic Maya art, including the murals at Santa Rita. Aside from the relatively simple loincloth and sandals, the Grolier 4 deity wears what Coe (1973:150) referred to as "fringes" across the knees, a costume element also found with the presiding Venus god on Grolier 7. With their short parallel lines and loose hanging element at the front, these suggest cut pelt, commonly worn by Toltec-style warrior figures from both Tula and Chichen Itza, including on the massive atlantean columns from Tula, although commonly with another pair on the ankles as well (de la Fuente et al. 1988:Illos. 19-22). However, a Toltec style *oyohualli* shell pectoral portrays two of the four figures wearing pelt knee binding without corresponding elements at the feet (Ekholm 1961). Such knee fringes characterize Classic Maya art that invokes the power of Teotihuacan military garb, but in neither case is fur explicitly depicted (Stone 1989:156, Figs. 2-3, 7, 11-15; see also Miller 1973:Figs. 83, 149, 154, 173-176).

In the Venus pages of the Borgia, Cospi, and Vaticanus B codices, the very same furry knee fringes appear with the eastern, dart-wielding gods of the Morning Star. This is especially clear for the Venus deities appearing on Vaticanus B 80–84, where all five wear them, along with the hanging strip at the front, quite like the Grolier examples. In the case of the Cospi, all but one of the Venus gods wears the pelt knee fringes, with the single exception having a starry skirt obscuring the knees. In the Borgia, the initial Venus god appearing with the day name Coatl (Snake) also has the hanging strips at the front, whereas the other four have simpler fur "gaiters" without the pendant elements. In addition, the same furry knee elements appear with portrayals of the Venus god, Tlahuizcalpantecuhtli, on Telleriano-Remensis 14v, an early colonial document pertaining to Aztec religion and history.

The spear wielded above and behind the bound captive is rough, with the undulating Etz'nab-marking band commonly found with ancient Maya depictions of worked chert. Vestiges of an earpiece and necklace indicate that he is wearing jewelry as well as being clothed, with the loincloth belt as well as a sandal plainly evident. From the back of his head rises a broad curving element marked with six circles or dots, but because of the largely missing head, it is impossible to discern whether this represents hair, headdress, foliage, or even a stream of water.

Like the vanquished beings on Grolier 3 and 9, the captive on Grolier 4 appears as if floating, and although in different pose, the sacrificed god on Grolier 6 is also not touching the ground, perhaps a convention of separating such hapless beings from the sustaining earth.

Grolier 5

A victorious god wears a bound headdress with two serpents. In ancient Mesoamerica, knotted serpent headdresses are typically worn by goddesses, but there is no indication that this figure is female. In addition, males

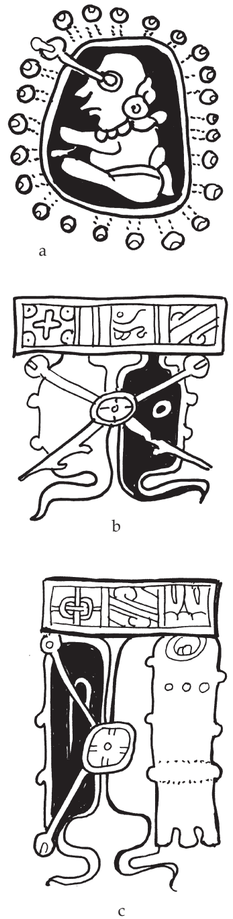


Figure 21. Portrayals of eyeballs and darkness in Late Postclassic Maya codices: (a) deity with protruding eye in dark field surrounded by eyeballs, Madrid 34a; (b) eclipse sign with sun and eyeballs as barbed lances, Dresden 56b; (c) eclipse sign with sun and projecting eyeballs, Dresden 54b. Drawings: Karl Taube.

can also appear wearing knotted serpent headdresses, including one of the central warrior figures from the Lower Temple of the Jaguars frieze at Chichen Itza (Maudslay 1889-1902:3:Fig. 12, Pls. 44, 49). Grolier 5 is the first of three deities to wield an atlatl, or spearthrower, and the only deity to wear the paper ear flaps of the penitents or captives rather than a decorative ear flare or bead.

Who is the deity of Grolier 5? The facial profile is quite similar to representations of the Maya sun god, including an example appearing on Dresden 55a. The curving line extending from the nose to the chin delineates a beard and resembles that of the Dumbarton Oaks turquoise mosaic mask as well as a wooden mask with gold foil appliqué at the Art Institute of Chicago (1965.782). Both masks depict solar deities that are characteristic of very late Prehispanic Maya imagery (Taube 2010:162; Taube and Ishihara 2012). The series of short lines on the right leg of the deity suggest hair, possibly pelt leggings like those that appear in Late Classic Maya vessel scenes. On Maya vessels, the leggings are of jaguar pelt (e.g., K533, K1439, K1896), which would be consistent with the solar identification: for the Maya, the sun *was* a jaguar (Taube 1992b:54). We believe, based on these and other examples, that Grolier 5 is an early example of the Postclassic Maya old sun god.

This sun deity holds the atlatl before his face, a pose of military aggression in Early Classic-period art of Teotihuacan and Teotihuacan-related scenes among the Classic Maya (Taube 2011:104). In addition, this convention continued in the Late Postclassic, including the Mixtec codices (see Codex Nuttall 66–67). His left hand grasps three darts with the points marked red at the base, which can also be seen for the dart penetrating the temple in the foreground as well as in a similar dart and temple scene on Grolier 8. This depiction runs counter to the common Postclassic convention of putting red at the tip of flint or chert points, and as in the case of the sharp elements lining the lances on Grolier 1–3, it probably denotes blood.

A shield covers most of the left lower arm, a common convention in Maya art, and features what appears to be a stylized human face in the center, much like the pectoral worn by another deity on Grolier 7. The victorious warrior on Dresden 60b holds a circular shield and three darts in the same position in his left arm (Figure 16a). Coe (1973:154) identified the ten circular elements with wavy stalks emanating from this central motif as eyes, which can paradoxically represent darkness or brightness in Mesoamerican iconography, such as eyes in dark clouds in the Borgia Group, or shining stars in the night sky. Madrid 34a features a figure seated in a dark circular background rimmed by a series of 23 radiating eyes (Figure 21a). In addition, the eye of the figure projects from its stalk out to the rim, probably indicating his starry night vision. For the eclipse passages in the Codex Dresden, eyeballs on stalks project from solar *k'in* signs (Figure 21b, c). On Dresden 54b, the eyeball elements are on the black side of the eclipse motif, suggesting that the Maya eyeballs probably allude to a darkened or night sun.

However, as Coe (1973:154) first proposed, the center of the shield, like most round shields, probably refers to the face of the Jaguar God of the Underworld, a dark, nocturnal aspect of the sun deity and quite possibly a fire god as well (Stuart 1998:408). The central face also resembles the numeral seven, whose personified glyphic form is this same solar jaguar. Nowhere is this more explicit than on Lintel 2 from Temple IV at Tikal, where the massive image of the Jaguar God of the Underworld has the numeral seven—one bar and two dots—emblazoned on his cheek (Jones and Satterthwaite 1982:Fig. 73) and the victorious Tikal ruler bears a circular shield with the deity's image over his lower left arm.

The Grolier 5 deity stands before a temple rendered in profile, a roofed superstructure with a stepped platform below, the basic sign for "temple" in Mesoamerica (Stuart 1987a:Fig. 46). The roof is capped with a trefoil flower atop a circular element resembling the bells worn by the standing gods of Grolier 1, 6, and 10. Metal bells overlap with the concepts of blossoms, dance, music, and the "Flower World" complex described by Jane Hill (1992) for Mesoamerica and the Greater Southwest, evident, for example, in the Mixtec metal, floral bells discovered in Tomb 7 at Monte Alban (Caso 1969). In addition, in contact-period Central Mexican belief, the Xochicalco, or "House of Flowers," was dedicated to the god of dance and music, Xochipilli. One portion of the Middle Pages of the Codex Borgia, page 37, portrays the mythic origins of music, with Xochipilli playing a flute and drum within the house of flowers (Taube 2001, 2004a). For the world directional pages in the Borgia, Cospi, and Fejérváry-Mayer codices of Late Postclassic highland Mexico, the eastern temple of Tonatiuh, the sun god, is consistently a floral building. This may further relate to the *nikte' naah*, or "flower building," of the Classic Maya, although the significance of this Maya epithet remains obscure (Stuart 1998:378).

A curtain covers the flower temple doorway, and a dart on the diagonal pierces the stepped temple platform, a sign for conquest in the Late Postclassic Mixtec codices. The dart motif is also a basic theme in the Dresden, Borgia, Cospi, and Vaticanus B Venus pages, with the weapon signifying the baleful rays of the Morning Star. Below the curtain, a spiral element in the temple doorway denotes flames (Coe 1973:154), a widespread Aztec convention for depicting conquest. The temple on Grolier 8 is also pierced by a spear, but it lacks this curling device. It is also conceivable that the spiral depicts a conch trumpet: the mural

Figure 22. Probable Early Postclassic portrayals of Tlahuizcalpantecuhtli: (a) armed skeletal god with flint in nostrils, detail of carved shell pectoral, Museo Nacional de Antropología, Mexico City; (b) skeletal deity with spearthrower, darts, and conch pectoral, Northwest Colonnade, Chichen Itza (from Morris et al. 1931:Pl. 105); (c) skeletal warrior figure with large star sign on abdomen, Northwest Colonnade (after Morris et al. 1931:Pl. 110); (d, e) skeletal warriors holding severed heads, detail of mural from the Temple of Chac Mool, Chichen Itza (after Morris et al. 1931:Pl. 164). Drawings: Karl Taube.

program at Santa Rita, Belize, portrays a temple with solar signs, along with a prominent conch on the roof (Gann 1900:Pl. 30). Grolier 5, then, presents a suite of solar and floral images, all under the control of a solar deity.

Grolier 6

Grolier 6 features a death deity who wields a massive sacrificial blade in his left hand while holding the rope bindings of a decapitated deity in his right. This death god features a chert blade in his nasal cavity, a common convention in later Postclassic Mesoamerican iconography (Borgia 3–7, 13, 15, 22, 56, 73). In addition, excavations at the Aztec Templo Mayor uncovered actual skulls with chert blades placed in the nasal cavity (Matos Moctezuma 1988). Although not documented in Classic Maya imagery, death gods with blades in the nostrils are also known for Early Postclassic art at Chichen Itza (Figure 6). In addition, a Toltec-style shell pectoral, or *oyohualli*, in the Museo Nacional de Antropología, portrays a skeletal warrior deity with a prominent blade in his nostrils (Figure 22a).

For the Grolier deity, both the blade in the skull and the sacrificial knife have wavy edges, a motif also found on the lance points on Grolier 3 and 4, a convention that denotes the sharp, undulating edge of a chipped stone knife. Similar wavy edging appears on the legs and back of the Grolier 6 death god. Although absent for the death deity on Grolier 1, this same body marking is on the skeletal being appearing on Grolier page 10; Grolier 6 and 10 also both feature wavy lines connected to circles on the lower limbs. These leg markings probably refer to hollow, marrow bone channels, a motif commonly found in the Codex Borgia (e.g., Borgia 56, 73). These are distinctions carefully drawn out by the Maya: the Dresden God A features dotted lines on the limbs instead of wavy ones (Coe 1973:54), but the Madrid death god has bone markings like those of Grolier 6 and 10, that

is, wavy lines connecting to dots (Figure 18c; Madrid 23d, 83c, 105a). For Madrid 23d, these markings on the skull are virtually identical to the undulating crossed lines of the Etz'nab day glyph. Not only do these Etz'nab markings commonly appear on Classic Maya portrayals of chert eccentrics, the equivalent day sign in Late Postclassic Central Mexico is Tecpatl or "Flint." The undulating lines edging the bodies of the Grolier 6 and 10 death gods thus denote them as sharp, stony beings.

The skeletal death deities appearing on Grolier 6 and 10 closely resemble portrayals of the Central Mexican Venus god, Tlahuizcalpantecuhtli, "lord of the dawn," the dart-throwing god in various aspects in the Cospi, Borgia, and Vaticanus B Venus pages first identified by Seler (1904). All five gods of Cospi 9–11 have flint blades projecting from their nostrils and larger ones from their right shoulders to indicate that they are sharp, cutting deities. For the Venus passage on Borgia 53 and 54, two Venus gods have skull heads, whereas the other three have masks covering their faces. Like the Cospi gods, they have flint dart points in their headdresses to denote the sharp, piercing rays of these beings. What is different about the Venus gods of Grolier pages 2, 6, and 10 is that these scenes concern the first appearance of Venus as *Evening Star*.

In his initial study of the Grolier, John B. Carlson (1983:50) pointed out that, contrary to earlier assessments, Tlahuizcalpantecuhtli embodied Venus as both the Morning and Evening Star. In support, he cited a Spanish-language gloss from the Telleranio-Remensis Codex: "This Tlahuizcalpantecuhtli means lord of the morning when it dawns and equally he is lord of that bright star when evening comes" (translation by Carlson 1983:50). In addition, Jeremy Coltman (2007) has made a compelling case that the Aztec Stuttgart Statuette probably portrays the skeletal Tlahuizcalpantecuhtli. However, the five dates on this sculpture—1 Deer, 1 Rain, 1 Monkey, 1 House, and 1 Eagle—are all western *trecena*s of the 260-day cycle, and not the five *trecenas* corresponding to the east. Tlahuizcalpantecuhtli was a complex deity and embodied more than the Morning Star, dawn, and the east. Plainly, Tlahuizcalpantecuhtli was also the Evening Star.

Carlson also called attention to then-recent epigraphic research by Floyd Lounsbury (1982) concerning Late Classic Maya texts referring to appearances of Venus as Evening Star. Lounsbury (1982:155) had argued that a number of Maya monuments depict a skeletal being in relation to these purported Venus dates, that is, "Venus symbols and skulls that appear as iconographic elements in some of the monuments." Lounsbury went on to note that a "prominent row of teeth" is a defining trait of the "Venus skull" (1982:157-158). In his 1983 work, Carlson cited Lounsbury's study as evidence that the Grolier was authentic, given that his research was published well after the discovery of the codex. Following Lounsbury, Carlson (1983:45, 2014:5) also commented that the Classic-period "toothy skull" is consistently related to Venus as Evening Star in Maya writing and art. However, Lounsbury's identification of a Classic Maya skeletal deity being as a manifestation of the Evening Star has not stood the test of time. For one, the cited dates do not correspond well to appearances of Venus as Evening Star (Bricker and Bricker 2011:223-224). In addition, no argument has been provided as to how the "toothy skull" is distinct from other Classic Maya conventional renderings of skulls, which all show such dentition by their very nature as defleshed bone. Some Classic-era glyphs employ the skull to specify the "head," *jol*, as in the captions of Room 2 at Bonampak, Chiapas, with or without the mandible (Miller and Brittenham 2013:236-237; cf. Dos Pilas Hieroglyphic Stairway 4, Step IV:G1). Other such "toothy skulls," such as named beings in texts at Tamarandito and Tikal, Guatemala, are simply a set of nighttime insects, often with a single eyeball on the forehead. For its part, a sign from the Temple of Inscriptions at Palenque, Center Tablet:A5, illustrated by Lounsbury (1982:Fig. 1d), is read **UH** or **UUH**, "jewel" or "ornament," without any link to Venus. Its meaning in the Center Tablet is obscure, but it appears to relate to mythic vegetation.

Although Lounsbury's work does not provide sufficient evidence, the skeletal death gods on Grolier 6 and 10 (and possibly Grolier 2 as well) are probably Early Postclassic forms of Tlahuizcalpantecuhtli, with comparable Early Postclassic examples from the carved piers of the Northwest Colonnade at Chichen Itza, one featuring a skeletal being with the nasal flint and the same knotted paper leggings worn by the deities on Grolier pages 6 and 10 (Figure 22b). Another figure from the same structure has the flint protruding from his skull but also a prominent star sign covering his waist and hips (Figure 22c). In his initial discussion of the Grolier 6 scene, Coe (1973:154) compared Grolier 6 to a skeletal deity appearing in a vast and now-lost exterior polychrome mural from the Temple of the Warriors (Figures 6 and 22d). Coe noted that the figures of both the mural and Grolier 6 have blades in their nostrils, wear the knotted gaiters, and hold similar knives in their hands. However, the similarities go still further, as both also grasp severed human heads by the hair, with the Grolier god lifting it from the freshly severed neck of the victim (Figures 22d and 23a). Although more fragmentary, another portion of the mural appears to portray the same deity also holding a severed human head, in this case with a trefoil blood scroll commonly appearing in Maya epigraphy and art (Figure 22e; see Houston et al. 2006:Fig. 2-37). The knotted leg and ankle elements of Grolier 6 are also very similar to those of the skeletal decapitators depicted in the Temple of

a b

Figure 23. Decapitated victims grasped by a lock of hair: (a) Grolier 6; (b) Codex Vaticanus B, 24. Drawings: Karl Taube.

the Warriors mural (cf. Joralemon 1974). Like the two examples from the adjacent Northeast Colonnade, these mural figures, along with the Grolier death deities, are almost certainly early portrayals of Tlahuizcalpantecuhtli.

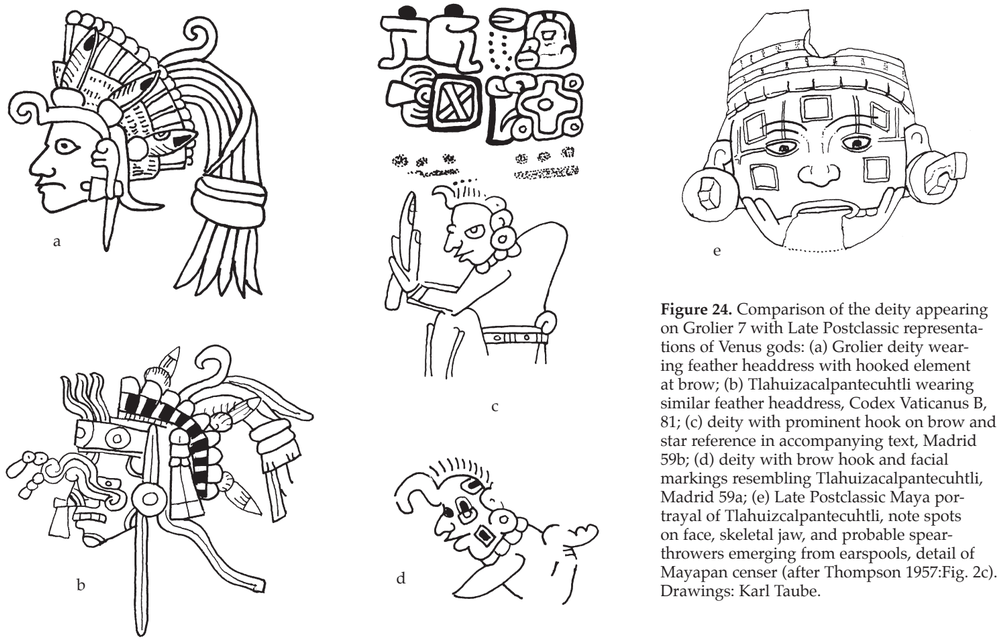
The Grolier 6 deity wears a mantle with three globular elements, items that could either be eyes or metal bells. In addition, he wears the *tezcacuitlapilli* also worn by the Grolier 2 death god. On Grolier 6, this back mirror device is bound to a knotted belt marked by four rectangular elements containing a central dot. In the Borgia Group of manuscripts, the convention of a series of segmented rectangular devices containing a central circle denotes stone mosaic inlay, whether it be of jade, shell, or turquoise, and this motif might well pertain to the prominent mosaic mirror of Grolier 6. Whereas the Grolier deity wears a simple bracelet on his right wrist, a long pendant element is bound to his upper left arm and sways upward behind the sacrificial blade.

The Grolier 6 death god lifts the freshly severed head of the victim by the hair (Figure 23a); the body below kneels on one knee, a pose commonly denoting subservience in Classic Maya iconography (Taube 2003). The scene is similar to one of a killer bat in Vaticanus B, who grasps a severed head by a lock of hair above the still-vertical body (Figure 23b). The Grolier victim is also bound with a rope and has what appears to be paper pulled through his ear, all motifs commonly appearing with Classic Maya portrayals of captives. The red blood streaming from his severed neck takes two forms, a series of dots as well as undulating lines. Similar wavy lines can be seen in blood scrolls from the Cacaxtla murals, including blood in the maw of the plumed serpent of Structure A (see Matos Moctezuma 1987:85). In the original red outline (see Figure 8b), a hook-like element extends above the brow of the slain captive, a form also found with the victorious god on the following page 7 (Figure 8c). This being on Grolier page 6 is notably similar to a seated deity appearing on page 59b of the Codex Madrid, who not only has the same cranial hook but also a similar protuberance at the bridge of the nose (Figure 24c). In the massive corpus of Mesoamerican images, these are the only two gods sharing both attributes, strongly suggesting that they are the same deity.

Grolier 7

The victorious figure of Grolier 7 wields a lance with frontally flowing feathers and what appears to be a loose piece of cloth in his right hand. Although his physical appearance could suggest that he is human and perhaps even a historical individual, the context of these pages as well as his attributes suggests otherwise. Composed of four feather elements, his headdress is very close to the headdresses worn by the five deities in the Vaticanus B Venus passage (Figure 24a, b): both have a lower frame marked by a series of short parallel lines at the upper edge topped by a spray of feathers demarcated by a line near their tips and a descending spray of quetzal plumes emanating from the upper center of the headdress. In addition, both the Grolier 7 deity and the Vaticanus B series have three projecting eagle plumes resembling blades, with both supported by a circular element, clearly portrayed as eagle down for the Vaticanus B gods. In fact, the only major difference between the Grolier and Vaticanus B headdresses is that for the Grolier the three eagle plumes spring from the lowest tier of the headdress and for the Vaticanus B from above the second fan of feathers.

The Grolier 7 god also has a prominent hooked device projecting from the brow (Figure 24a). In recent research, Taube (2010:171) has noted that hooked elements on Late Postclassic serpent heads denote them as spearthrowers, with the curving device being the projecting element for holding the butt of the dart. Similarly, the hook form on the brow of the Grolier god may well denote him as a personified atlatl, the basic weapon of the Venus gods in ancient Mesoamerica and deployed on Grolier 5, 8, and 10. Madrid 59c depicts a hunchbacked deity with a similar hook emerging from his brow (Figure 24c). The accompanying text includes a prominent Venus or star sign, indicating the celestial nature of this being. On the same page just above, there is another god with the hooked brow (Figure 24d). One of the more distinctive characteristics is his facial markings, which closely resemble depictions of the spotted face of Tlahuizcalpantecuhtli in Late Postclassic highland Mexico. Moreover, there is a Chen Mul censer face from Mayapan that was originally identified as Tlahuizcalpantecuhtli by Thompson (1957; see also Taube 1992b:120-122). In this case, the deity has similar rectangular facial markings along with a



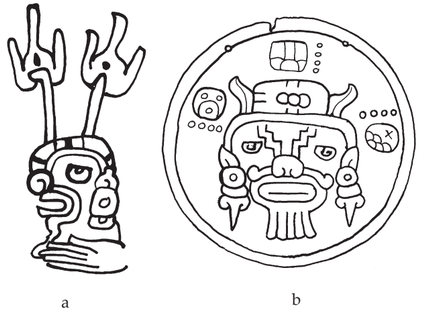
a c e b d

Figure 24. Comparison of the deity appearing on Grolier 7 with Late Postclassic representations of Venus gods: (a) Grolier deity wearing feather headdress with hooked element at brow; (b) Tlahuizcalpantecuhtli wearing similar feather headdress, Codex Vaticanus B, 81; (c) deity with prominent hook on brow and star reference in accompanying text, Madrid 59b; (d) deity with brow hook and facial markings resembling Tlahuizcalpantecuhtli, Madrid 59a; (e) Late Postclassic Maya portrayal of Tlahuizcalpantecuhtli, note spots on face, skeletal jaw, and probable spearthrowers emerging from earspools, detail of Mayapan censer (after Thompson 1957:Fig. 2c). Drawings: Karl Taube.

fleshless mandible (Figure 24e). A pair of hooked elements project from his earspools, once again alluding to the curving tips of spearthrowers. In addition, the break at the central brow area is quite circular, suggesting that an element may have projected from the head. Although now missing, it is conceivable that this is the hooked brow piece found with the Grolier deity and the examples appearing on Madrid 59.

The Grolier 7 Venus god faces a tree with a prominent god face on the trunk, a motif similar to that found on Madrid 65b, which depicts the same being sprouting foliage from his brow (Figure 25a). Although often referred to as God C for the codices, during the Classic period this being was a distinct deity denoting brilliance, reflective surfaces, and immanent spirit; accordingly, David Stuart called him the "Shiner" (Leonard and Taube 2007; Stuart 2010). Among the items that he appears on is polished jade, including belt celts. In Classic Maya iconography, he can substitute as a form of the so-called "*lem*" sign first identified by Schele and Miller (1983) for mirrors and other polished surfaces in Classic Maya epigraphy and art, a motif that also appears on the shaft of the shooting dart on Grolier 10.

With his beard, the "Shiner" deity on the trunk of Grolier 7 resembles a frontal representation of the same being on a gilded copper disk



a b

Figure 25. The "Shiner" in Postclassic Maya art: (a) bearded head with "Shiner"/God C attributes sprouting foliage, Madrid 65b; (b) bearded face of "Shiner" with probable *k'in* solar sign in headdress, gilded copper plate from the Sacred Cenote, Chichen Itza. Drawings: Karl Taube.

discovered in the Sacred Cenote at Chichen Itza, an item that obviously embodies qualities of resplendent brilliance (Figure 25b). In addition, the cenote deity bears a solar *k'in* sign atop his head and pendant solar rays as earpieces. The Grolier tree yields fruit or flowers; in view of their form as concentric circles, they may be jade earspools, such as commonly appear in Classic Maya iconography. In addition, the concept of a "jade tree" exists in both Classic and Postclassic Maya imagery (Taube 2005; Stuart 2006a:136-137; Stuart and Stuart 2008:176, 255 n.10). For example, the sarcophagus lid of K'inich Janahb Pakal of Palenque features a tree with the prominent head of the "Shiner" on the trunk and a jade necklace hanging from the branches. The plant on Grolier page 7 probably denotes a later version of this shining tree of jade, wealth, and abundance.

Grolier 8

Like Grolier 5, Grolier 8 features a temple speared by the atlatl's dart, its doorway curtain also tied back by a swag. Spiky crenellations stud the top of the temple, possibly alluding to the knife-blade *almenas* seen on the roofs of temples in the Borgia Group (e.g., Codex Borgia 50).

Grolier 8's principal figure is a bird deity who holds both atlatl and spear; his legs end in feet articulated by sharp bird talons, probably those of an eagle, as noted previously by Coe (1973:154). A similar example appears on a Toltec-style shell pectoral, although in this case they are eagle-skin leggings, with sandaled human feet below the eagle talons (Figure 26a). Nonetheless, the talons are similar to those of the Grolier deity, with two large talons appearing in profile and another behind the heel. On the Toltec shell, the human figure is backed by

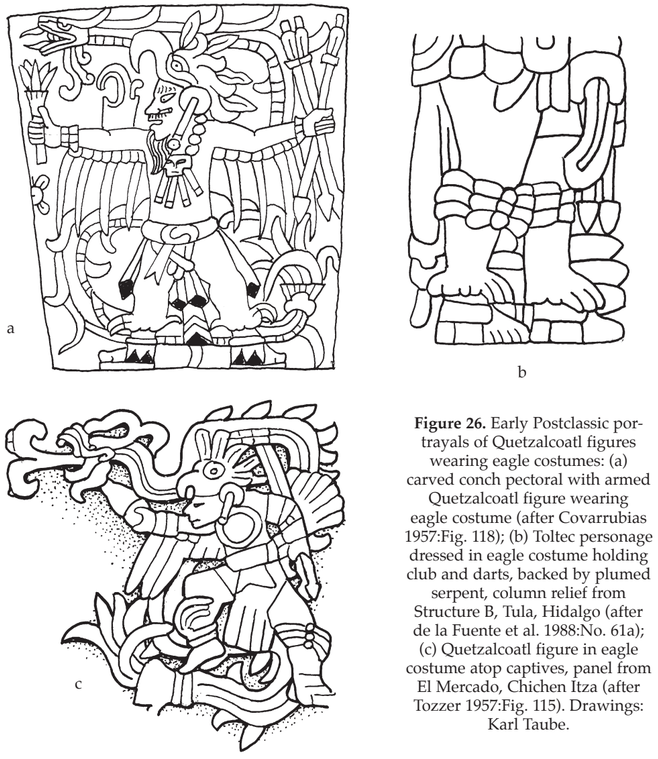


Figure 26. Early Postclassic portrayals of Quetzalcoatl figures wearing eagle costumes: (a) carved conch pectoral with armed Quetzalcoatl figure wearing eagle costume (after Covarrubias 1957:Fig. 118); (b) Toltec personage dressed in eagle costume holding club and darts, backed by plumed serpent, column relief from Structure B, Tula, Hidalgo (after de la Fuente et al. 1988:No. 61a); (c) Quetzalcoatl figure in eagle costume atop captives, panel from El Mercado, Chichen Itza (after Tozzer 1957:Fig. 115). Drawings: Karl Taube.

a massive undulating plumed serpent, much like the archaizing vase excavated at the Templo Mayor (Figure 20a), the Aztec relief from Cerro Malinche at Tula, and the central Quetzalcoatl figure from the Lower Temple of the Jaguars relief at Chichen Itza. However, Column 1 at Tula makes an especially close comparison, as it portrays a warrior figure with similar eagle leggings backed by a plumed serpent with a rattlesnake tail curving behind his legs (Figure 26b). An elaborate relief from the Mercado structure at Chichen Itza depicts a victorious eagle warrior atop two prisoners again backed by a plumed serpent (Figure 26c). The identification of the eagle warrior with the feathered serpent also appears in a mural in Structure A at Cacaxtla (Brittenham 2015:Fig. 278). In this case, a Maya-style warrior in eagle costume dances on the back of a plumed serpent, or Quetzalcoatl, in this instance with more anatomically correct talons: three in profile and one in back.

Despite shared characteristics with other eagle warriors, the Grolier 8 figure differs in one major way: the curious segmented elements covering the shins and thighs. Although it is conceivable

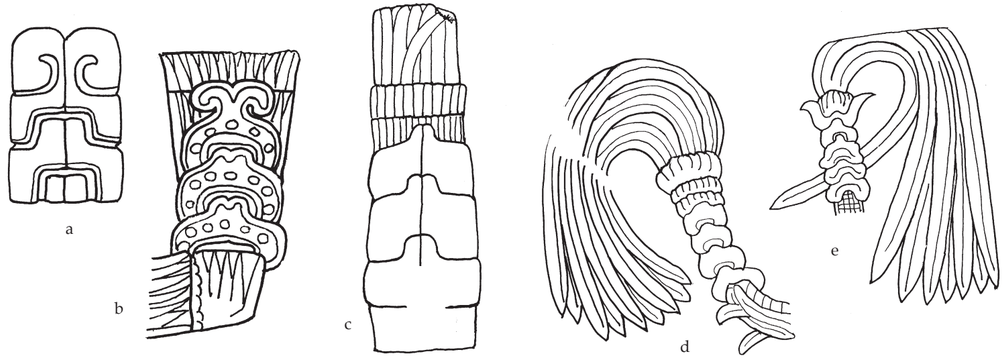


Figure 27. Rattlesnake tails in Classic and Early Postclassic Mesoamerican art: (a) Early Classic, Teotihuacan-style rattlesnake balustrade sculpture (after Solís 2009:No. 155c); (b) plumed serpent tail, detail of mural from Techinantitla, Teotihuacan (after Berrin 1988:Fig. VI.2); (c) Postclassic plumed serpent tail from column or ballustrade, Chichen Itza (after Maudslay 1889-1902:3:Pl. 63b); (d) plumed serpent tail, Lower Temple of the Jaguars, Chichen Itza (after Maudslay 1889-1902:3:Pl. 49); (e) plumed serpent tail, lintel from El Castillo, Chichen Itza (after Maudslay 1889-1902:3:Pl. 35a). Drawings: Karl Taube.

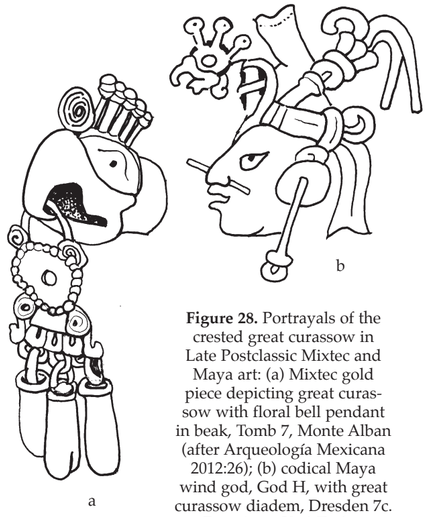


Figure 28. Portrayals of the crested great curassow in Late Postclassic Mixtec and Maya art: (a) Mixtec gold piece depicting great curassow with floral bell pendant in beak, Tomb 7, Monte Alban (after Arqueología Mexicana 2012:26); (b) codical Maya wind god, God H, with great curassow diadem, Dresden 7c. Drawings: Karl Taube.

that they portray plumage, they also resemble the interlocking segments of rattlesnake tails, including examples from Teotihuacan, Tula, and Chichen Itza (Figure 27). In addition to the possible rattlesnake-tail motif, the Grolier deity wears what appears to be a plumed serpent headdress with the upturned flexible snout and curving fangs commonly appearing with Maya portrayals of snakes. The headdress has a feathered crest typical of feathered serpents in Classic and Postclassic Maya art, where there are few depictions of feathered rattlesnakes (Taube 2010:Figs. 24, 25). Although Maya-style plumed serpents typically display a cranial quetzal crest, this is not the case for the Grolier example, which has bulbous elements resembling projecting eyeballs backed by a series of long and pendant plumes. In Postclassic highland Mexico, this is a common convention for portraying the great curassow (*Crax rubra*) native to the Maya lowlands (Figure 28a). On Dresden 7c, God H—the codical form of the wind god—wears a bird diadem with a similar crest, quite possibly also alluding to the great curassow (Figure 28b). Although with different imagery, the Grolier figure appears to combine aspects of bird and serpent, much like examples from Chichen Itza, Tula, and earlier Cacaxtla.

The Grolier deity wears a tapered hide kilt similar to the protective deerskin worn by Classic Maya ballplayers and by musicians in the Bonampak murals. His thick belt with crossed bands is also worn by players of the ball game. These belts, however, are also worn by wind gods in the Bonampak murals, as well as the aged merchant god of the Cacaxtla paintings; no other features of Grolier 8 suggest play of the game. In addition, the Grolier 8 deity wears a *tezcatcuitlapilli*, a device not associated with ballplayers.

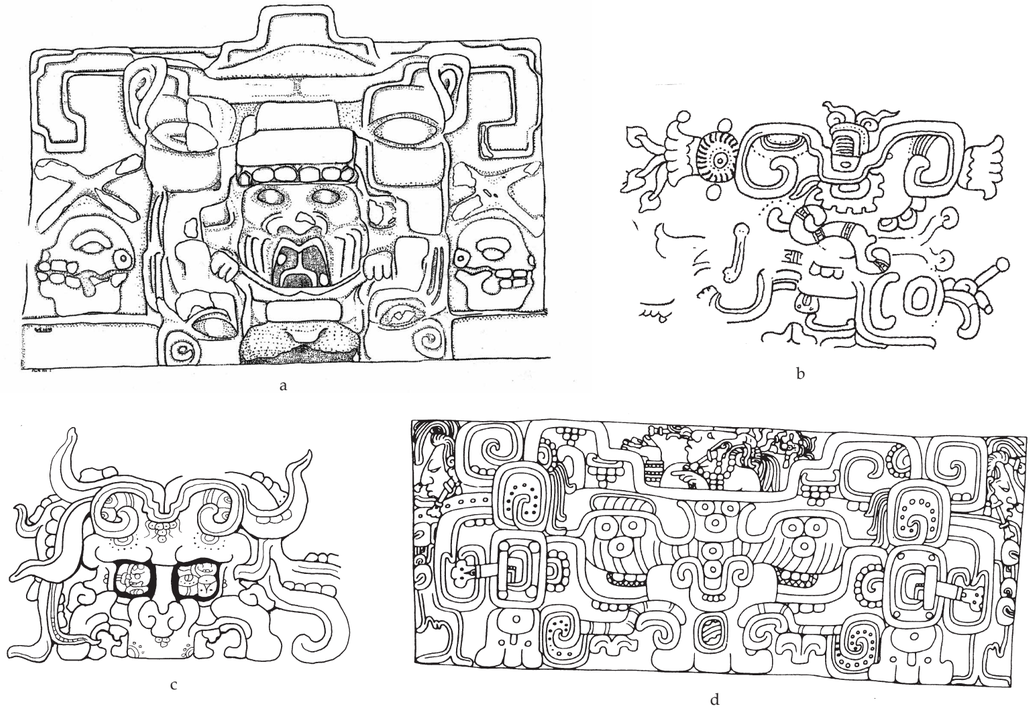


Figure 29. Stepped mountain imagery in Maya art: (a) *witz* mask facade with central and outcurving stepped cranium, Holmul (drawing by Nina Neivens Estrada courtesy of Francisco Estrada-Belli, from Estrada-Belli 2011:Fig. 5.11); (b) profile *witz* mountain with central stepped cranial cleft, detail of Early Classic vase from Kaminaljuyu, Guatemala (drawing by Karl Taube, from Taube 2004b:10d); (c) *witz* head with maize sprouting from central cleft, detail of Tablet of the Temple of the Foliated Cross, Palenque (drawing by Karl Taube); (d) Late Classic *witz* mask with stepped cranial cleft and outcurving brow elements, Bonampak Stela 1 (detail of drawing by Peter Mathews, from Mathews 1980:Fig. 3).

Grolier 9

The distinctive god of Grolier 9 displays a prominently cleft head that flares outward on both sides. Stepped architectural crenellations, or *almenas*, ornament the two sides of the outward-flaring cranium. Furthermore, both the god's brow and one side of the interior cleft display similarly stepped outlines; the cleft appears to contain maize grains. Coe (1973:154) had suggested that this might be a maize god, but also noted that he is entirely distinct from known maize deities from either Central Mexico or the Maya area. Nonetheless a small painted Tancah mural subsequently published by Arthur Miller (1982:Pl. 11) portrays a deity with a similarly cleft head, in this case containing the *k'an* maize glyph rather than maize grain (Figure 14a). A semblant being has been documented in graffiti at Pasión del Cristo, in the Río Bec region, as a figure seated near God D (Figure 14b; Mayer 1997:Fig. 2). Discovered in 1996, long after the first appearance of the Grolier, it shows the same split head and what may even be *tuun* or "stone" markings on one of its head-tangs. In view of the additional Tancah example, Carlson (2014:5) has identified the

Grolier deity as follows:

> This impersonator of the Maize God E has a stepped, bifurcated split-open head with kernels of corn with stepped "cloud terraces" appended on both sides. (Carlson 2014:15)

Although both figures may well portray the same being, it is by no means certain that they constitute aspects of the Maize God. The Grolier deity has an old, craggy face, in sharp contrast to Classic and Postclassic depictions of the maize deity, where he is almost invariably in the prime of youth. Rather than being the embodiment of the youthful Maize God, the Grolier deity and quite possibly the Tancah and Pasión del Cristo examples as well may portray a personified mountain fertile with maize. For example, in the Late Postclassic Dresden Codex, mountains (*witz*, in Mayan inscriptions) are portrayed as the profile heads of old men marked with *kawak* elements denoting stone (Taube 2010:Fig. 28b). As further noted by Taube (2010:178, Fig. 20a), the corners of Tulum Structure 16 feature massive versions of this being, with huge ears that extend along the entire length of the face, and although the significance of the ears remains obscure, this is also the case with the Grolier 9 deity. The aged Maya deity commonly known as God N can also appear as a personified mountain in Late Classic Maya iconography, recalling the four mountain year-bearers, or Mam, known for modern highland Guatemala (Taube 2013:93, Fig. 5.2). The columns from the Northeast Colonnade at Chichen Itza portray four God N figures as world sustainers emerging out of cleft mountains (Figure 31b).

Although there are Classic and Postclassic Maya depictions of old men as mountain gods, they lack the most striking element of the Grolier deity, the sharply out-turning cranial cleft. This, however, is a common feature of the conventional Classic-period form of mountains, a zoomorphic head with a long snout, commonly referred to as the "Witz Monster," and found at the corners of Classic Maya structures, including Temple 22 at Copan. In many cases, the head displays a central cleft with the sides flaring outward in two downward curls, much like the Grolier deity. In addition, the cleft is frequently stepped, like one side of the cranial cleft in the Grolier scene (Figure 29b–d). Of course actual mountains do not exhibit such regulated forms, and, like the *almenas* and stepped brow of the Grolier deity, the stepped cleft within suggests a constructed, architectonic feature.

Aside from zoomorphic *witz* heads in Classic Maya art, epigraphic *witz* signs in Classic Maya texts can also have an upper, stepped central cleft with symmetrically outcurling sides, including an Early Classic example appearing on Tonina Monument 150 (Figure 30a). In addition, an Early Classic textual reference to the Ucanal emblem glyph features a *witz* glyph with an asymmetrical cleft, one side being stepped and the other not (Figure 30b). In the case of the Grolier mountain god, he bears a nearly identical cleft, but with the stepped half on the opposite side. That said, it is quite clear that these are essentially identical cleft motifs and that the Grolier being is indeed a mountain god.

The ancient Maya understood pyramids to be symbolic mountains.

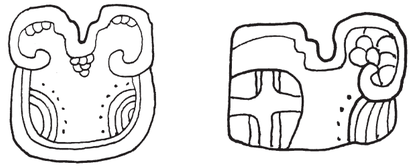


Figure 30. *Witz* signs portraying central mountain clefts with outcurving elements in Classic Maya epigraphy: (a) *witz* glyph with stepped cleft, note symmetrical curls at sides, Tonina Monument 150 (after Graham et al. 2006:84); (b) mountain glyph with asymmetrical cleft, detail of incised Early Classic vessel (after Stuart 1987a:Fig. 31a).

In turn, mountains were likely viewed as great pyramids, a "reciprocal metaphor" that Houston (1988:348-352) has discussed. Of great antiquity in the Maya area, the concept of the architectonic mountain begins as early as 400 BC at Holmul, where a pair of stucco masks feature a zoomorphic creature with a smaller figure emerging from its maw (Figure 29a). As Francisco Estrada-Belli (2011:92) notes, the two facades portray *witz* masks, possibly the earliest known in Maya monumental architecture. These masks are made to represent architecture itself, with a stepped *almena* projecting from the top of the head and two similar forms appearing in silhouette at the sides. Despite having been made almost 2,000 years before the Grolier Codex, these flanking elements are similar to the pair of *almenas* appearing with the Grolier mountain god.

In Epiclassic and Early Postclassic Maya art, *witz* heads can have a V-shaped cleft with symmetrical out-curving elements quite like the Grolier and Tancah deities (Figure 31a–c). The Codex Laud portrays a cleft mountain with two outcurving elements, probably peaks as well (Figure 31e). Two bearded male heads appear below; given that beards are widely identified with aged men in ancient Mesoamerican art, these two heads probably portray mountains as old men in the Dresden and Structure 16 at Tulum (Taube 2010:Fig. 28).

The Late Postclassic Mixtec Nochistlan Vase from highland Oaxaca portrays a cleft mountain with a similar outline composed of two curving peaks: there, a world tree grows from the center of the mountain cleft (Figure 31d). The tips of two limbs appear to terminate in ears of corn flanked by their husks, making this a maize world tree, analogous to Classic Maya depictions of a

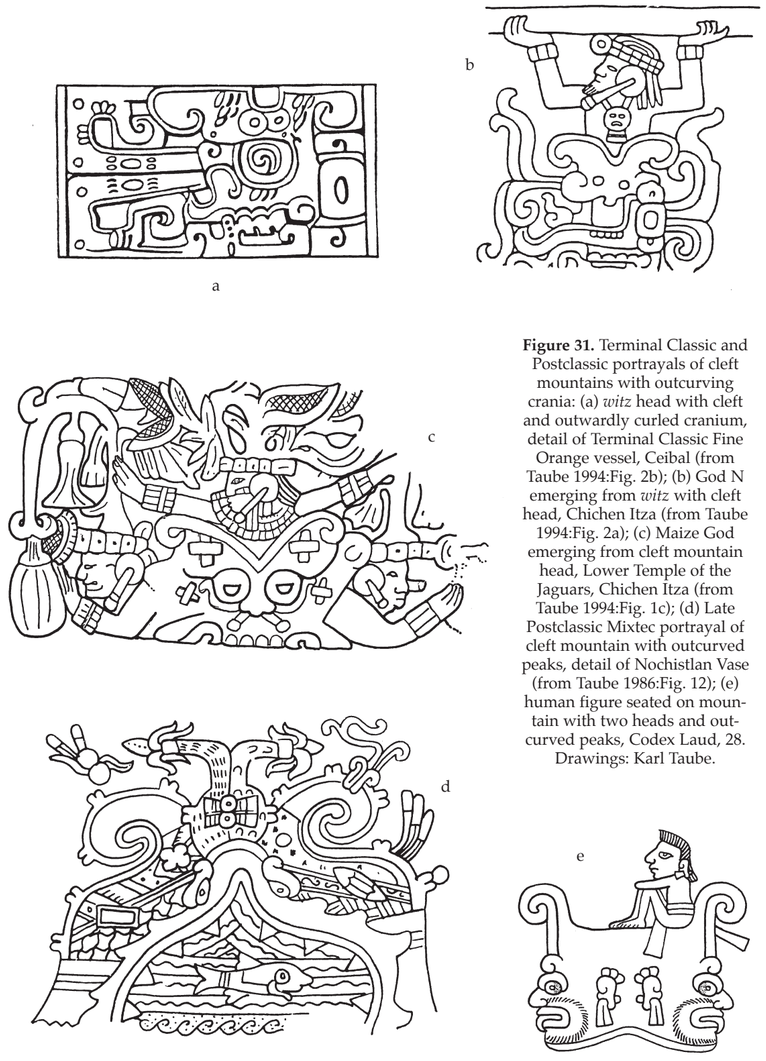


Figure 31. Terminal Classic and Postclassic portrayals of cleft mountains with outcurving crania: (a) *witz* head with cleft and outwardly curled cranium, detail of Terminal Classic Fine Orange vessel, Ceibal (from Taube 1994:Fig. 2b); (b) God N emerging from *witz* with cleft head, Chichen Itza (from Taube 1994:Fig. 2a); (c) Maize God emerging from cleft mountain head, Lower Temple of the Jaguars, Chichen Itza (from Taube 1994:Fig. 1c); (d) Late Postclassic Mixtec portrayal of cleft mountain with outcurved peaks, detail of Nochistlan Vase (from Taube 1986:Fig. 12); (e) human figure seated on mountain with two heads and outcurved peaks, Codex Laud, 28. Drawings: Karl Taube.

contortionist maize god as a world tree (cf. K6547) or the maize tree appearing on the Tablet of the Temple of Foliated Cross at Palenque. The same monument portrays a zoomorphic *witz* head sprouting maize from its cleft head, again with the downward-curling elements at the sides (Figure 29c). Bonampak Stela 1 depicts the Maize God in this stepped element (Figure 29d). This is also the case for column reliefs from the Lower Temple of the Jaguars at Chichen Itza, where the Maize God emerges from the cleft (Figure 31c). From these many examples we can see that the seed within the cranial cleft denotes the Grolier 9 deity as a fertile mountain and the source of maize, much like Paxil of the Popol Vuh, the cleft mountain whence maize first came (Tedlock 1985:145-146, 288, 357). In short, Grolier 9 depicts the aged mountain deity from whom maize grows rather than the Maize God.

The Grolier 9 mountain deity wields a rounded object in his upraised left hand. Although it resembles the disks growing on the precious tree of Grolier 7, it is more irregular in outline. Carlson (1983:9, 2015:5) observes that the object is probably a stone, which would be a weapon par excellence of a mountain god. In ancient Mesoamerica, stones were identified with punishment, with public stoning used to execute adulterers. In Nahuatl, the *disfrasismo* phrase *in tetl in cuahuitl* means "stone and wood" as a phrase for castigation. In Late Postclassic Central Mexico, the deity Itzlacoliuhque-Ixquimilli, or "curved obsidian blindfolded one," served as the god of castigation, who is usually rendered with his head in the form of a curving stone blade, recalling the pair of curving stony elements on the head of the Grolier 9 god (Taube 1992b:110-112).

Along with a thick belt, the Grolier deity wears a circular pectoral containing two round elements, and, like the pectoral on page 2, these indicate holes for suspension, possibly for a gilded copper disk of the sort dredged from the Sacred Cenote at Chichen Itza (Lothrop 1952:Fig. 9a). The mountain deity also wears a pair of bracelets that do not match. Thus whereas the right wrist bears three thick bands mapped out in the underpainting (Figure 9a), the left is depicted with four thinner ones with no lines to demark their sides: it was not sketched ahead of time. The anklets are composed of four vertical elements that recall the long jade beads worn on the wrists and ankles of Classic Maya figures. This is the only example of such anklets in Grolier.

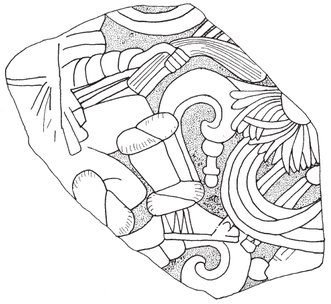
Bound by two ropes, the tightly trussed captive is being lifted by the mountain god, a tucked foot floating diagonally well above the ground line. He wears a thick earspool, possibly of wood, and a beaded necklace with a pectoral resembling the day name K'an, as written in the glyph column on Grolier 1 and 3. However, without a circular cartouche, the outline of the pendant is more irregular, with the upper portion appearing as a separate element that resembles the *ik'* wind sign. Although the face of the captive appears to be entirely human, he has an aquatic bird—perhaps a heron or cormorant—atop his head. Rather than being a headdress element, this appears to be a complete, live bird, with its feet visible before the captive's brow. The closest parallel in the Maya codices is Dresden 36b, which portrays a deity with an aquatic bird grasping a fish in its long beak. However, in this case the bird grows directly out of the god's cranium, recalling Classic-period portrayals of GI of the Palenque Triad (e.g., Kerr 1989:69 [K1391]). Whether or not the Dresden and Grolier examples are a Postclassic version of the poorly known, Classic-period GI remains obscure.

Grolier 10

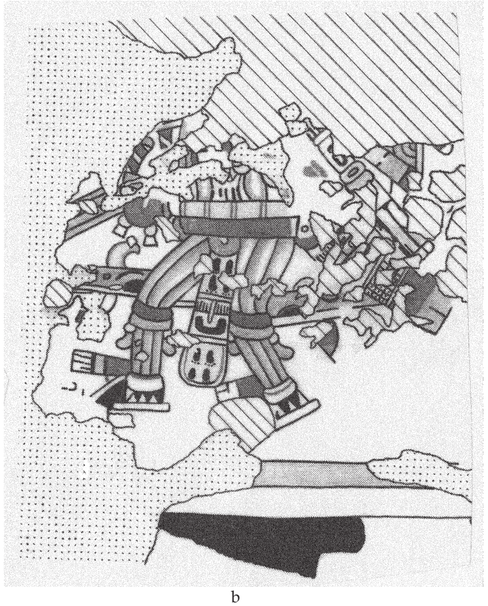
Although much of the deity's head on Grolier 10 is missing, a bony mandible is plainly visible, identifying this figure as a death god, the third such deity of the Grolier sequence. Additionally, what is probably an eyeball protrudes from the crest of hair just above the earspool, a common feature on the hair crest of death and Venus gods, as can also be seen on Codex Nuttall 78, where a dart-wielding skeletal being has hair marked with alternating flints and protruding eyes along with a prominent star sign in his abdomen. Like the Grolier 5 sun god, the Grolier 10 deity raises an atlatl in his right hand while he grasps darts with his left arm, which also bears a round shield. In this case, the shield is marked with a profile rendering of a death deity, probably a version of the same presiding death god. The deity has the same skeletal legs as has the Grolier 6 god, with the same wavy lines connected to dots to indicate the marrow channel. He also wears "stacked bow tie" gaiters, here with the hanging elements found with the gods appearing on Grolier 4 and 7. A bird apparently formed the headdress, of which little else can be said, given how much of Grolier 10 is lost. Nevertheless, his lower body is well-preserved, in distinction to most pages of Grolier, revealing his sandals, which are marked with triangular black elements at the heel. In Late Postclassic Central Mexico, this type of sandal is often worn by deities, including Tezcatlipoca in the Codex Borgia and the Coyolxauhqui monument from the Templo Mayor, and is commonly referred to as *itzcactli* meaning "obsidian sandal" (Nicholson 1985:79). Beyond Central Mexico, a Late Postclassic Maya mural from San Ángel, Quintana Roo, portrays a figure wearing *itzcactli* sandals (Figure 32b). That these sandals emerge in Early Postclassic iconography—that is, roughly contemporaneous with Grolier—is confirmed by their presence on the Toltec-style shell pectoral of Quetzalcoatl, along with a figure from a monumental relief from the Upper Temple of the Jaguars at Chichen Itza (Figure 32a).

The Venus god of Grolier 10 has unleashed a dart marked by the sign for shininess, shooting it into the enclosed blue water containing a stylized gastropod. Nearly identical mollusks can be seen within bodies of water in both Mixtec and Central Mexican codices (Codex Nuttall 16, 34, 75, 80; Codex Vienna 9, 47; Codex Borgia 12, 53). In this regard, this scene is similar to the scenes of spearing of Chalchiuhtlicue, the goddess of terrestrial water, in the Borgia and Cospi Venus pages, where she is also in a pool of water, indicating drought. Although lacking the pool of water, the spearing of Chalchiuhtlicue in the Vaticanus B is cognate, as is probably the spearing of a turtle by a Venus God on Dresden 49c. Indeed, Coe (1973:154) comments that this scene is quite like the Borgia passage with Chalchiutlicue, which also features a bleeding turtle in the water. Of all the victims in the Grolier, page 10 most closely corresponds to the victims appearing in the Prehispanic Dresden, Borgia, Cospi, and Vaticanus B Venus pages.

Throughout the Grolier Codex, the artist has cut corners or assumed knowledge on the part of the user—and perhaps the artist was even that intended user. The artist may even have been under time pressure to complete the manuscript, especially given that the reverse was prepared but blank. On almost every page of the manuscript, we see where details were left incomplete. With respect to the gods in particular, the artist may have omitted details because the maker knew that it would be intelligible to



a



b

Figure 32. Postclassic portrayals of *itzcactli* sandals in the northern Maya lowlands: (a) Early Postclassic figure wearing *itzcactli* sandals, detail of carved panel from the Upper Temple of the Jaguars, Chichen Itza (after rubbing by Merle Greene Robertson); (b) Late Postclassic mural portraying figure with *itzcactli* sandals, San Ángel, Quintana Roo (from Gallareta and Taube 2005:Fig. 6.8).

the user. For example, the skeletal being on Grolier 8 has a zone for hair that typically would have vertical lines, much like a "Mohawk" haircut seen on the death god on Grolier 2. But on Grolier 8, they are absent. Similarly, the captive on Grolier 6 has a long shank of hair that would logically have had thin lines drawn within it. Although the brow element is missing from K'awiil on Grolier 1, the K'awiil of Grolier 4 has this detail intact. The painter knew where his reader's own knowledge could fill in the details.

Could the Painter of Grolier Have Lived in the 20th Century?

This is the question that has underpinned much of this exercise. Was there an errant scholar of ancient Mesoamerica who thought he or she could pass a manuscript off on colleagues and dealers, deceiving specialists in archaeoastronomy alongside museum curators?

Our answer is, from all the evidence of recondite, indigenous knowledge in the Grolier, a conclusive "no." But to sustain the argument, let us review the specialized knowledge that such forgers would have had, and would have to have had before 1964.

Most known falsifications are painted on deer vellum, and the forger—or forgers—armed with this knowledge, would have needed to acquire thirteenth-century *amate* from an unknown source, and presumably guessing—since they would not have the means to have it carbon-dated—that it was Prehispanic in origin. Since there is as yet neither documentation of an individual nor a group of forgers collecting the necessary material to prepare this manuscript in the mid-twentieth century, it is perhaps better to refer to this alleged effort in the plural. Clearly, no single individual would have been able to perform this monumental task. Thus, "they" would have had to know how to soften and prepare the ancient bark paper, using a template, to yield the nearly perfect folds. The measurements of the Madrid or Paris Codex would also have been necessary, available at that time only in relatively obscure publications, in order to conform to their dimensions. Long before scientific study would determine that gesso—rather than the calcium carbonate plaster used in the Dresden, Madrid, and Paris codices—was deployed as the surface of the non-Maya books of Mesoamerica, it was decided to coat these folded pages with gesso, as if keenly aware that the Early Postclassic was a time of extensive syncretism between the Maya area, central Mexico, and Oaxaca.

Before 1964, only Ann Axtell Morris (1931) had reported extensively on the way Maya artists sketched with a thin red on their prepared surfaces, and her illustration of this was printed in black-and-white (Figure 5), in a book limited to 500 copies. Forgers would have needed to observe the practice directly from the paintings of Bonampak, yet no comment was made about underpainting in early publications of those murals. Perhaps while studying Bonampak's rich blue pigments the forgers would happened upon the recipe for Maya blue, which, although reported in a U.S. scientific journal in 1962, would not be synthesized in a laboratory until Mexican conservation scientists did so in the early 1980s (Gettens 1962; Reyes Valerio 1993).

At least one forger would have had intimate knowledge of the movements of Venus and suspected that Eric Thompson was wrong in claiming that this planet was malevolent only on *heliacal* risings. Thus, they would have presciently painted such malignant deities on *all four* pages of each 584-day Venus period (Bricker and Bricker 2011). In developing their inventory of Venus deities, they included the Venus deity of Grolier 9, a being first identified and described in print by Karl Taube in 2010. This is the Mountain God with split head, bearing maize in the cleft. This team of fakers had intuited this deity by the early 1960s—at least a decade before Arthur Miller discovered a painted mural of a related image at Tancah and three decades before Karl Herbert Mayer documented another example at Pasión del Cristo. No such image was known in the 1960s.

Although presumably working in Mexico, the forgers read English and German fluently and extensively—and had access to the resources of a major university or a private library. In composing the pages, they must have had the five-volume set of Eduard Seler's *Gesammelte Abhandlung*, published between 1902 and 1923, at their fingertips. Seler's work would have enabled them to combine stylistic and iconographic elements from Late Classic Maya art, Toltec Tula, and Chichen Itza, and Mixtec and Borgia Group codices into a believable, thirteenth-century whole. Decades ahead of the 1960s, they would need to have realized that the Venus god Tlahuizcalpantecuhtli in the Codex Telleriano-Remensis was the Evening Star, and so transferred that deity's back shield with its skull to the Evening Star god of Grolier 2.

Deeply immersed in Maya writings, the forgers did not copy glyphs as they appear in the Dresden, Madrid, and Paris, the expected practice of forgers. Even more surprising is their realization of the true nature and multiple functions of so-called "Ring Numbers," in contrast to the universally accepted opinion of Thompson in the 1960s. Knowing that such expressions could operate as distance numbers, from one Venus phase to another, and that this recent creation should look like a hybrid codex, they expressed the 20-day position values as dots, with the additional unit position numbers as Maya-style bars-and-dots within the "rings."

Even with this book painted and in hand, the forgers knew that they must make the entire codex look and feel old and worn. They had presumably constructed a complete Venus-cycle codex of twenty pages, so the first task in the process was to tear off ten pages and throw them away (a heart-rending move, attached as they must have been to their project at this point). Next they tore away much of the lower third of the remaining pages, and by some means abraded the edges of the folds, yielding subtle tears, clear damage between Grolier 5 and 6, and more subtle insults along every page where the manuscript was folded. Then they inexplicably found a way to detach the larger part of Grolier 10, leaving the fragment an apparent "orphan" from the rest of the codex. Lastly, an advanced knowledge of chemistry enabled them to apply a convincing inorganic residue and an organic stain to selected pages.

Conclusions

We are confident that the scribe of the Grolier was not a mid-twentieth-century forger. He was fluent in two systems of style, facture, and glyphs, both Central Mexican and Maya, and drew on more than a passing knowledge of Mixtec conventions. He used typical Maya bark paper but finished the surface with gesso, like a Central Mexican manuscript. In the early thirteenth century, at the end of what is typically called the Early Postclassic period, the scribe was working in difficult times. Yet communication was sustained effectively between several regions and their traditions of making and writing. In large part this contact was channeled by painters and priests—indeed, by someone like the maker himself. He could not have known that commonplaces of Late Postclassic representation, particularly as in the Borgia group of codices, would find their earliest surviving form in his book. Nor could he have imagined that scribal habits inherited from an ancient tradition in the Maya lowlands would find some of their latest survivals in his book.

The comparisons to Grolier come from Maya art of all periods, as well as from Tula, Hidalgo, and with careful attention to contact-period manuscripts, both Mixtec and Central Mexican. The painter of Grolier had a deep reservoir of ancient knowledge to draw upon—much deeper than he himself surely even knew, expressing in paint aspects of weaponry with roots in the Preclassic era. He also had a knack for simplifying and capturing Toltec elements that would be deployed by later artists of Oaxaca and Central Mexico. It is within such a range that not a single detail fails to ring true. A team of forgers would presumably make at least one error. In this respect, it is not the accuracy of Grolier that convinces us, but rather the absence of iconographic mistakes, by standards of knowledge available only in the last few years.

A reasoned weighing of evidence leaves only one possible conclusion: four intact Maya codices survive from the Precolumbian period, and one of them is the Grolier. The Grolier Codex can now take its place in the history of Mesoamerica, the most ancient of all its manuscripts, and a bona fide survivor of one of the least-understood eras of Mesoamerican history.

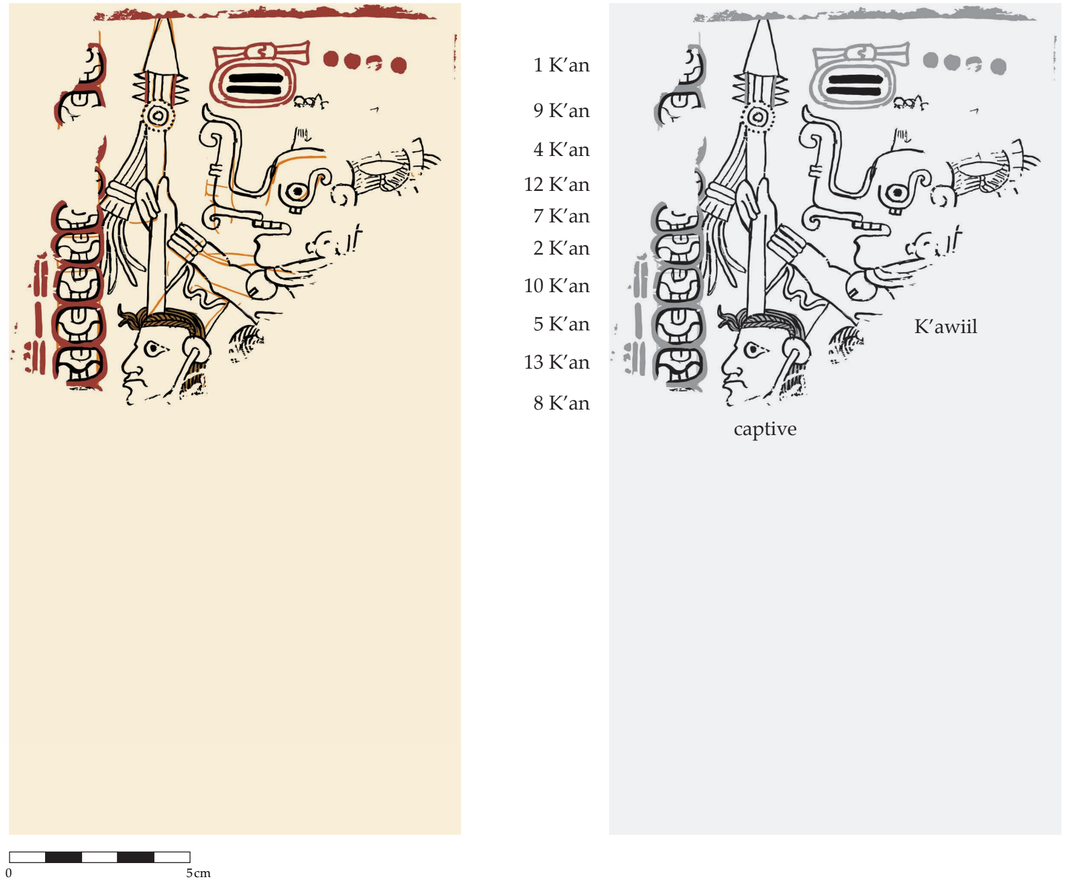


Figure 33. Grolier page 1. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

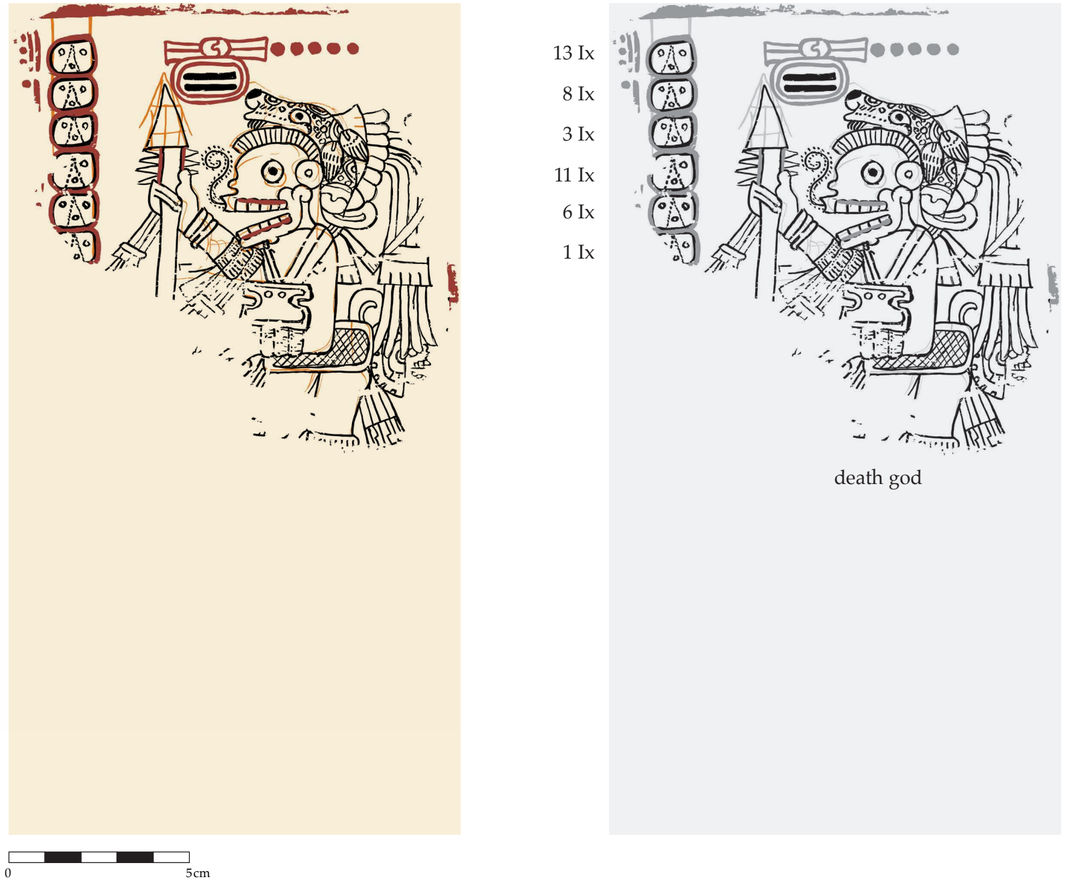


Figure 34. Grolier page 2. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

Figure 35. Grolier page 3. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

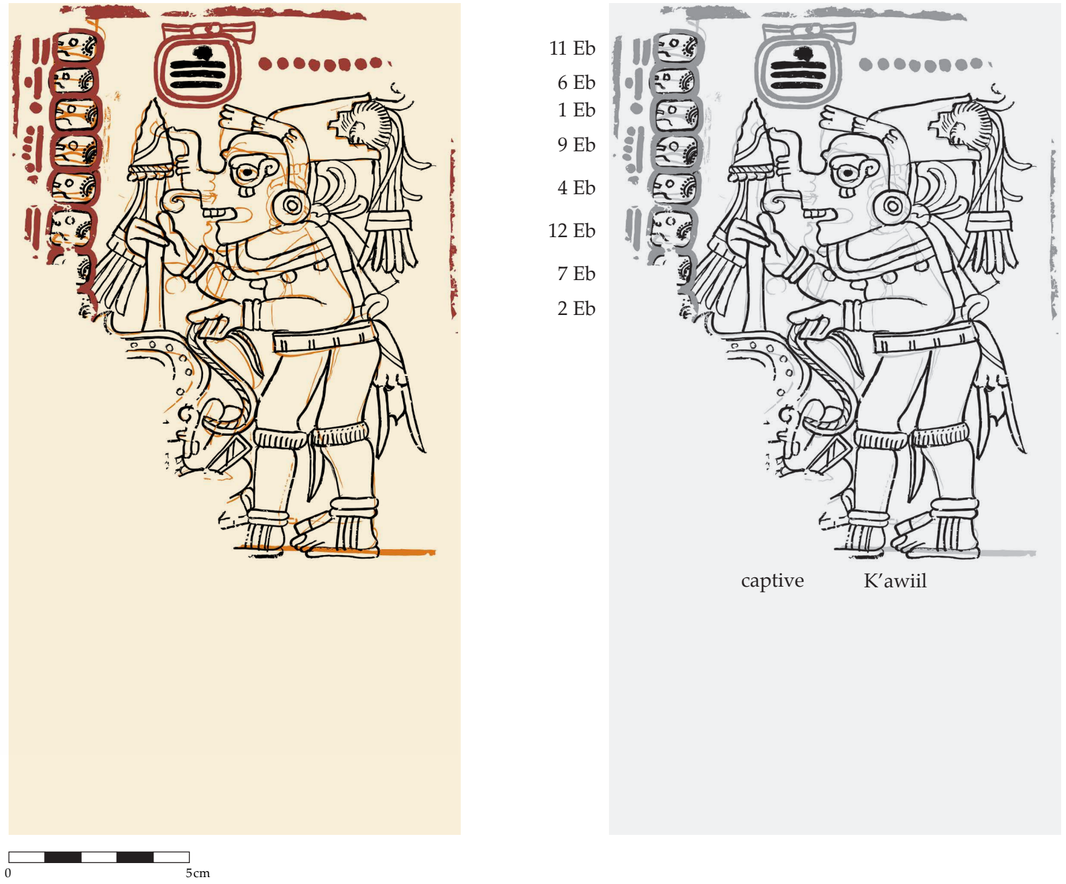


Figure 36. Grolier page 4. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

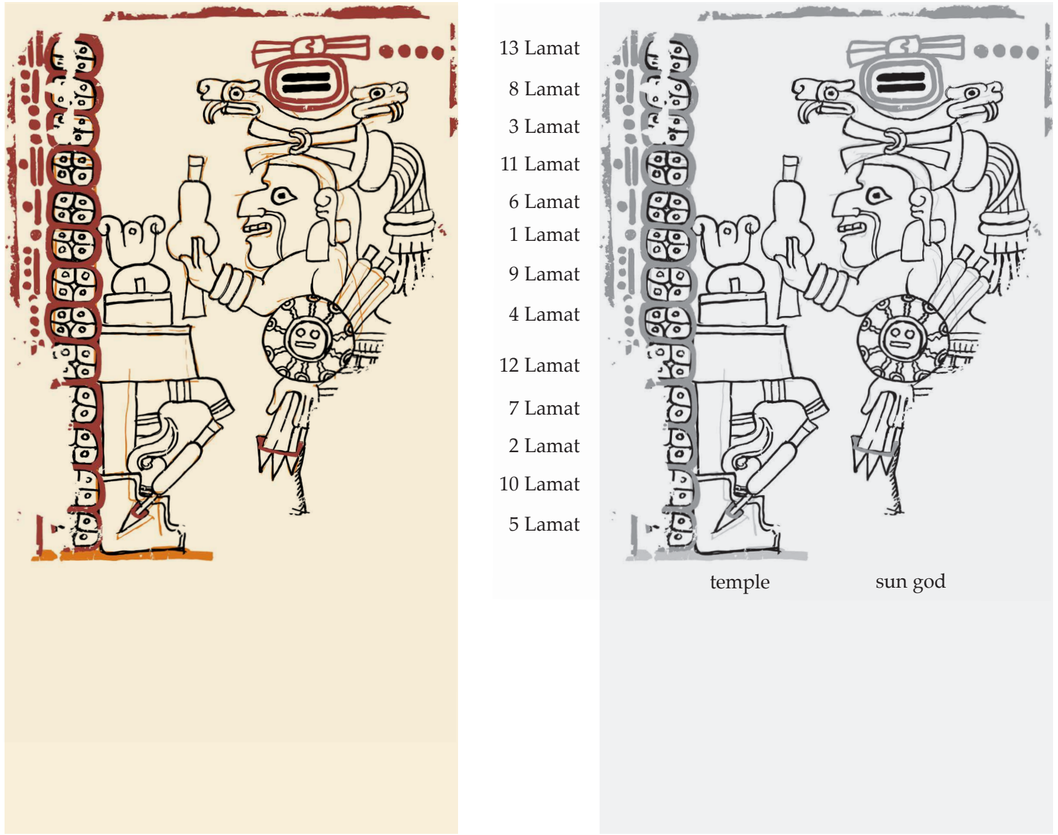


Figure 37. Grolier page 5. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

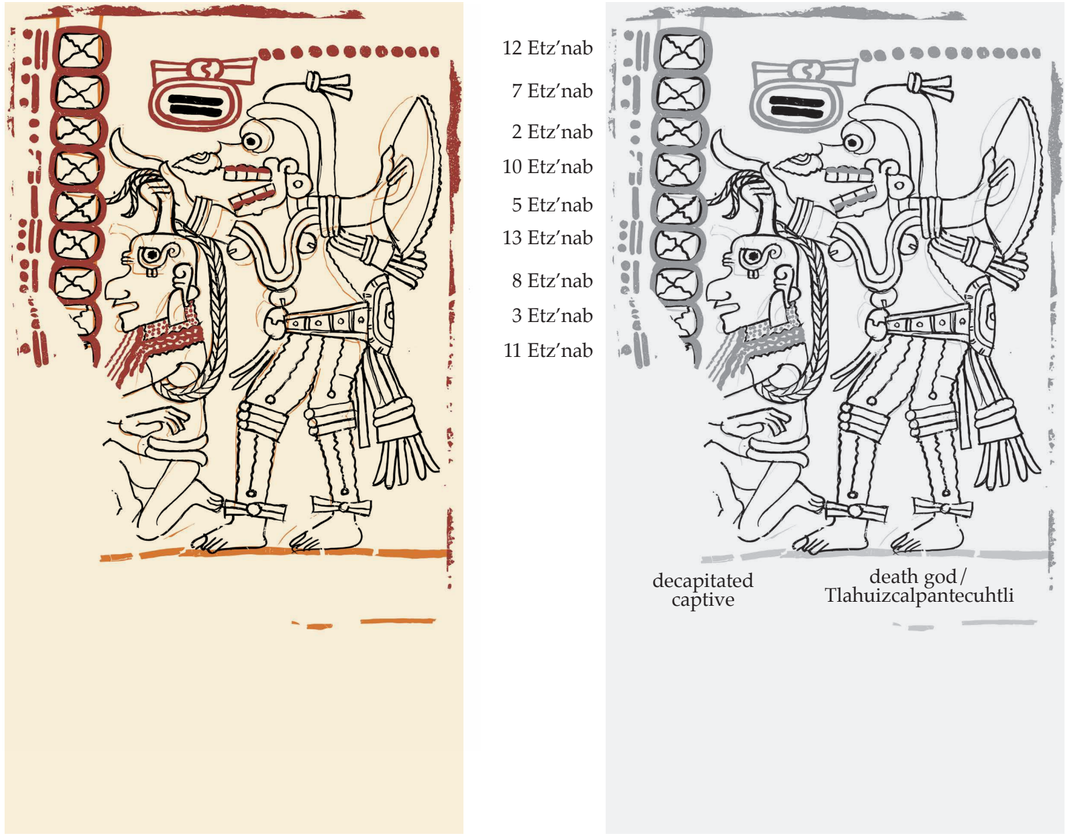


Figure 38. Grolier page 6. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

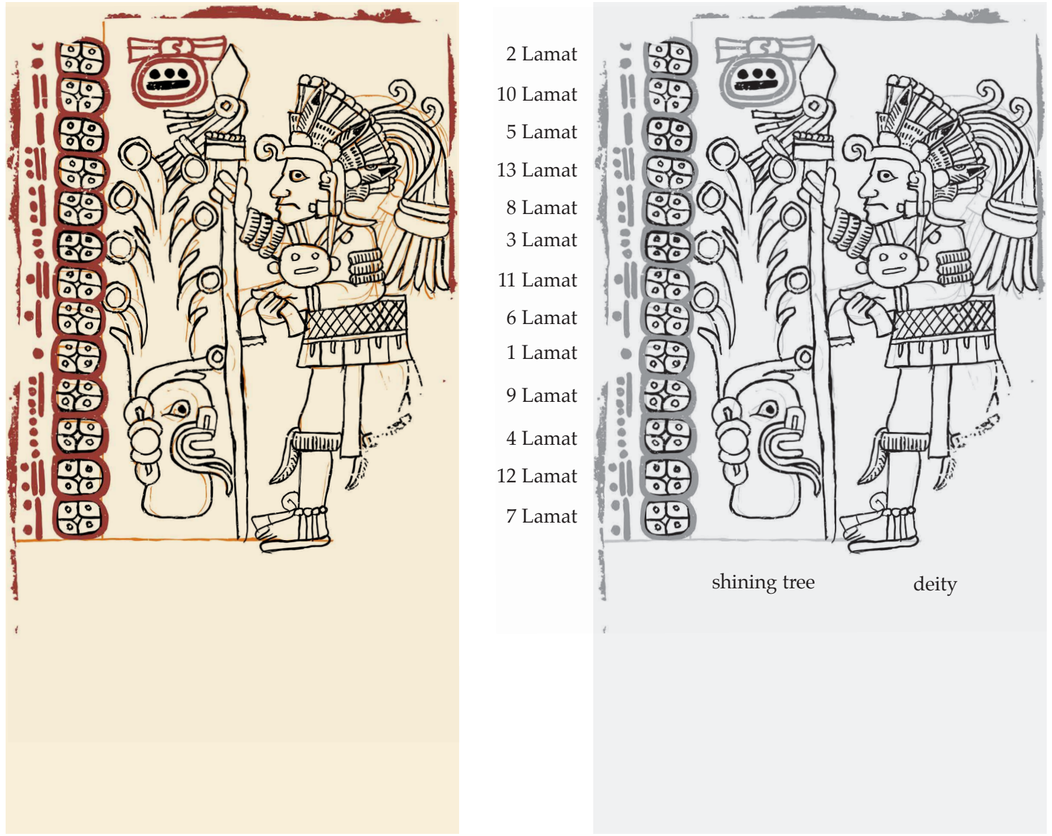


Figure 39. Grolier page 7. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

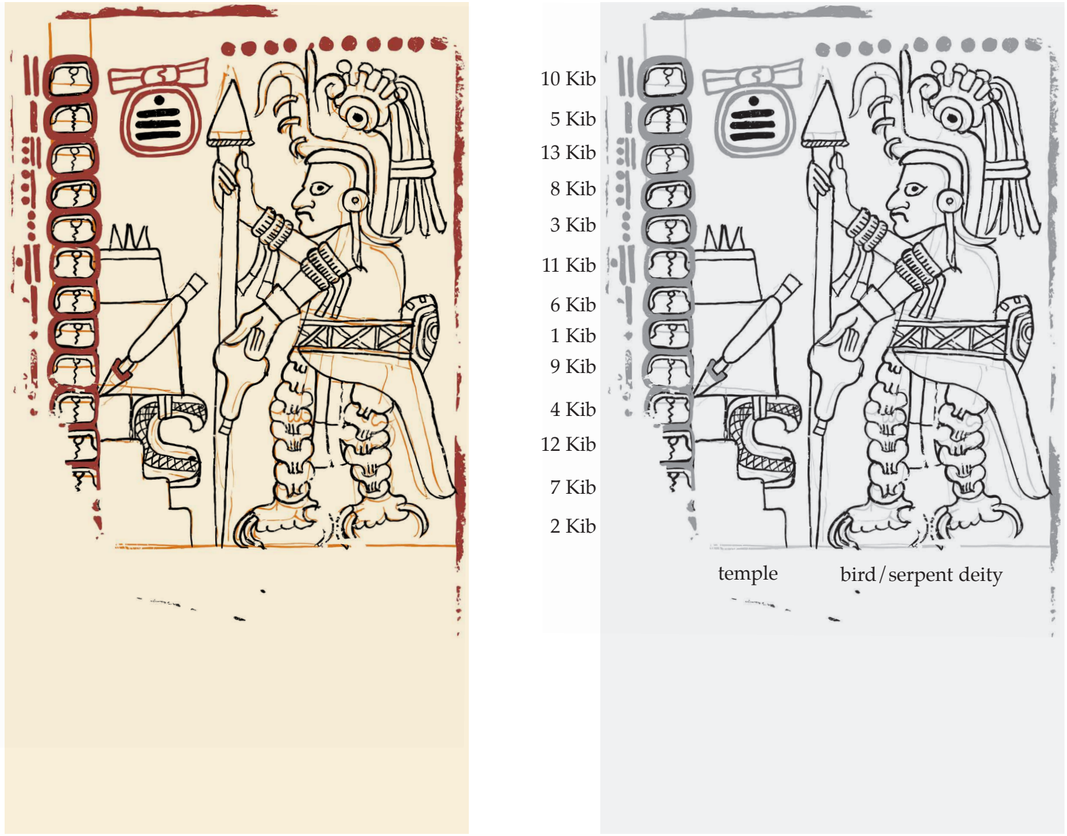


Figure 40. Grolier page 8. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

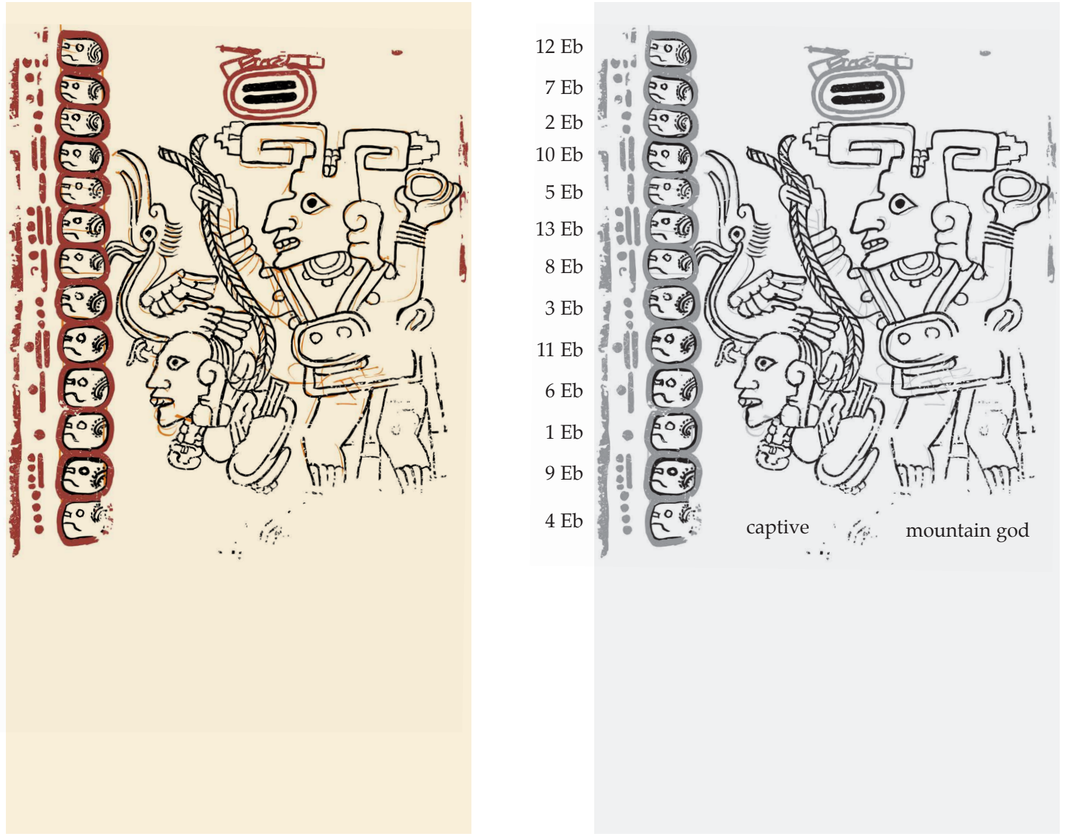


Figure 41. Grolier page 9. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

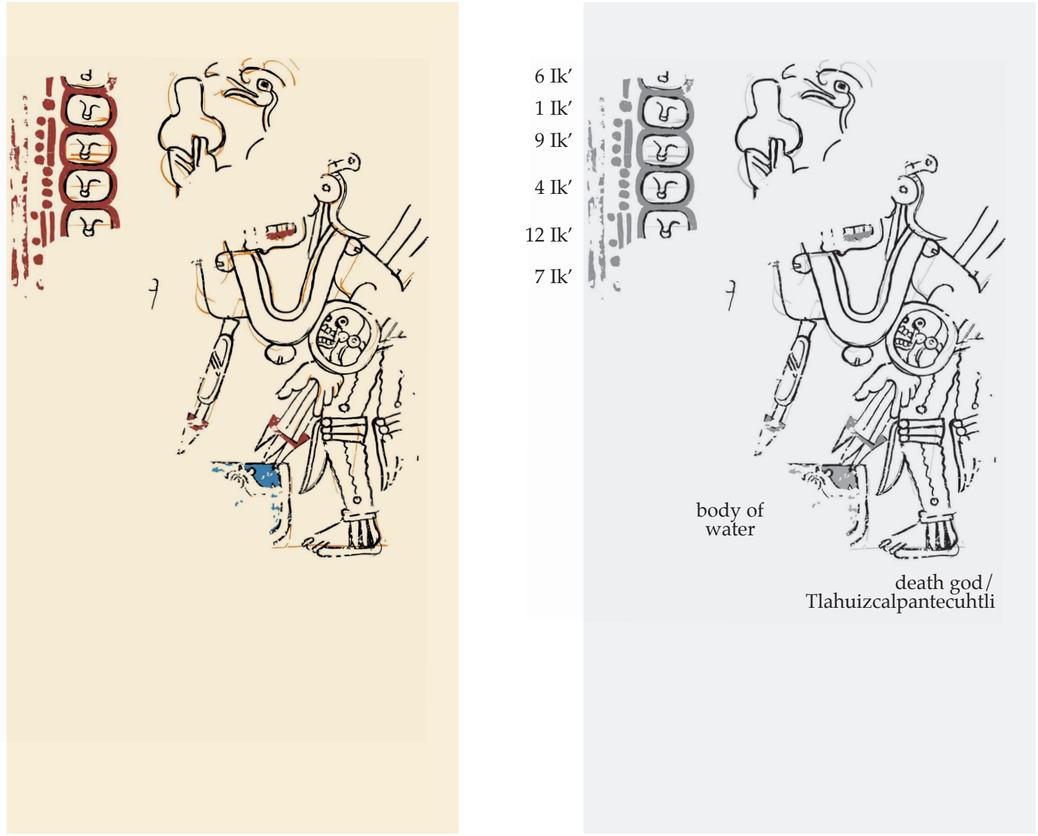


Figure 42. Grolier page 10. Color rendering in schematic form by Nicholas Carter, with overlay version annotated by Karl Taube.

Maya Archaeology

References Cited

Acuña, Mary Jane
2007 Ancient Maya Cosmological Landscapes: Early Classic Mural Paintings at Río Azul, Petén, Guatemala. M.A. thesis, University of Texas at Austin.

Adams, Abigail E., and James E. Brady
2005 Ethnographic Notes on Maya Q'eqchi' Cave Rites: Implications for Archaeological Interpretation. In *In the Maw of the Earth Monster: Mesoamerica Ritual Cave Use*, edited by James E. Brady and Keith M. Prufer, pp. 301-327. University of Texas Press, Austin.

Adams, Richard E. W.
1999 *Río Azul: An Ancient Maya City*. University of Oklahoma Press, Norman.

Adams, Richard E. W., ed.
1984 *Río Azul Project Reports, No. 1: Final 1983 Report*. Center for Archaeological Research, University of Texas, San Antonio.
1986 *Río Azul Reports, No. 2: The 1984 Season*. Center for Archaeological Research, University of Texas, San Antonio.
1987 *Río Azul Reports, No. 3: The 1985 Season*. Center for Archaeological Research, University of Texas, San Antonio.
2000 *Río Azul Reports, No. 5: The 1987 Season*. Center for Archaeological Research, University of Texas, San Antonio.

Adams, Richard E. W., and Hubert R. Robichaux
1992 Tombs of Río Azul, Guatemala. *Research and Exploration* 8(4):412-427. National Geographic Society, Washington, D.C.

Agrinier, Pierre
1964 *The Archaeological Burials at Chiapa de Corzo and Their Furniture*. Papers 16. New World Archaeological Foundation, Brigham Young University, Provo.
1975 *Mound 1A, Chiapa de Corzo, Chiapas, Mexico: A Late Preclassic Architectural Complex*. Papers 37. New World Archaeological Foundation, Brigham Young University, Provo.

Agurcia Fasquelle, Ricardo, Payson Sheets, and Karl Andreas Taube
in press *Rosalila's Eccentric Chert Cache at Copan and Eccentrics among the Classic Maya*. Monograph 2. Precolumbia Mesoweb Press, San Francisco.

Andrews, E. Wyllys, V
1986 Olmec Jades from Chacsinkin, Yucatan, and Maya Ceramics from La Venta, Tabasco. In *Research and Reflections in Archaeology and History: Essays in Honor of Doris Stone*, edited by E. Wyllys Andrews V, pp. 11-49. Publication 57. Middle American Research Institute, Tulane University, New Orleans.

Andrews, George F.
2000 La arquitectura de Río Bec: un estudio de contrastes. In *Arquitectura e ideología de los antiguos mayas. Memoria de la Segunda Mesa Redonda de Palenque*, edited by Sylvia Trejo, pp. 109-157. Instituto Nacional de Antropología e Historia; Consejo Nacional para la Cultura y las Artes, Mexico.

Arellano Hoffmann, Carmen, Peter Schmidt, and Xavier Noguez, eds.
2002 *Libros y escritura de tradición indigena. Ensayos sobre los codices prehispánicos y coloniales de México*. El Colegio Mexiquense, Zinacantepec.

Arnold, Dean E., Jason R. Branden, Patrick Ryan Williams, Gary M. Feinman, and J. P. Brown
2008 The First Direct Evidence for the Production of Maya Blue: Rediscovery of a Technology. *Antiquity* 82(315):151-164.

Arqueología Mexicana
2012 El tesoro de Monte Albán. *Arqueología Mexicana*, Special Edition 41.

Ashmore, Wendy
1991 Site-Planning Principles and Concepts of Directionality among the Ancient Maya. *Latin American Antiquity* 2(3): 199-226.

Ashmore, Wendy, and Pamela L. Geller
2005 Social Dimensions of Mortuary Space. In *Interacting with the Dead: Perspectives on Mortuary Archaeology for the New Millennium*, edited by Gordon F. M. Rakita, Jane E. Buisktra, Lane A. Beck, and Sloan R. Williams, pp. 81-92. University of Florida Press, Gainesville.

Assmann, Jan
1995 *Egyptian Solar Religion in the New Kingdom: Re, Amun and the Crisis of Polytheism*. Anthony Alcock, trans. Kegan Paul International, London.

Aveni, Anthony F.
1999 Astronomy in the Mexican Codex Borgia. *Journal for the History of Astronomy* 24, Archaeoastronomy Supplement 30:S1-S20.

Bachand, Bruce R., and Lynneth S. Lowe
2012 Chiapa De Corzo's Mound 11 Tomb and the Middle Formative Olmec. In *Arqueología reciente de Chiapas. Contribuciones del encuentro celebrado en el 60ª aniversario de la Fundación Arqueológica Nuevo Mundo*, edited by Lynneth S. Lowe and Mary E. Pye, pp. 45-68. Papers 72. New World Archaeological Foundation, Brigham Young University, Provo.

Baer, Phillip, and Mary E. Baer
1952 Materials on Lacandon Culture of the Petha (Pelha) Region. Microfilm Collection of Manuscripts on Middle American Cultural Anthropology 34. University of Chicago Library, Chicago.

Baglioni, Piero, Rodorico Giorgi, Marcia C. Arroyo, David Chelazzi, Francesca Ridi, and Diana Magaloni Kerpel
2011 On the Nature of the Pigments of the General History of the Things of New Spain: The Florentine Codex. In *Colors Between Two Worlds: The Florentine Codex of Bernardino de Sahagún*, edited by Louis A. Waldman, pp. 79-106. I Tatti, Florence.

Baines, John
2000 Egyptian Deities in Context: Multiplicity, Unity, and the Problem of Change. In *One God or Many? Concepts of Divinity in the Ancient World,* edited by Barbara N. Porter, pp. 9-78. Transactions of the Casco Bay Assyriological Institute, New York.

Balcells González, Joshua A.
2007a Following the Traces of Temple XX: Proyecto Grupo de las Cruces 2002 Excavations. In *Palenque: Recent Investigations at the Classic Maya Center*, edited by Damien B. Marken, pp. 161-173. Altamira Press, Walnut Creek.
2007b La hermenéutica de los artefactos trasladados a símbolos: la crítica al modelo de corte maya y el comportamiento socio-político burocrático del Templo XIX, en Palenque, Chiapas. M.A. thesis, Facultad de Ciencias Antropológicas, Universidad Autónoma de Yucatán, Merida.

Ball, Joseph W.
1993 Pottery, Potters, Palaces, and Polities: Some Socioeconomic and Political Implications of Late Classic Maya Ceramic Industries. In *Lowland Maya Civilization in the Eighth Century A.D.*, edited by Jeremy A. Sabloff and John S. Henderson, pp. 243-272. Dumbarton Oaks, Washington, D.C.

1994 Type:Variety Analysis and Masterworks of Classic Maya Polychrome Pottery. In *Painting the Maya Universe: Royal Ceramics of the Classic Period*, by Dorie J. Reents-Budet, pp. 362-365. Duke University Press, Durham.

Bardawil, Lawrence W.
1976 The Principal Bird Deity in Maya Art: An Iconographic Study of Form and Meaning. In *The Art, Iconography and Dynastic History of Palenque, Part III: Proceedings of the Segunda Mesa Redonda de Palenque, 1974*, edited by Merle Greene Robertson, pp. 195-210. Robert Louis Stevenson School, Pebble Beach.

Barrera Vásquez, Alfredo, Juan Ramón Bastarrachea Manzano, William Brito Sansores, Refugio Vermont Salas, David Dzul Góngora, and Domingo Dzul Pot
1980 *Diccionario maya Cordemex, maya-español, español-maya*. Ediciones Cordemex, Merida.

Bassie-Sweet, Karen
1996 *At the Edge of the World: Caves and Late Classic Maya World View*. University of Oklahoma Press, Norman.
2002 Maya Creator Gods. *Mesoweb*: www.mesoweb.com/features/bassie/CreatorGods/CreatorGods.pdf.
2008 *Maya Sacred Geography and the Creator Deities*. University of Oklahoma Press, Norman.

Baudez, Claude-François
1996 La Casa de los Cuatro Reyes de Balamku. *Arqueología Mexicana* 3(18):36-41.
2002a *Une histoire de la religion des Mayas. Du panthéisme au panthéon*. Editions Albin Michel, Paris.
2002b Venus y el Códice Grolier. *Arqueología Mexicana* 10(55):70-79.

Beliaev, Dmitri
2000 Wuk Tsuk and Oxlahun Tsuk: Naranjo and Tikal in the Late Classic. In *The Sacred and the Profane: Architecture and Identity in the Maya Lowlands*, edited by Pierre R. Colas, Kai Delvendahl, Marcus Kuhnert, and Annette Schubart, pp. 63-82. Acta Mesoamericana 10. Verlag Anton Saurwein, Markt Schwaben.

Berger, Rainer, Suzanne De Atley, Reiner Protsch, and Gordon R. Willey
1974 Radiocarbon Chronology for Seibal, Guatemala. *Nature* 252(5483):472-473.

Berjonneau, Gérald, and Jean-Louis Sonnery, eds.
1985 *Rediscovered Masterpieces of Mesoamerica: Mexico-Guatemala-Honduras*. Editions Art, Boulogne.

Berlin, Heinrich
1963 The Palenque Triad. *Journal de la Société des Américanistes de Paris* 52:91-99.

Bernal Romero, Guillermo
2009 *El Tablero de K'antok. Una inscripción del Grupo XVI de Palenque, Chiapas*. Centro de Estudios Mayas, Instituto de Investigaciones Filológicas, Universidad Nacional Autónoma de México, Mexico.

Berrin, Kathleen, ed.
1988 *Feathered Serpents and Flowering Trees: Reconstructing the Murals of Teotihuacan*. Fine Arts Museums of San Francisco, San Francisco.

Beyer, Hermann
1910 Das aztekische Götterbild Alexander von Humboldt's. In *Wissenschaftliche Festschrift zur Enthüllung des von Seiten Seiner Majestät Kaiser Wilhelm II. dem mexikanischen Volke zum Jubiläum seiner Unabhängigkeit gestifteten Humboldt-Denkmals*, pp. 107-119. Müller, Mexico.

Bíró, Péter
2011 Politics in the Western Maya Region (1): Ajawil / Ajawlel and Ch'e'n. *Estudios de Cultura Maya* 38:41-73.

Blake, Michael
1991 An Emerging Formative Chiefdom at Paso de la Amada, Chiapas, Mexico. In *The Formation of Complex Society in Southeastern Mesoamerica*, edited by William L. Fowler, pp. 27-46. CRC Press, Boca Raton.

Bonnet, Hans
[1939]1999 On Understanding Syncretism. *Orientalia* 68:181-198.

Boone, Elizabeth Hill
2007 *Cycles of Time and Meaning in the Mexican Books of Fate*. University of Texas Press, Austin.

Boot, Erik
1999 Of Serpents and Centipedes: The Epithet of Wuk Chapaht Chan K'inich Ahaw. Maya Supplemental File 3. Manuscript.
2004 Kerr No. 4546 and a Reference to an Avian Manifestation of the Creator God Itzamnaj. *MayaVase*: www.mayavase.com/Kerr4546.pdf.
2005a A Preliminary Overview of Common and Uncommon Classic Maya Vessel Type Collocations in the Primary Standard Sequence. *MayaVase*: www.mayavase.com/BootVesselTypes.pdf.

Boot, Erik (continued)
2005b Further Notes on the Initial Sign as /ALAY/. *Wayeb Notes* 18. Electronic document, www.wayeb.org/notes/wayeb_notes0018.pdf.
2005c *Continuity and Change in Text and Image at Chichen Itza, Yucatan, Mexico: A Study of the Inscriptions, Iconography, and Architecture at a Late Classic to Early Postclassic Maya Site*. CNWS Publications, Leiden.
2008 At the Court of Itzam Nah Yax Kokaj Mut: Preliminary Iconographic and Epigraphic Analysis of a Late Classic Vessel. *MayaVase*: www.mayavase.com/God-D-Court-Vessel.pdf.
2009a Otot as a Vessel Classification for a Footed Bowl: Short Epigraphic Note on a Bowl in the Collection of the Musem of Fine Arts, Boston. *MayaVase*: www.mayavase.com/otot.pdf.
2009b The Bat Sign in Maya Hieroglyphic Writing: Some Notes and Suggestions, Based on Examples on Late Classic Ceramics. *MayaVase*: www.mayavase.com/boot_bat.pdf.
2009c The Updated Preliminary Classic Maya–English, English–Classic Maya Vocabulary of Hieroglyphic Readings. *Mesoweb*: www.mesoweb.com/resources/vocabulary/index.html.

Boyer, Pascal
2001 *Religion Explained: The Evolutionary Origins of Religious Thought*. Basic Books, New York.

Brady, James E., and Keith M. Prufer
2005 Maya Cave Archaeology: A New Look at Religion and Cosmology. In *Stone Houses and Earth Lords: Maya Religion in the Cave Context*, edited by Keith M. Prufer and James E. Brady, pp. 365-379. University of Colorado Press, Boulder.

Breedlove, Dennis, and Robert M. Laughlin
2000 *The Flowering of Man: A Tzotzil Botany of Zinacantán*. Smithsonian Institution Press, Washington, D.C.

Bricker, Harvey M., and Victoria R. Bricker
2011 *Astronomy in the Maya Codices*. Memoir 265. American Philosophical Society, Philadelphia.

Brinton, Daniel Garrison
1881 The Names of the Gods in the Kiche Myths, Central America. *Proceedings of the American Philosophical Society* 19(109):613-647.

Brittenham, Claudia L.
2015 *The Murals of Cacaxtla: The Power of Painting in Ancient Central Mexico*. University of Texas Press, Austin.

Brokmann, Carlos
1996 *Proyecto Arqueológico El Palmar, Campeche*. Consejo Nacional para la Cultura y las Artes; Instituto Nacional de Antropología e Historia, Mexico.
1997 Proyecto Arqueológico El Palmar, Campeche: informe preliminar de actividades de la primera temporada de campo. Archivo técnico, Centro INAH, Campeche.

Bruce S., Roberto D.
1967 Jerarquía maya entre los dioses lacandones. *Anales* 18:3-108. Instituto Nacional de Antropología e Historia, Mexico.

Buckley, James
1973 Isotopes' Radiocarbon Measurements X. *Radiocarbon* 15(2):280-298.

Buikstra, Jane E., T. Douglas Price, Lori E. Wright, and James A. Burton
2004 Tombs from the Copan Acropolis: A Life History Approach. In *Understanding Early Classic Copan*, edited by Ellen E. Bell, Marcello A. Canuto, and Robert J. Sharer, pp. 191-212. University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia.

Byland, Bruce, and John M. D. Pohl
1994 *In the Realm of 8 Deer: The Archaeology of the Mixtec Codices*. University of Oklahoma Press, Norman.

Calvo del Castillo, Helena, José L. Ruvalcaba Sil, Tomás Calderón, Marie Vander Meeren, and Laura Sotelo
2007 The Grolier Codex: A PIXE and RBS Study of the Possible Maya Document. In *Proceedings of the XI International Conference on PIXE and its Analytical Applications. Puebla, Mexico, May 25-29, 2007*. Universidad Nacional Autónoma de México, Mexico. Available: www.fisica.unam.mx/pixe2007/Downloads/Proceedings/PDF_Files/PIXE2007-PII-43.pdf.

Carlson, John B.
1983 The Grolier Codex: A Preliminary Report on the Content and Authenticity of a Thirteenth-Century Maya Venus Almanac. In *Calendars in Mesoamerica and Peru: Native American Computations of Time*, edited by Anthony F. Aveni and Gordon Brotherston, pp. 27-57. International Series 174. British Archaeological Reports, Oxford.
1990 America's Ancient Skywatchers. *National Geographic Magazine* 177(3):76-107.
2012-2013 [issued 2015] The Twenty Masks of Venus: A Brief Report of Study and Commentary on the Thirteenth-Century Maya Grolier Codex, a Fragment of a 104-Year Hybrid-Style Maya Divinatory Venus Almanac. *Archaeoastronomy* 25:1-29.

2014 The Grolier Codex: An Authentic 13th-Century Maya Divinatory Venus Almanac: New Revelations on the Oldest Surviving Book on Paper in the Ancient Americas. *The Smoking Mirror* 22(4):2-7.

Carlson, Ruth, and Francis Eachus
1977 The Kekchi Spirit World. In *Cognitive Studies of Southern Mesoamerica*, edited by Helen L. Neuenswader and Dean E. Arnold, pp. 38-65. Publication 3. Sil Museum of Anthropology, Dallas.

Caso, Alfonso
1969 *El tesoro de Monte Albán*. Editorial Libros de México, Mexico.

Chase, Diane Z., and Arlen F. Chase
1996 Maya Multiples: Individuals, Entries, and Tombs in Structure A34 of Caracol, Belize. *Latin American Antiquity* 7(1):69-79.

Cheetham, David
2010 America's First Colony: Olmec Materiality and Ethnicity at Canton Corralito, Chiapas, Mexico. Ph.D. dissertation, Arizona State University, Tempe.

Chinchilla Mazariegos, Oswaldo
2010 La vagina dentada: una interpretación de la Estela 25 de Izapa y las guacamayas del juego de pelota de Copán. *Estudios de Cultura Maya* 36:117-144.
2011 The Flowering Glyphs: Animation in Cotzumalhuapa Writing. In *Their Way of Writing: Scripts, Signs, and Pictographies in Pre-Columbian America*, edited by Elizabeth H. Boone and Gary Urton, pp. 43-75. Dumbarton Oaks, Washington, D.C.

Chinchilla, Oswaldo M., and Stephen Houston
1992 Historia política de la zona de Piedras Negras: las inscripciones de El Cayo. In *VI Simposio de Investigaciones Arqueológicas en Guatemala, 1992*, edited by Juan Pedro Laporte, Héctor Escobedo, and Sandra Villagrán de Brady, pp. 55-63. Museo Nacional de Arqueología y Etnología, Guatemala.

Christenson, Allen J.
2001 *Art and Society in a Highland Maya Community: The Altarpiece of Santiago Atitlán*. University of Texas Press, Austin.
2003 *Popol Vuh: The Sacred Book of the Maya*. O Books, Winchester.

Chuchiak, John F.
2006 De Extirpatio Codicis Yucatanensis: The 1607 Colonial Confiscation of a Maya Sacred Book – New Interpretations on the Origins and Provenience of the Madrid Codex. In *Sacred Books, Sacred Languages: Two Thousand Years of Ritual and Religious Maya Literature*, edited by Rogelio Valencia Rivera and Geneviève Le Fort, pp. 113-140. Acta Mesoamericana 18. Verlag von Flemming, Möckmühl.

Ciudad Real, Antonio de
2001 *Calepino maya de Motul*. René Acuña, ed. Editores Plaza y Valdés, Mexico.

Clark, John E., and Arlene Colman
2014 Olmec Things and Identity: A Reassessment of Offerings and Burials at La Venta, Tabasco. In *The Inalienable in the Archaeology of Mesoamerica*, edited by Brigitte Kovacevich and Michael G. Callaghan, pp. 14-37. Archaeological Papers of the American Anthropological Association 23(1). Wiley-Blackwell, Malden.

Clark, John E., and Richard D. Hansen
2001 Architecture of Early Kingship: Comparative Perspectives on the Origins of the Maya Royal Court. In *Royal Courts of the Ancient Maya, Volume 2: Data and Case Studies*, edited by Takeshi Inomata and Stephen D. Houston, pp. 1-45. Westview Press, Boulder.

Clark, John E., Fred W. Nelson, and Gene L. Titmus
2012a Flint Effigy Eccentrics. In *Ancient Maya Art at Dumbarton Oaks*, edited by Joanne Pillsbury, Miriam Doutriaux, Reiko Ishihara-Brito, and Alexandre Tokovinine, pp. 270-281. Dumbarton Oaks, Washington, D.C.
2012b Eccentric Flint (plates 50-52). In *Ancient Maya Art at Dumbarton Oaks*, edited by Joanne Pillsbury, Miriam Doutriaux, Reiko Ishihara-Brito, and Alexandre Tokovinine, pp. 282-287. Dumbarton Oaks, Washington, D.C.

Closs, Michael P., Anthony F. Aveni, and Bruce Crowley
1984 The Planet Venus and Temple 22 at Copán. *Indiana* 9:221-247.

Codex Borgia
1993 *Codice Borgia*. Codices Mexicanos 5. Akademische Druck- und Verlagsanstalt; Fondo de Cultura Economica, Graz and Mexico.

Codex Fejérváry-Mayer
1994 *Codice Fejérváry-Mayer*. Codices Mexicanos 7. Akademische Druck- und Verlagsanstalt; Fondo de Cultura Economica, Graz and Mexico.

Coe, Michael D.
1973 *The Maya Scribe and His World*. The Grolier Club, New York.
1974 A Carved Wooden Box from the Classic Maya Civilization. In *Primera Mesa Redonda de Palenque, Part II: A Conference on the Art, Iconography, and Dynastic History of Palenque, 1973*, edited by Merle Greene Robertson, pp. 51-58. Robert Louis Stevenson School, Pebble Beach.
1975 Death and the Ancient Maya. In *Death and the Afterlife in Pre-Columbian America*, edited by Elizabeth P. Benson, pp. 87-104. Dumbarton Oaks, Washington, D.C.
1977 Supernatural Patrons of Maya Scribes and Artists. In *Social Process in Maya Prehistory: Essays in Honour of Sir Eric Thompson*, edited by Norman Hammond, pp. 327-347. Princeton University Press, Princeton.
1978 *Lords of the Underworld: Masterpieces of Classic Maya Ceramics*. The Art Museum, Princeton University, Princeton.
1988 Ideology of the Maya Tomb. In *Maya Iconography*, edited by Elizabeth P. Benson and Gillett G. Griffin, pp. 222-235. Princeton University Press, Princeton.
1989 The Hero Twins: Myth and Image. In *The Maya Vase Book: A Corpus of Rollout Photographs of Maya Vases, Volume 1*, pp. 161-184. Kerr Associates, New York.
1992 *Breaking the Maya Code*. Thames and Hudson, New York.

Coe, Michael D., and Richard A. Diehl
1980 *In the Land of the Olmec: The Archaeology of San Lorenzo Tenochtitlán*. 2 vols. University of Texas Press, Austin.

Coe, Michael D., and Stephen D. Houston
2015 *The Maya*. 9th ed. Thames and Hudson, New York.

Coe, Michael D., and Justin Kerr
1982 *Old Gods and Young Heroes: The Pearlman Collection of Maya Ceramics*. The Israel Museum, Jerusalem.
1997 *The Art of the Maya Scribe*. Thames and Hudson, London.
1998 *The Art of the Maya Scribe*. Harry N. Abrams, New York.

Coe, Michael D., and Mark Van Stone
2001 *Reading the Maya Glyphs*. Thames and Hudson, New York.

Coe, William
1965 Tikal: Ten Years of Study of a Maya Ruin in the Lowlands of Guatemala. In *Expedition* 8(1). Available: www.penn.museum/sites/expedition/tikal-2/.
1990 *Excavations in the Great Plaza, North Terrace and North Acropolis of Tikal*. Tikal Report 14. 5 vols. University Museum Monograph 61. University Museum, University of Pennsylvania, Philadelphia.

Coggins, Clemency Chase
1975 Painting and Drawing Styles at Tikal: An Historical and Iconographic Reconstruction. Ph.D. dissertation, Department of Anthropology, Harvard University, Cambridge.

Coggins, Clemency Chase, and Orrin C. Shane III, eds.
1984 *Cenote of Sacrifice: Maya Treasures from the Sacred Well at Chichén Itzá*. University of Texas Press, Austin.

Colby, Benjamin N., and Lore M. Colby
1981 *The Daykeeper: The Life and Discourse of an Ixil Diviner*. Harvard University Press, Cambridge.

Coltman, Jeremy
2007 The Aztec Stuttgart Statuette: An Iconographic Analysis. *Mexicon* 29(3):70-77.

Cortés de Brasdefer, Fernando
1996 A Maya Vase from "El Señor del Petén." *Mexicon* 18(1):6.

Cortez, Constance
1986 The Principal Bird Deity in Preclassic and Early Classic Maya Art. M.A. thesis, University of Texas at Austin.

Covarrubias, Miguel
1957 *Indian Art of Mexico and Central America*. Alfred A. Knopf, New York.

Cucina, Andrea, Vera Tiesler, and Arturo Romano
2004 Los acompañantes de Janaab' Pakal y de la Reina Roja de Palenque, Chiapas: el significado de sacrificios humanos en las exequias de la sociedad maya del Clásico. In *Janaab' Pakal de Palenque. Vida y muerte de un gobernante maya*, edited by Vera Tiesler and Andrea Cucina, pp. 69-102. Universidad Nacional Autónoma de México, Mexico.

Cyphers, Ann
2004 *Escultura olmeca de San Lorenzo Tenochtitlán*. Universidad Nacional Autónoma de México, Mexico.

Dávalos Hurtado, Eusebio
1961 Return to the Sacred Cenote. *National Geographic Magazine* 120(4):540-549.

de la Fuente, Beatriz, Silvia Trejo, and Nelly Gutiérrez Solana
1988 *Escultura en piedra de Tula: catálogo*. Cuadernos de Historia del Arte 50. Universidad Nacional Autónoma de México, Mexico.

Demarest, Arthur A., Tomás Barrientos, and Federico Fahsen
2006 El apogeo y el colapso del reinado de Cancuen: resultados e interpretaciones del Proyecto Cancuen, 2004-2005. In *XIX Simposio de Investigaciones Arqueológicas en Guatemala, 2005*, edited by Juan Pedro Laporte, Bárbara Arroyo, and Héctor E. Mejía, v. 2, pp. 757-768. Ministerio de Cultura y Deportes; Instituto de Antropología e Historia; Asociación Tikal; Fundación Arqueológica del Nuevo Mundo, Guatemala.

Diehl, Richard A.
1990 The Olmec at La Venta. In *Mexico: Splendors of Thirty Centuries*, edited by Kathleen Howard, pp. 51-71. Metropolitan Museum of Art, New York.

Domenici Davide, David Buti, Costanza Miliani, Brunetto G. Brunetti, and Antonio Sgamellotti
2014 The Colours of Indigenous Memory: Non-invasive Analyses of Pre-Hispanic Mesoamerican Codices. In *The Painted Surface*, edited by Antonio Sgamellotti, Brunetto G. Brunetti, and Costanza Miliani, pp. 94-117. Royal Society of Chemistry, London.

Dresden Codex
n.d.a Codex Dresdensis - Mscr.Dresd.R.310. Available: digital.slub-dresden.de/werkansicht/dlf/2967/1/.
n.d.b Ernst Förstemann's facsimile of the Dresden Codex. *FAMSI*: www.famsi.org/mayawriting/codices/pdf/dresden_fors_schele_all.pdf.

Drucker, Philip
1952 *La Venta, Tabasco: A Study of Olmec Ceramics and Art*. Bulletin 153. Bureau of American Ethnology, Smithsonian Institution, Washington, D.C.

Drucker, Philip, Robert F. Heizer, and Robert H. Squier
1959 *Excavations at La Venta, Tabasco, 1955*. Bulletin 170. Bureau of American Ethnology, Smithsonian Institution, Washington, D.C.

Ekholm, Gordon F.
1961 Some Collar-Shaped Shell Pendants from Mesoamerica. In *Homenaje a Pablo Martínez del Río en el vigésimoquinto aniversario de la primera edición de Los orígenes americanos*, pp. 287-293. Instituto Nacional de Antropología e Historia, Mexico.
1970 *Ancient Mexico and Central America*. American Museum of Natural History, New York.

Eliade, Mircea
1959 Methodological Remarks on the Study of Religious Symbolism. In *The History of Religions: Essays in Methodology*, edited by Mircea Eliade and Joseph M. Kitagawa, pp. 86-107. University of Chicago Press, Chicago.
1961 *Images and Symbols: Studies in Religious Symbolism*. Harvill Press, London.

Esparza, Octavio Olguín, and Kenichiro Tsukamoto
2011 Espacios de la escenografía ritual. In *Los Mayas. Voces de piedra*, edited by Alejandra Martínez de Velasco and María Elena Vega, pp. 393-399. Ámbar Diseño, México.

Estrada Belli, Francisco
2006 Lightning Sky, Rain, and the Maize God: The Ideology of Preclassic Maya Rulers at Cival, Peten, Guatemala. *Ancient Mesoamerica* 17(1):57-78.
2008 Investigaciones arqueológicas en la región de Holmul, Peten: Holmul, Cival, La Sufricaya y K'o. Report submitted to the Foundation for the Advancement of Mesoamerican Studies. Available: www.famsi.org/reports/07028es/index.html.
2011 *The First Maya Civilization: Ritual and Power Before the Classic Period*. Routledge, Abingdon.

Evans-Pritchard, Edward E.
1956 *Nuer Religion*. Clarendon Press, Oxford.

Fash, Barbara W.
2005 Iconographic Evidence for Water Management and Social Organization at Copán. In *Copán: The History of an Ancient Maya Kingdom*, edited by E. Wyllys Andrews and William L. Fash, pp. 103-138. School of American Research, Santa Fe.

Fash, William
1991 *Scribes, Warriors and Kings: The City of Copán and the Ancient Maya*. Thames and Hudson, London.

Fash, William L., and Barbara W. Fash
1996 Building a World-View: Visual Communication in Classic Maya Architecture. *Res: Anthropology and Aesthetics* 29/30:127-147.

Fash, William L., and David S. Stuart
1991 Dynastic History and Cultural Evolution at Copan. In *Classic Maya Political History: Hieroglyphic and Archaeological Evidence*, edited by T. Patrick Culbert, pp. 147-179. School of American Research Advanced Seminar Series. Cambridge University Press, New York.

Fitzsimmons, James, L.
1998 Classic Maya Mortuary Anniversaries at Piedras Negras, Guatemala. *Ancient Mesoamerica* 9(2):271-278.

Förstemann, Ernst
1880 *Die Maya Handschrift der Königlichen öffentlichen Bibliothek zu Dresden*. Verlag der A. Naumann'schen Lichtdruckerei, Leipzig.
1906 *Commentary on the Maya Manuscript in the Royal Public Library of Dresden*. Papers 4(2). Peabody Museum of American Archaeology and Ethnology, Harvard University, Cambridge.

Foster, Lynn, and Linnea Wren
1996 World Creator and World Sustainer: God N at Chichén Itzá. In *Eighth Palenque Round Table, 1993*, edited by Martha J. Macri and Jan McHargue, pp. 259-269. Pre-Columbian Art Research Institute, San Francisco.

Freidel, David, and Stanley Guenter
2006 Soul Bundles, Caches, Tombs, and Cenotaphs: Creating the Places of Resurrection and Accession in Maya Kingship. In *Sacred Bundles: Ritual Acts of Wrapping and Binding in Mesoamerica*, edited by Julia Guernsey and F. Kent Reilly, pp. 59-79. Ancient America Special Publication 1. Boundary End Archaeology Research Center, Barnardsville.

Freidel, David, and Linda Schele
1988 Symbol and Power: A History of the Lowland Maya Cosmogram. In *Maya Iconography*, edited by Elizabeth P. Benson and Gillett G. Griffin, pp. 44-93. Princeton University Press, Princeton.

Freidel, David, Linda Schele, and Joy Parker
1993 *Maya Cosmos: Three Thousand Years on the Shaman's Path*. William Morrow, New York.

Freidel, David, and Charles Suhler
1999 The Path to Life: Toward a Functional Analysis of Ancient Maya Architecture. In *Mesoamerican Architecture as a Cultural Symbol*, edited by Jeff Karl Kowalski, pp. 250-273. Oxford University Press, Oxford.

Gallareta Negrón, Tomás, and Karl Taube
2005 Late Postclassic Occupation in the Ruinas de San Angel Region, Quintana Roo. In *Quintana Roo Archaeology*, edited by Justine M. Shaw and Jennifer P. Mathews, pp. 87-111. University of Arizona Press, Tucson.

Gann, Thomas
1900 Mounds in Northern Honduras. *Annual Report* 19(2):655-692. Bureau of American Ethnology, Washington, D.C.

García Barrios, Ana, and Erik Velásquez García
2010 Artistas, gobernantes y magos: el papel de los chatan winik en la sociedad maya. Paper presented at the 15th European Maya Conference, "Maya Society and Socio-territorial Organization," Madrid.

García Moll, Roberto
2005 *Pomoná: un sitio del Clásico maya en las colinas tabasqueñas*. Instituto Nacional de Antropología e Historia, Mexico.

Garibay, Angel M.
1965 *Teogonía e historia de los mexicanos. Tres opúsculos del siglo XVI*. Editorial Porrúa, Mexico.

Gettens, Rutherford J.
1962 Maya Blue: An Unsolved Problem in Ancient Pigments. *American Antiquity* 27(41):557-564.

Gifford, Carol A., and Muriel Kirkpatrick, eds.
1996 Index of Mesoamerican Archaeological Nomenclature. *Ceramica de Cultura Maya et al.* 18:1-162. Department of Anthropology, Temple University, Philadelphia.

Gifford, James C.
1976 *Prehistoric Pottery Analysis and the Ceramics of Barton Ramie in the Belize Valley*. Memoirs 18. Peabody Museum of Archæology and Ethnology, Harvard University, Cambridge.

Girard, Rafael
1952 *El Popol-Vuh, fuente histórica*. Editorial del Ministerio de Educación Pública, Guatemala.

Golden, Charles, Andrew K. Scherer, A. René Muñoz, and Rosaura Vásquez
2008 Piedras Negras and Yaxchilan: Divergent Political Trajectories in Adjacent Maya Polities. *Latin American Antiquity* 19(3):249-274.

González Cruz, Arnoldo
1993 Trabajos arqueológicos en Palenque, Chiapas: informe de campo, temporada VI. Archivo técnico, Instituto Nacional de Antropología e Historia, Mexico.
1994a Trabajos recientes en Palenque. *Arqueología Mexicana* 1(10):39-45.

1994b Informe de temporada 1992-1994: Proyecto Especial Palenque. Archivo técnico, Instituto Nacional de Antropología e Historia, Mexico.
2004 Los templos XXI and XXII de Palenque: algunos resultados de la temporada 2004. *Lakamha': Boletín Informativo del Museo y Zona Arqueológica de Palenque* 3(13):37.
2011 *La Reina Roja: una tumba real de Palenque*. Consejo Nacional para la Cultura y las Artes; Instituto Nacional de Antropología e Historia; Turner, Mexico.

González Cruz, Arnoldo, and Joshua A. Balcells González
2014a Análisis y catálogo de cerámica del Templo XX, XXI, XXII, Basurero y Casa del Palacio. Informe del Proyecto Arqueológico Palenque, temporada 2013. Archivo técnico, Instituto Nacional de Antropología e Historia, Mexico.
2014b El complejo funerario de la Subestructura XX de Palenque: análisis realizados, resultados preliminares and catálogo de materiales. Archivo técnico, Instituto Nacional de Antropología e Historia, Mexico.

González Cruz, Arnoldo, and Guillermo Bernal Romero
2003a El trono del Templo XXI de Palenque, Chiapas: el reinado de K'inich Ahkal Mo' Nahb'. *Arqueología Mexicana* 62:70-75.
2003b *El trono de Ahkal Mo' Nahb' III: un hallazgo trascendental en Palenque, Chiapas*. Instituto Nacional de Antropología e Historia; Nestlé, Mexico.
2004 The Throne Panel of Temple 21 at Palenque. In *Courtly Art of the Ancient Maya*, by Mary E. Miller and Simon Martin, pp. 264-267. Thames and Hudson, New York.

Gossen, Gary
1974 *Chamulas in the World of the Sun: Time and Space in a Maya Oral Tradition*. Harvard University Press, Cambridge.

Graham, Ian
1971 *The Art of Maya Hieroglyphic Writing*. Peabody Museum of Archaeology and Ethnology, Harvard University; Center for Inter-American Relations, Cambridge and New York.
1975 *Corpus of Maya Hieroglyphic Inscriptions, Volume 1: Introduction to the Corpus*. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
1977 *Corpus of Maya Hieroglyphic Inscriptions, Volume 3, Part 1: Yaxchilan*. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
1982 *Corpus of Maya Hieroglyphic Inscriptions, Volume 3, Part 3: Yaxchilan*. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Graham, Ian, Lucia R. Henderson, Peter Mathews, and David Stuart
2006 *Corpus of Maya Hieroglyphic Inscriptions, Volume 9, Part 2: Tonina*. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Graham, John A.
1990 Monumental Sculpture and Hieroglyphic Inscriptions. In *Excavations at Seibal, Department of Peten, Guatemala*, edited by Gordon R. Willey, pp. 1-79. Memoirs 17(1). Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Graham, Mark Miller
1993 Displacing the Center: Constructing Prehistory in Central America. In *Reinterpreting Prehistory of Central America*, edited by Mark M. Graham, pp. 1-38. University Press of Colorado, Niwot.

Grube, Nikolai
1992 Classic Maya Dance: Evidence from Hieroglyphs and Iconography. *Ancient Mesoamerica* 3(2):201-218.
1994 Epigraphic Research at Caracol, Belize. In *Studies in the Archaeology of Caracol, Belize*, edited by Arlen F. Chase and Diane Z. Chase, pp. 83-122. Pre-Columbian Art Research Institute, San Francisco.
2004a Akan: The God of Drinking, Disease and Death. In *Continuity and Change: Maya Religious Practices in Temporal Perspective*, edited by Daniel Graña Behrens, Nikolai Grube, Christian M. Prager, Frauke Sachse, Stefanie Teufel, and Elizabeth Wagner, pp. 59-76. Verlag Anton Saurwein, Markt Schwaben.
2004b The Orthographic Distinction between Velar and Glottal Spirants in Maya Hieroglyphic Writing. In *The Linguistics of Maya Writing*, edited by Søren Wichmann, pp. 61-82. University of Utah Press, Salt Lake City.
2005 Toponyms, Emblem Glyphs, and the Political Geography of Southern Campeche. *Anthropological Notebooks* 11:89-102.
2006 Die Hieroglyphentexte auf den Keramiken. In *Die Maya: Schrift und Kunst*, edited by Nikolai Grube and Maria Gaida, pp. 58-81. SMB-Dumont, Berlin.
2008 Monumentos esculpidos: epigrafía e iconografía. In *Reconocimiento arqueológico en el sureste del estado de Campeche, México: 1996-2005*, edited by Ivan Šprajc, pp. 177-231. Paris Monographs in American Archaeology 19. BAR International Series 1742. Archaeopress, Oxford.

Grube, Nikolai, and Maria Gaida
2006 *Die Maya: Schrift und Kunst*. SMB-Dumont, Berlin.

Grube, Nikolai, and Simon Martin
2004 *The Proceedings of the Maya Hieroglyphic Workshop: Patronage, Betrayal, and Revenge: Diplomacy and Politics in the Eastern Maya Lowlands*. Transcribed and edited by Phil Wanyerka. University of Texas at Austin; Cleveland State University, Austin and Cleveland.

Grube, Nikolai, and Werner Nahm
1990 A Sign for the Syllable *mi*. *Research Reports on Ancient Maya Writing* 31. Center for Maya Research, Washington, D.C.
1994 A Census of Xibalba: A Complete Inventory of Way Characters on Maya Ceramics. In *The Maya Vase Book: A Corpus of Rollout Photographs of Maya Vases, Volume 4*, edited by Barbara Kerr and Justin Kerr, pp. 686-715. Kerr Associates, New York.

Grube, Nikolai, Carlos Pallán Gayol, and Antonio Benavides Castillo
2009 La Escalinata Jeroglífica 1 de Sabana Piletas, Campeche: nuevos datos sobre el epiclásico en la región Puuc. In *Los Investigadores de la Cultura Maya* 17(2):95-115. Universidad Autónoma de Campeche, Campeche.

Grube, Nikolai, and Linda Schele
1991 *Tzuk* in the Classic Maya Inscriptions. *Texas Notes on Precolumbian Art, Writing, and Culture* 14. Center of the History and Art of Ancient American Culture, Art Department, University of Texas, Austin.

Guernsey, Julia
2006 *Ritual and Power in Stone: The Performance of Rulership in Mesoamerican Izapan Style Art*. University of Texas Press, Austin.

Guilliem Arroyo, Salvador
1998 El Templo Calendário de México-Tlatelolco. *Arqueología Mexicana* 6(34):46-53.

Guiteras Holmes, Calixta
1961 *Perils of the Soul: The World View of a Tzotzil Indian*. Free Press, New York.

Guthrie, Stewart
1993 *Faces in the Clouds: A New Theory of Religion*. Oxford University Press, New York.

Haines, Helen
2012 "When We Two Parted": Remaking the Ancient Maya Political Landscape of North-Central Belize. Paper presented at the Chacmool Conference, University of Calgary.

Hall, Grant D.
1986 Results of Tomb Investigations at Río Azul, Season 1984. In *Río Azul Reports, No. 2: The 1984 Season*, edited by Richard E. W. Adams, pp. 69-110. Center for Archaeological Research, University of Texas, San Antonio.
1989 Realm of Death: Royal Mortuary Customs and Polity Interaction in the Classic Maya Lowlands. Ph.D. dissertation, Harvard University, Cambridge.

Hammond, Norman
1999 The Genesis of Hierarchy: Mortuary and Offertory Ritual in the Pre-Classic at Cuello, Belize. In *Social Patterns in Pre-Classic Mesoamerica*, edited by David C. Grove and Rosemary A. Joyce, pp. 49-66. Dumbarton Oaks, Washington, D.C.

Hanks, William F.
1990 *Referential Practice: Language and Lived Space among the Maya*. University of Chicago Press, Chicago.

Healy, Paul F., and Jaime J. Awe
2001 Middle Preclassic Jade Spoon from Belize. *Mexicon* 23(3):61-64.

Hellmuth, Nicholas M.
1987a *Monster und Menschen in der Maya-Kunst*. Akademische Druck- und Verlagsanstalt, Graz.
1987b *The Surface of the Underwaterworld: Iconography of the Gods of Early Classic Maya Art in Petén, Guatemala*. Foundation for Latin American Anthropological Research, Culver City.

Helmke, Christophe
2009 Ancient Maya Cave Usage as Attested in the Glyphic Corpus of the Maya Lowlands and the Caves of the Roaring Creek Valley, Belize. Ph.D. dissertation, Institute of Archaeology, University of London.
in prep. An Analysis of the Imagery and Text of the Cuychen Vase. In *Speleoarchaeological Investigations in the Macal River Valley, Belize*, edited by Christophe Helmke. Precolumbia Mesoweb Press, San Francisco.

Helmke, Christophe, and Jaime Awe
2008 Organización territorial de los antiguos mayas de Belice Central: confluencia de datos arqueológicos y epigráficos. *Mayab* 20:65-91.

Helmke, Christophe, Jaime Awe, and Nikolai Grube
2010 The Carved Monuments and Inscriptions of Xunantunich: Implications for Terminal Classic Sociopolitical Relationships in the Belize Valley. In *Classic Maya Provincial Politics: Xunantunich and Its Hinterlands*, edited by Lisa J. LeCount and Jason Yaeger, pp. 97-121. University of Arizona Press, Tucson.

Helmke, Christophe, Jaime J. Awe, and Harri Kettunen
2003 Hieroglyphic Inscriptions of the Belize Valley: Implications for Socio-political Landscape and Dynastic Interaction. Paper presented at the 28th Maya Meetings at Texas, University of Texas, Austin.

Helmke, Christophe, Jaime J. Awe, Shawn G. Morton, and Gyles Iannone
in prep. Archaeological Investigations at Cuychen, Macal River Valley, Belize. In *Speleoarchaeological Investigations in the Macal River Valley, Belize*, edited by Christophe Helmke. Precolumbia Mesoweb Press, San Francisco.

Helmke, Christophe, Harri Kettunen, and Stanley Guenter
2006 Comments on the Hieroglyphic Texts of the B-Group Ballcourt Markers at Caracol, Belize. *Wayeb Notes* 23. Electronic document, www.wayeb.com/notes/wayeb_notes0023.pdf.

Helmke, Christophe, and Jesper Nielsen
2009 Hidden Identity and Power in Ancient Mesoamerica: Supernatural Alter Egos as Personified Diseases. *Acta Americana* 17(2):49-98.

Hendon, Julia
1991 Status and Power in Classic Maya Society: An Archaeological Study. *American Anthropologist* 93(4):894-918.

Hill, Jane
1992 The Flower World of Old Uto-Aztecan. *Journal of Anthropological Research* 48(2):117-144.

Hodgson, John G., John G. Clark, and Emiliano Gallaga Murrieta
2010 Ojo de Agua Monument 3: A New Olmec-Style Sculpture from Ojo de Agua, Chiapas, Mexico. *Mexicon* 32(6):139-144.

Holland, William Robert
1963 *Medicina maya en los altos de Chiapas: un estudio del cambio socio-cultural*. Colección de Antropología Social 2. Instituto Nacional Indigenista, Mexico.

Hooper, Steven
2006 *Pacific Encounters: Art and Divinity in Polynesia 1760-1860*. British Museum Press, London.

Hornung, Erik
1982 *Conceptions of God in Ancient Egypt: The One and the Many*. Cornell University Press, Ithaca.

Houston, Stephen D.
1983 A Reading for the Flint-Shield Glyph. In *Contributions to Maya Hieroglyphic Decipherment* 1, edited by Stephen D. Houston, pp. 13-25. Human Relations Area Files, New Haven.
1986 Problematic Emblem Glyphs: Examples from Altar de Sacrificios, El Chorro, Río Azul, and Xultun. *Research Reports on Ancient Maya Writing* 3:1-11.
1988 The Phonetic Decipherment of Mayan Glyphs. *Antiquity* 62(234):126-135.
1989 *Reading the Past: Maya Glyphs*. British Museum, London.
1993 *Hieroglyphs and History at Dos Pilas: Dynastic Politics of the Classic Maya*. University of Texas Press, Austin.
1998 Classic Maya Depictions of the Built Environment. In *Function and Meaning in Classic Maya Architecture*, edited by Stephen D. Houston, pp. 333-372. Dumbarton Oaks, Washington, D.C.
2001 Comment on "The Power and Ideology of Artistic Creation: Elite Craft Specialists in Classic Maya Society" by Takeshi Inomata. *Current Anthropology* 42(3):336-337.
2004 Writing in Early Mesoamerica. In *The First Writing: Script Invention as History and Process*, edited by Stephen D. Houston, pp. 274-309. Cambridge University Press, Cambridge.
2014 *The Life Within: Classic Maya and the Matter of Permanence*. Yale University Press, New Haven.

Houston, Stephen, Claudia Brittenham, Cassandra Mesick, Alexandre Tokovinine, and Christina Warinner
2009 *Veiled Brightness: A History of Ancient Maya Color*. University of Texas Press, Austin.

Houston, Stephen D., Hector Escobedo, Mark Child, Charles Golden, Richard Terry, and David Webster
2000 In the Land of the Turtle Lords. *Mexicon* 12(5):97-110.

Houston, Stephen D., Hector Escobedo, Perry Hardin, Richard Terry, David Webster, Mark Child, Charles Golden, Kitty Emery, and David Stuart
1999 Between Mountains and Sea: Investigations at Piedras Negras, Guatemala, 1998. *Mexicon* 21(1):10-17.

Houston, Stephen D., and Takeshi Inomata
2009 *The Classic Maya*. Cambridge University Press, New York.

Houston, Stephen D., and Simon Martin
2012 Mythic Prototypes and Maya Writing. *Maya Decipherment: decipherment.wordpress.com/2012/01/04/mythic-prototypes-and-maya-writing/*.

Houston, Stephen, John Robertson, and David Stuart
2000 The Language of Classic Maya Inscriptions. *Current Anthropology* 41(3):321-356.
2001 *Quality and Quantity in Glyphic Nouns and Adjectives*. Research Reports on Ancient Maya Writing 47. Center for Maya Research, Washington, D.C.

Houston, Stephen D., and David Stuart
[1990]1992 T632 as *Muyal*, "Cloud." Central Tennessean Notes in Maya Epigraphy 1. In *Workbook for the XVIth Maya Hieroglyphic Workshop at Texas, March 14-15*, by Linda Schele, pp. 226-227. Department of Art and Art History; Institute of Latin American Studies, University of Texas, Austin.
1996 Of Gods, Glyphs and Kings: Divinity and Rulership among the Classic Maya. *Antiquity* 70(268):289-312.
2001 Peopling the Classic Maya Court. In *Royal Courts of the Ancient Maya. Volume One: Theory, Comparison, and Synthesis*, edited by Takeshi Inomata and Stephen Houston, pp. 54-83. Westview Press, Boulder.

Houston, Stephen D., David Stuart, and Karl A. Taube
1989 Folk Classification of Classic Maya Pottery. *American Anthropologist* 91(3):720-726.
1992 Image and Text on the "Jauncy Vase." In *The Maya Vase Book: A Corpus of Rollout Photographs of Maya Vases, Volume 3*, edited by Barbara Kerr and Justin Kerr, pp. 12-26. Kerr Associates, New York.
2006 *The Memory of Bones: Body, Being, and Experience among the Classic Maya*. University of Texas Press, Austin.

Hull, Kerry
2003 Verbal Art and Performance in Ch'orti' and Maya Hieroglyphic Writing. Ph.D. dissertation, University of Texas at Austin.

Hull, Kerry, Michael D. Carrasco, and Robert Wald
2009 The First-Person Singular Independent Pronoun in Classic Ch'olan. *Mexicon* 31(2):36-43.

Humberto Ruz, Mario
1968 Tzeltal/Spanish Words from the Mid-Sixteenth Century Copanaguastla Vocabulary of Fr. Domingo de Ara, with an English Translation. In *Highland Chiapas Before the Spanish Conquest*, edited by Edward E. Calnek, pp. 65-79. New World Archaeological Foundation, Provo.

Hunn, Eugene S.
1977 *Tzeltal Folk Zoology: The Classification of Discontinuities in Nature*. Academic Press, New York.

Hurst, Heather
2005 San Bartolo: técnicas de pintura mural del Preclásico Tardío. In *XVIII Simposio de Investigaciones Arqueológicas en Guatemala, 2004*, edited by Juan Pedro Laporte, Bárbara Arroyo, and Héctor E. Mejía, v. 2, pp. 639-646. Ministerio de Cultura y Deportes; Instituto de Antropología e Historia; Asociación Tikal; Foundation for the Advancement of Mesoamerican Studies, Guatemala.

Iannone, Gyles
2006 Archaeological Approaches to Ancient Maya Geopolitical Borders. In *Space and Spatial Analysis in Archaeology*, edited by Elizabeth C. Robertson, Jeffery D. Seibert, Deepika C. Fernandez,, and Marc U. Zender, pp. 205-214. University of Calgary Press, Calgary.

Inomata, Takeshi
2001 King's People: Classic Maya Courtiers in a Comparative Perspective. In *Royal Courts of the Ancient Maya, Volume One: Theory, Comparison, and Synthesis*, edited by Takeshi Inomata and Stephen Houston, pp. 27-53. Westview Press, Boulder.
2014 War, Violence, and Society in the Maya Lowlands. In *Embattled Bodies, Embattled Places: War in Pre-Columbian America*, edited by Andrew Scherer and John Verano, pp. 25-56. Dumbarton Oaks, Washington, D.C.

Inomata, Takeshi, Daniela Triadan, Kazuo Aoyama, Victor Castillo, and Hitoshi Yonenobu
2013 Early Ceremonial Constructions at Ceibal, Guatemala, and the Origins of Lowland Maya Civilization. *Science* 340(6131):467-471.

Jackson, Sarah E.
2005 Deciphering Classic Maya Political Hierarchy: Epigraphic, Archaeological, and Ethnohistoric Perspectives on the Courtly Elite. Ph.D. dissertation, Department of Anthropology, Harvard University.

Jackson, Sarah, and David Stuart
2001 The Aj K'uhun Title: Deciphering a Classic Maya Term of Rank. *Ancient Mesoamerica* 12(2):217-228.

Jones, Christopher
1977 Inauguration Dates of Three Late Classic Rulers of Tikal, Guatemala. *American Antiquity* 42(1):28-60.

Jones, Christopher, and Linton Satterthwaite
1982 *The Monuments and Inscriptions of Tikal: The Carved Monuments*. Tikal Report 33, Part A. Monograph 44. University Museum, University of Pennsylvania, Philadelphia.

Joralemon, Peter David
1971 *A Study of Olmec Iconography*. Studies in Pre-Columbian Art and Archaeology 7. Dumbarton Oaks, Washington, D.C.
1974 Ritual Blood-Sacrifice among the Ancient Maya: Part I. In *Primera Mesa Redonda de Palenque, Part II: A Conference on the Art, Iconography, and Dynastic History of Palenque, 1973*, edited by Merle Greene Robertson, pp. 59-75. Robert Louis Stevenson School, Pebble Beach.
1976 The Olmec Dragon: A Study in Pre-Columbian Iconography. In *Origins of Religious Art and Iconography in Preclassic Mesoamerica*, edited by H. B. Nicholson, pp. 27-71. Latin American Studies Series 31. University of California, Los Angeles.
1996 In Search of the Olmec Cosmos: Reconstructing the World View of Mexico's First Civilization. In *Olmec Art of Ancient Mexico*, pp. 51-59. National Gallery of Art, Washington, D.C.

Joyce, Rosemary A., and John S. Henderson
2010 Being "Olmec" in Early Formative Period Honduras. *Ancient Mesoamerica* 21(1):187-200.

Joyce, Thomas A., J. Cooper Clark, and J. Eric S. Thompson
1927 Report on the British Museum Expedition to British Honduras, 1927. *Journal of the Royal Anthropological Institute of Great Britain and Ireland* 57:295-323.

Kaufman, Terrence S.
1989 The Meso-American Calendar: The Day Names. Paper presented at the Santa Barbara Conference on Mesoamerican Writing, Santa Barbara.

Kaufman, Terrence S., and William M. Norman
1984 An Outline of Proto-Cholan Phonology, Morphology and Vocabulary. In *Phoneticism in Mayan Hieroglyphic Writing*, edited by John S. Justeson and Lyle Campbell, pp. 77-166. Institute for Mesoamerican Studies, State University of New York, Albany.

Kelley, David H.
1976 *Deciphering the Maya Script*. University of Texas Press, Austin.

Kerr, Justin
1989 *The Maya Vase Book: A Corpus of Rollout Photographs of Maya Vases, Volume 1*. Kerr Associates, New York.
1990 *The Maya Vase Book: A Corpus of Rollout Photographs of Maya Vases, Volume 2*. Kerr Associates, New York.
1994 *The Maya Vase Book: A Corpus of Rollout Photographs of Maya Vases, Volume 4*. Kerr Associates, New York.

Kettunen, Harri
2006 *Nasal Motifs in Maya Iconography: A Methodological Approach to the Study of Ancient Maya Art*. Annales Academie Scientarium Finnicae, Helsinki.

Kettunen, Harri, and Christophe Helmke
2005 *Introduction to Maya Hieroglyphs: Workshop Handbook. 10th European Maya Conference*. Leiden University; Wayeb, Leiden.

Kidder, Alfred V., Jesse D. Jennings, and Edwin M. Shook
1946 *Excavations at Kaminaljuyu, Guatemala*. Publication 561. Carnegie Institution of Washington, Washington, D.C.

Krempel, Guido, and Sebastian Matteo
2011 North-Eastern Peten Styles from a Local Perspective: The Ceramic Schools of Yax We'en Chan K'ihnich. Paper presented at the 1st Cracow Maya Conference, Department of New World Archaeology, Institute of Archaeology, Jagellonian University, Cracow.

Kubler, George
1969 *Studies in Classic Maya Iconography*. Memoirs 18. Connecticut Academy of Arts and Sciences, New Haven.

Kurth, Dieter
1977 Götter determinieren Götter. *Studien zur Altägyptischen Kultur* 5:175-181.

Lacadena García-Gallo, Alfonso
1995 Evolución formal de las grafías escriturarias mayas: implicaciones históricas y culturales. Ph.D. dissertation, Departamento de Historia de América II (Antropología de América), Facultad de Geografía e Historia, Universidad Complutense de Madrid.
2000 Los escribas del Códice de Madrid: Metodología paleográfica. *Revista Española de Antropología Americana* 30:27-85.

Lacadena García-Gallo, Alfonso (continued)
2003 El corpus glífico de Ek' Balam, Yucatán, México. Report submitted to the Foundation for the Advancement of Mesoamerican Studies. Available: www.famsi.org/reports/01057es/index.html.
2004a On the Reading of Two Glyphic Appellatives of the Rain God. In *Continuity and Change: Maya Religious Practices in Temporal Perspective*, edited by Daniel Graña-Behrens, Nikolai Grube, Christian M. Prager, Frauke Sachse, Stefanie Teufel, and Elizabeth Wagner, pp. 87-98. Verlag Anton Saurwein, Markt Schwaben.
2004b Passive Voice in Classic Maya Texts. In *The Linguistics of Maya Writing*, edited by Søren Wichmann, pp. 165-194. University of Utah Press, Salt Lake City.
2008 El título *lakam*: evidencia epigráfica sobre la organización tributaria y militar interna de los reinos mayas del Clásico. *Mayab* 20:23-43.
2009 Apuntes para un estudio sobre literatura maya antigua. In *Texto y contexto. Perspectivas intraculturales en el análisis de la literatura maya yucateca*, edited by Antje Gunsenheimer, Tsubasa Okoshi Harada, and John F. Chuchiak, pp. 31-52. BAS, Bonn.

Lacadena, Alfonso, and Søren Wichmann
2004 On the Representation of the Glottal Stop in Maya Writing. In *The Linguistics of Maya Writing*, edited by Søren Wichmann, pp. 103-162. University of Utah Press, Salt Lake City.

La Farge, Oliver, and Douglas Byers
1931 *The Year Bearer's People*. Publication 3. Middle American Research Institute, Tulane University, New Orleans.

Landa Abrego, María Elena, Eduardo Pareyón Moreno, Alejandro Huerta Carrillo, Emma E. Herrera G., Rosa Lorena Román Torres, Martha Guajardo P., Josefina Cruz R., Sara Altamirano R., and Eva Rodríguez C.
1988 *La Garrafa. Cuevas de la Garrafa, Chiapas. Estudio y conservación de algunos objectos arqueológicos*. Gobierno del Estado de Puebla; Centro Regional de Puebla; Instituto Nacional de Antropología e Historia, Puebla.

Laporte, Juan Pedro, and Vilma Fialko
1995 Un reencuentro con Mundo Perdido, Tikal, Guatemala. *Ancient Mesoamerica* 6(1):41-94

Las Casas, Bartholmé
1909 *Apologética historia de las Indias*. 2 Vols. Nueva Biblioteca de Autores Españoles 13. Bailly, Bailliere e Hijos, Madrid.

Lavy, Paul A.
2003 As in Heaven, So on Earth: The Politics of Visnu, Siva and Harihara Images in Preangkorian Khmer Civilisation. *Journal of South Asian Studies* 34(1):21-39.

Lee, Thomas A., Jr., ed.
1985 *Los códices mayas*. Universidad Autónoma de Chiapas, Tuxtla Gutiérrez.

Leonard, Daniel, and Karl Taube
2007 The God C Variant: A Reappraisal. Paper presented at the 72nd Annual Meeting for the Society for American Archaeology, Austin.

León Portilla, Miguel
1963 *Aztec Thought and Culture: A Study of the Ancient Nahuatl Mind*. University of Oklahoma Press, Norman.
1999 Ometeotl, el supremo dios dual, y Tezcatlipoca "dios principal." *Estudios de Cultura Náhuatl* 30:133-152.

Leventhal, Richard M., and Gary H. Gossen
1993 The Topography of Ancient Maya Religious Pluralism: A Dialogue with the Present. In *Lowland Maya Civilization in the Eighth Century A.D.*, edited by Jeremy A. Sabloff and John S. Henderson, pp. 185-218. Dumbarton Oaks, Washington, D.C.

Littmann, Edwin R.
1982 Maya Blue: Further Perspectives and the Possible Use of Indigo as the Colorant. *American Antiquity* 47(2):404-408.

Lombardo de Ruiz, Sonia
2001 Los estilos en la pintura mural maya. In *La pintura mural prehispánica en México, II, Área maya. Tomo III, Estudios*, edited by Leticia Staines Cicero, pp. 85-154. Instituto de Investigaciones Estéticas, Universidad Nacional Autónoma de México, Mexico.

López Austin, Alfredo
1993 *The Myths of the Opossum: Pathways of Mesoamerican Mythology*. University of New Mexico Press, Albuquerque.
1997 *Tamoanchan, Tlalocan: Places of Mist*. University Press of Colorado, Niwot.

López Bravo, Roberto
2000 La veneración de los ancestros en Palenque. *Arqueología Mexicana* 45(8):38-43.

López Bravo, Roberto, Javier López Mejía, and Benito Venegas Durán
2004 Del Motiepa al Murciélagos: la segunda temporada de campo del Proyecto Crecimiento Urbano de la Antigua Ciudad de Palenque. *Lakamha': Boletín Informativo del Museo y Zona Arqueológica de Palenque* 2(9):8-12.

López Luján, Leonardo
2005 *The Offerings of the Templo Mayor of Tenochtitlan*. University of New Mexico Press, Albuquerque.
2010 *Tlaltecuhtli*. Instituto Nacional de Antropología e Historia. Mexico.

Lothrop, Samuel K., ed.
1952 *Metals from the Cenote of Sacrifice at Chichen Itza, Yucatan*. Memoirs 10(2). Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Lounsbury, Floyd G.
1976 A Rationale for the Initial Date of the Temple of the Cross at Palenque. In *The Art, Iconography and Dynastic History of Palenque, Part III: Proceedings of the Segunda Mesa Redonda de Palenque, 1974*, edited by Merle Greene Robertson, pp. 211-224. Robert Louis Stevenson School, Pebble Beach.
1982 Astronomical Knowledge and its Uses at Bonampak, Mexico. In *Archaeoastronomy in the New World: American Primitive Astronomy*, edited by Anthony F. Aveni, pp 143-168. Cambridge University Press, New York.
1983 Base of the Venus Table of the Dresden Codex, and Its Significance in the Calendar-Correlation Problem. In *Calendars in Mesoamerica and Peru: Native American Computation of Time*, edited by Anthony F. Aveni and Gordon Brotherston, pp. 1-26. International Series 174. British Archaeological Reports, Oxford.
1984 Glyphic Substitution: Homophonic and Synonymic. In *Phoneticism in Mayan Hieroglyphic Writing*, edited by John S. Justeson and Lyle Campbell, pp. 167-184. Institute for Mesoamerican Studies, State University of New York, Albany.

Love, Bruce
1994 *The Paris Codex: A Handbook for a Maya Priest*. University of Texas Press, Austin.

Love, Michael, and Julia Guernsey
2007 Monument 3 from La Blanca, Guatemala: A Middle Preclassic Earthen Sculpture and its Ritual Associations. *Antiquity* 81(314):920-932.

Lowe, Gareth W.
1977 The Mixe-Zoque as Competing Neighbors of the Early Lowland Maya. In *The Origins of Maya Civilization*, edited by Richard E. W. Adams, pp. 197-248. University of New Mexico Press, Albuquerque.
1981 Olmec Horizons Defined in Mound 20, San Isidro, Chiapas. In *The Olmec and their Neighbors: Essays in Memory of Matthew Sterling*, edited by Elizabeth P. Benson, pp. 231-255. Dumbarton Oaks, Washington, D.C.
1989 The Heartland Olmec: Evolution of Material Culture. In *Regional Perspectives on the Olmec*, edited by Robert J. Sharer and David C. Grove, pp. 33-67. Cambridge University Press, Cambridge.

Lowe, Gareth, and Pierre Agrinier
1960 *Mound 1, Chiapa de Corzo, Chiapas, Mexico*. Papers 8. New World Archaeological Foundation, Brigham Young University, Provo.

Lowe, Lynneth
2012 Chiapa de Corzo y su arqueología a la luz de las investigaciones actuales. In *XXV Simposio de Investigaciones Arqueológicas en Guatemala*, edited by Bárbara Arroyo, Lorena Paiz, and Héctor Mejía, v. 1, pp. 285-292. Ministerio de Cultura y Deportes; Instituto de Antropología e Historia; Asociación Tikal, Guatemala.

MacLeod, Barbara
1990 Deciphering the Primary Standard Sequence. Ph.D. dissertation, University of Texas at Austin.
2004 A World in a Grain of Sand. In *The Linguistics of Maya Writing*, edited by Søren Wichmann, pp. 291-325. University of Utah Press, Salt Lake City.

MacLeod, Barbara, and Yuriy Polyukhovich
2005 Deciphering the Initial Sign. In *Sourcebook for the 29th Maya Hieroglyph Forum, March 11-16, 2005*, pp. 166-174. Department of Art and Art History, University of Texas, Austin.

MacLeod, Barbara, and Dorie Reents-Budet
1994 The Art of Calligraphy: Image and Meaning. In *Painting the Maya Universe: Royal Ceramics of the Classic Period*, by Dorie Reents-Budet, pp. 106-163. Duke University Press, Durham.

MacLeod, Barbara, and Andrea Stone
1995 The Hieroglyphic Inscriptions of Naj Tunich: Naj Tunich and the Tradition of Maya Cave Painting. In *Images from the Underworld*, edited by Andrea J. Stone, pp. 155-184. University of Texas Press, Austin.

Madrid Codex
n.d. The Combined Brasseur de Bourbourg and Léon de Rosny, Madrid Codex. *FAMSI*: www.famsi.org/mayawriting/codices/madrid.html.

Magaloni Kerpel, Diana
1998 El arte en el hacer: técnicas de pintura mural. In *Fragmentos del pasado. Murales prehispánicos*, edited by Beatriz de la Fuente, pp. 88-109. Universidad Nacional Autónoma de México, Mexico.
2004 Materiales, técnicas y procedimientos en la pintura mural de Mesoamerica: metodología de estudio. In *Muros que hablan. Ensayos sobre la pintura mural prehispánica en México*, edited by Beatriz de la Fuente, pp. 141-158. Colegio Nacional, Mexico.

Marcus, Joyce
1978 Archaeology and Religion: A Comparison of the Zapotec and Maya. *World Archaeology* 10(2):172-191.

Marken, Damien B.
2007 The Construction Chronology of Palenque: Seriation within an Architectural Form. In *Palenque: Recent Investigations at the Classic Maya Center*, edited by Damien B. Marken, pp. 57-81. Altamira Press, Walnut Creek.

Martin, Simon
1996 Tikal's "Star War" Against Naranjo. In *Eighth Palenque Round Table, 1993*, edited by Martha J. Macri and Jan McHargue, pp. 223-236. Pre-Columbian Art Research Institute, San Francisco.
2001 Under a Deadly Star: Warfare among the Classic Maya. In *Maya: Divine Kings of the Rain Forest*, edited by Nikolai Grube, Eva Eggebrecht, and Matthias Seidel, pp. 175-185. Könemann, Cologne.
2004 Preguntas epigráficas acerca de los escalones de Dzibanché. In *Los cautivos de Dzibanché*, edited by Enrique Nalda, pp. 104-115. Instituto Nacional de Antropología e Historia, Mexico.
2005a Of Snakes and Bats: Shifting Identities at Calakmul. *The PARI Journal* 6(2):5-13.
2005b The Mesoamerican Flood: Myth and Metaphor. Paper presented at the 10th European Maya Conference, "The Maya and their Neighbors," University of Leiden.
2006a Cacao in Ancient Maya Religion: First Fruit of the Maize Tree and Other Tales from the Underworld. In *Chocolate in the Americas: A Cultural History of Cacao*, edited by Cameron McNeil, pp. 154-183. University of Florida Press, Gainesville.
2006b Sun Bird: The Symbolism of Macaws in Ancient Maya Art. Paper presented at The Peabody Museum Weekend of the Americas, "Stairways to Immortality: Ancestors, Heroes, and Warriors," Harvard University, Cambridge.
2006c The Great Sustainer: The Role of God N in Maya Religion. Paper presented at the 24th University of Pennsylvania Museum Maya Weekend, "Maya Shamans: Magic Heroes and Spirit Healers," Philadelphia.
2006d The Old Man of the Maya Universe: Towards an Understanding of God N. Paper presented at the 30th Maya Meetings at Texas, University of Texas, Austin.
2007a Ideology and the Early Maya Polity. Paper presented at the conference "The Origins of Maya States," University of Pennsylvania Museum, Philadelphia.
2007b Theosynthesis in Ancient Maya Religion. Paper presented at the 12th European Maya Conference, "The Maya and Their Sacred Narratives: Text and Context of Maya Mythologies," Geneva.
2008 Dissecting the Cosmic Monster: The Iconography of the Altar of Stela M at Copan. Paper presented at the 32nd Maya Meetings at Texas, University of Texas, Austin.
2010 The Dark Lord of Maya Trade. In *Fiery Pool: The Maya and the Mythic Sea*, edited by Daniel Finamore and Stephen D. Houston, pp. 160-162. Yale University Press, New Haven.
2012 Carved Bowl. In *Maya Art at Dumbarton Oaks*, edited by Joanne Pillsbury, Miriam Doutriaux, Reiko Ishihara-Brito, and Alexandre Tokovinine, pp. 108-119. Pre-Columbian Art at Dumbarton Oaks 4. Dumbarton Oaks, Washington, D.C.
2013 El Templo Rojo y los mayas: arte, mitología, y contactos culturales en las pinturas de Cacaxtla. In *La pintura mural prehispánica en México, V, Cacaxtla. Tomo III, Estudios*, edited by María Teresa Uriarte Castañeda and Fernanda Salazar Gil, pp. 528-544. Instituto de Investigaciones Estéticas, Universidad Nacional Autónoma de México, Mexico.
2014 Early Classic Co-Rulers on Tikal Temple VI. *Maya Decipherment*: decipherment.wordpress.com/2014/11/22/early-classic-co-rulers-on-tikal-temple-vi/.

Martin, Simon, and Nikolai Grube
2000 *Chronicle of the Maya Kings and Queens: Deciphering the Dynasties of the Ancient Maya*. Thames and Hudson, New York.

2008 *Chronicle of the Maya Kings and Queens: Deciphering the Dynasties of the Ancient Maya*. 2nd ed. Thames and Hudson, New York.

Martínez Hernández, Juan
1913 La creación del mundo según los mayas. Páginas inéditas del manuscrito Chumayel. *Proceedings of the XVIII International Congress of Americanists*, pp. 164-171. London.

Martínez Hernández, Juan, ed.
1929 *Diccionario de Motul maya-español atribuido a Fray Antonio de Ciudad Real y Arte de la lengua maya por Fray Juan Coronel*. Compañía Tipográfica Yucateca, Mérida.

Mathews, Peter L.
[1977]2001 The Inscription on the Back of Stela 8, Dos Pilas, Guatemala. In *The Decipherment of Ancient Maya Writing*, edited by Stephen D. Houston, David Stuart, and Oswaldo Chinchilla Mazariegos, pp. 394-415. University of Oklahoma Press, Norman.
1980 Notes on the Dynastic Sequence of Bonampak, Part 1. In *Third Palenque Round Table 1978, Part 2*, edited by Merle Greene Robertson, pp. 60-73. University of Texas Press, Austin.
1997 *La escultura de Yaxchilán*. Colección Científica 368. Instituto Nacional de Antropología e Historia, Mexico.

Matos Moctezuma, Eduardo
1988 *The Great Temple of the Aztecs: Treasures of Tenochtitlan*. Thames and Hudson, London.

Matos Moctezuma, Eduardo, and Felipe Solís Olguín
2002 *Aztecs*. The Royal Academy of Arts, London.

Matteo, Sebatian, and Guido Krempel
2010 La nobleza y el estilo cerámico de Xultun, Petén, Guatemala. Paper presented at the XXIV Simposio de Investigaciones Arqueologicas en Guatemala, Museo Nacional de Arqueología y Etnología, Guatemala.

Maudslay, Alfred P.
1889-1902 *Archaeology*. 5 vols. Appendix to *Biologia Centrali-Americana; or, Contributions to the Knowledge of the Fauna and Flora of Mexico and Central America*. R. H. Porter and Dulau, London.

Mayer, Karl Herbert
1978 *Maya Monuments: Sculptures of Unknown Provenance in Europe*. Acoma Books, Ramona.
1984 *Maya Monuments: Sculptures of Unknown Provenance in Middle America*. Verlag von Flemming, Berlin.
1989 *Maya Monuments: Sculptures of Unknown Provenance, Supplement 2*. Verlag von Flemming, Berlin.
1991 *Maya Monuments: Sculptures of Unknown Provenance, Supplement 3*. Verlag Von Flemming, Berlin.
1995 *Maya Monuments: Sculptures of Unknown Provenance, Supplement 4*. Academic Publishers, Berlin.
1997 Maya Drawings and Graffiti at Pasión del Cristo II, Campeche. *Mexicon* 19(2):23-25.
2004 *The Hieroglyphic Stairway 1 at Edzna, Campeche, Mexico*. Academic Publishers, Graz.

McAnany, Patricia A.
1993 The Economics of Social Power and Wealth among Eighth-Century Maya Households. In *Lowland Maya Civilization in the Eighth Century A.D*, edited by Jeremy A. Sabloff and John S. Henderson, pp. 65-89. Dumbarton Oaks, Washington, D.C.
1995 *Living with the Ancestors: Kinship and Kingship in Ancient Maya Society*. University of Texas Press, Austin.

McDonald, Andrew J.
1983 *Tzutzuculi: A Middle-Preclassic Site on the Pacific Coast of Chiapas, Mexico*. Papers 47. New World Archaeological Foundation, Brigham Young University, Provo.

Means, Philip A.
1917 *History of the Spanish Conquest of Yucatan and of the Itzas*. Papers 7. Peabody Museum of American Archaeology and Ethnology, Harvard University, Cambridge.

Meskell, Lynn M., and Rosemary A. Joyce
2003 *Embodied Lives: Figuring Ancient Maya and Egyptian Experience*. Routledge, London.

Métropoles Mayas
1993 *Métropoles Mayas*. Musées Royaux d'Art et d'Histoire, Brussels.

Meyer, Karl E.
1973 *The Plundered Past: The Story of the Illegal International Traffic in Works of Art*. Atheneum, New York.

Milbrath, Susan
1999 *Star Gods of the Maya: Astronomy in Art, Folklore, and the Calendars*. University of Texas Press, Austin.
2002 New Questions Concerning the Authenticity of the Grolier Codex. *Latin American Indian Literatures Journal* 18(1):50-83.

Miles, Susan
1957 The Sixteenth Century Pokom-Maya: A Documentary Analysis of Social Structure and Archaeological Setting. *Transactions* 47:733-781. American Philosophical Society, Philadelphia.

Miller, Arthur G.
1973 *Mural Painting of Teotihuacan*. Dumbarton Oaks, Washington, D.C.
1982 *On the Edge of the Sea: Mural Painting at Tancah-Tulum, Quintana Roo, Mexico*. Dumbarton Oaks, Washington, D.C.
1995 *The Painted Tombs of Oaxaca, Mexico: Living with the Dead*. Cambridge University Press, Cambridge.

Miller, Mary, and Claudia Brittenham
2013 *The Spectacle of the Late Maya Court: The Murals of Bonampak*. University of Texas Press, Austin.

Miller, Mary, and Simon Martin
2004 *Courtly Art of the Ancient Maya*. Fine Arts Museums of San Francisco; Thames and Hudson, New York.

Miller, Mary Ellen, and Karl Taube
1993 *An Illustrated Dictionary of the Gods and Symbols of Ancient Mexico and the Maya*. Thames and Hudson, London.

Monaghan, John D.
2000 Theology and History in the Study of Mesoamerican Religions. In *Supplement to the Handbook of Middle American Indians, Volume 6: Ethnology*, edited by John D. Monaghan, pp. 24-49. University of Texas Press, Austin.

Montgomery, John, and Christophe Helmke
2007 Dictionary of Maya Hieroglyphs. *FAMSI*: www.famsi.org/mayawriting/dictionary.htm.

Morán, Fray Pedro
1695 Arte de la lengua cholti que quiere decir lengua de milperos. Compuesto en este pueblo de lacandones llamado de la Señora de los Dolores, el 24 de junio de 1695. Photocopy of manuscript in the collection of the Instituto de Investigaciones Filológicas de la Universidad Nacional Autónoma de México, Mexico.

Morley, Sylvanus Griswold
1920 *The Inscriptions at Copan*. Publication 219. Carnegie Institution of Washington, Washington, D.C.

Morris, Ann A.
1931 Murals from the Temple of the Warriors and Adjacent Structures. In *The Temple of the Warriors*, by Earl Morris, Jean Charlot, and Ann Axtell Morris, pp. 347-481. Publication 406. Carnegie Institution of Washington, Washington, D.C.

Morris, Earl, Jean Charlot, and Ann Axtell Morris
1931 *The Temple of the Warriors*. Publication 406. Carnegie Institution of Washington, Washington, D.C.

Musée Rath Genève
1998 *Mexique: Terre des Dieux*. Musées d'Art et d'Histoire, Geneva.

Nájera, Martha Ilia
2003 *El don de la sangre en el equilibrio cósmico. El sacrificio y el autosacrificio sangriento entre los antiguos mayas*. Universidad Nacional Autónoma de México, Mexico.

Nehammer Knub, Julie, Simone Thun, and Christophe Helmke
2009 The Divine Rite of Kings: An Analysis of Classic Maya Impersonation Statements. In *The Maya and Their Sacred Narratives: Text and Context in Maya Mythologies*, edited by Geneviève Le Fort, Raphaël Gardiol, Sebastian Matteo, and Christophe Helmke, pp. 177-195. Acta Mesoamericana 20. Verlag Anton Saurwein, Markt Schwaben.

Neumann, Frankie J.
1973 Paper: A Sacred Material in Aztec Ritual. *History of Religions* 13(2):149-159.

Newsome, Elizabeth A.
2001 *Trees of Paradise and Pillars of the World: The Serial Stela Cycle of "18-Rabbit-God K," King of Copan*. University of Texas Press, Austin.

Nicholson, Henry B.
1967a A Fragment of an Aztec Relief Carving of the Earth Monster. *Journal de la Société des Américanistes* 56(1):81-94.
1967b A "Royal Headband" of the Tlaxcalteca. *Revista Mexicana de Estudios Antropológicos* 21:71-106.
1971 Religion in pre-Hispanic Central Mexico. In *Handbook of Middle American Indians 10: Archaeology of Northern Mesoamerica*, edited by Gordon F. Ekholm and Ignacio Bernal, pp. 395-446. University of Texas Press, Austin.
1985 The New Tenochtitlan Templo Mayor Coyolxauhqui-Chantico Monument. *Indiana* 10:77-98.

Nielsen, Jesper, and Christophe Helmke
2015 *The Fall of the Great Celestial Bird: A Master Myth in Early Classic Central Mexico*. Ancient America 13. Boundary End Center; Mesoamerica Center, University of Texas at Austin, Barnardsville and Austin.

Nowotny, Karl Anton
1961 *Tlacuilolli, die mexikanischen Bilderhandschriften, Stil und Inhalt, mit einem Katalog der Codex-Borgia-Gruppe*. Ibero-Amerikanische Bibliotek, Berlin.

Nuñez de la Vega, Francisco
[1702]1988 *Constituciones diocesanas del obispado de Chiapa*. Fuentes para el Estudio de la Cultura Maya 6. Centro de Estudios Mayas, Instituto de Investigaciones Filológicas, Universidad Nacional Autónoma de México, Mexico.

Ola Orie, Olanike, and Victoria E. Bricker
2000 Placeless and Historical Laryngeals in Yucatec Maya. *International Journal of American Linguistics* 66(3):283-317.

Ortíz C., Ponciano, and María del Carmen Rodríguez
1999 Olmec Ritual Behavior at El Manatí: A Sacred Space. In *Social Patterns in Pre-Classic Mesoamerica*, edited by David C. Grove and Rosemary A. Joyce, pp. 225-254. Dumbarton Oaks, Washington, D.C.

Palomo, Juan Manuel
2013 Mortuary Treatments at the Ancient Maya Center of Ceibal, Guatemala. M.A. thesis, University of Arizona, Tucson.

Paris Codex
1968 *Codex Peresianus*. Akademische Druck- und Verlagsanstalt, Graz.

Parsons, Lee Allen
1983 Altars 9 and 10, Kaminaljuyu, and the Evolution of the Serpent-Winged Deity. In *Civilization in the Ancient Americas: Essays in Honor of Gordon R. Willey*, edited by Richard M. Leventhal and Alan L. Kolata, pp. 145-156. University of New Mexico Press, Albuquerque.
1993 The Izapa Style and the Tibas Jade. In *Precolumbian Jade: New Geological and Cultural Interpretations*, edited by Frederick Lange, pp. 251-259. University of Utah Press, Salt Lake City.

Pasztory, Esther
1983 *Aztec Art*. Harry N. Abrams, New York.

Paxton, Meredith
2001 *The Cosmos of the Yucatec Maya: Cycles and Steps from the Madrid Codex*. University of New Mexico Press, Albuquerque.

Pendergast, David M.
1969 *Altun Ha, British Honduras (Belize): The Sun God's Tomb*. Occasional Papers 19. Royal Ontario Museum, Toronto.

Perry, Eugene, Adina Paytan, Bianca Pedersen, and Guadalupe Velazquez-Oliman
2009 Groundwater Geochemistry of the Yucatan Peninsula, Mexico: Constraints on Stratigraphy and Hydrogeology. *Journal of Hydrology* 367:27-40

Pillsbury, Joanne, Miriam Doutriaux, Reiko Ishihara-Brito, and Alexandre Tokovinine, eds.
2012 *Ancient Maya Art at Dumbarton Oaks*. Pre-Columbian Art at Dumbarton Oaks 4. Dumbarton Oaks, Washington, D.C.

Pohorilenko, Anatole
1996 Portable Carvings in the Olmec Style. In *Olmec Art of Ancient Mexico*, edited by Elizabeth Benson and Beatriz de la Fuente, pp. 118-131. National Gallery of Art, Washington, D.C.

Ponciano, Erick M.
2000 Apéndice al informe sobre la Tumba 25, Río Azul, Petén, Guatemala. In *Río Azul Reports, No. 5: The 1987 Season*, edited by Richard E. W. Adams, p. 239. Center for Archaeological Research, University of Texas, San Antonio.

Pope, Elizabeth I.
2006 Mythic Architecture and Drama in Ancient Mesoamerica: The Manifestation of the Mythological Landscape in the Historical World. Ph.D. dissertation, University of Texas at Austin.

Porter, Barbara N.
2000a One God or Many? A Brief Introduction to a Complex Problem. In *One God or Many? Concepts of Divinity in the Ancient World*, edited by Barbara N. Porter, pp. 1-8. Transactions of the Casco Bay Assyriological Institute, New York.

Porter, Barbara N. (continued)
2000b The Anxiety of Multiplicity: Concepts of Divinity as One and Many in Ancient Assyria. In *One God or Many? Concepts of Divinity in the Ancient World*, edited by Barbara N. Porter, pp. 211-271. Transactions of the Casco Bay Assyriological Institute, New York.

Porter, Barbara N., ed.
2000 *One God or Many? Concepts of Divinity in the Ancient World*. Transactions of the Casco Bay Assyriological Institute, New York.

Prager, Christian M.
2013 Übernatürliche Akteure in der Klassischen Maya-Religion: Eine Untersuchung zu intrakultureller Variation und Stabilität am Beispiel des *k'uh* "Götter"-Konzepts in den religiösen Vorstellungen und Überzeugungen Klassischer Maya-Eliten (250 - 900 n.Chr.). Ph.D dissertation, University of Bonn.

Proskouriakoff, Tatiana
1962 The Artifacts of Mayapan. In *Mayapan, Yucatan, Mexico*, edited by Harry E. D. Pollock, Ralph L. Roys, Tatiana Proskouriakoff, and A. Ledyard Smith, pp. 321-442. Publication 619. Carnegie Institution of Washington, Washington, D.C.
1974 *Jades from the Cenote of Sacrifice, Chichen Itza, Yucatan*. Harvard University, Cambridge.
1978 Olmec Gods and Maya God-Glyphs. In *Codex Wauchope*, edited by Marco Giardino, Barbara Edmonson, and Winifred Creamer, pp. 113-117. Tulane University, New Orleans.

Proskouriakoff, Tatiana, and J. Eric S. Thomson
1947 Maya Calendar Round Dates Such as 9 Ahau 17 Mol. *Notes on Middle American Archaeology and Ethnology* 79. Carnegie Institution of Washington, Cambridge.

Prufer, Keith M., and Andrew Kindon
2005 Replicating the Sacred Landscape: The Chen at Muklebal Tzul. In *Stone Houses and Earth Lords: Maya Religion in the Cave Context*, edited by Keith M. Prufer and James E. Brady, pp. 25-46. University Press of Colorado, Boulder.

Reents-Budet, Dorie
1991 The "Holmul Dancer" Theme in Maya Art. In *Sixth Palenque Round Table, 1986*, edited by Virginia M. Fields, pp. 217-222. University of Oklahoma Press, Norman.
1994 *Painting the Maya Universe: Royal Ceramics of the Classic Period*. Duke University Press; Duke University Museum of Art, Durham.

Reents-Budet, Dorie, Ronald L. Bishop, and Ellen Bell
2004 Secretos bajo la superficie: la cerámica maya y las antiguas prácticas funerarias. In *Culto funerário en la sociedad maya. Memoria de la Cuarta Mesa Redonda de Palenque*, pp. 309-332. Instituto de Antropología e Historia, Mexico.

Reilly, F. Kent, III
1991 Olmec Iconographic Influences on the Symbols of Maya Rulership. In *Sixth Palenque Round Table, 1986*, edited by Virginia M. Fields, pp. 151-166. University of Oklahoma Press, Norman.
1995 Art, Ritual, and Rulership in the Olmec World. In *The Olmec World: Ritual and Rulership*, edited by Jill Guthrie, pp. 26-45. The Art Museum, Princeton University, Princeton.
1999 Mountains of Creation and Underworld Portals: The Ritual Function of Olmec Architecture at La Venta, Tabasco. In *Mesoamerican Architecture as a Cultural Symbol*, edited by Jeff Karl Kowalski, pp. 14-39. Oxford University Press, Oxford.

Relaciones de Yucatán
1898-1900 *Coleccion de documentos inéditos relativos al descubrimiento, conquista y organización de las antiguas posesiones españolas de ultramar*. 2nd series. Real Academia de la Historia, Madrid.

Reyes Valerio, Constantino
1993 *De Bonampak al Templo Mayor. El azul maya en Mesoamérica*. Siglo XXI Editores, Mexico.

Ringle, William M.
1988 Of Mice and Monkeys: The Value and Meaning of T1016, the God C Hieroglyph. *Research Reports on Ancient Maya Writing* 18:1-22. Center for Maya Research, Washington, D.C.

Rishel, Joseph J., and Suzanne L. Stratton, eds.
2006 *The Arts in Latin America, 1492-1820*. Yale University Press, New Haven.

Rivard, Jean-Jacques
1965 Cascabeles y ojos del dios maya de la muerte, Ah Puch. *Estudios de Cultura Maya* 5:75-91.

Robelo, Cecilio Augustín
1911 Origen del calendario náhuatl. *Anales* 3:337-350. Museo Nacional de Arqueología, Historia y Etnología, Mexico.

Robertson, John, Stephen Houston, Marc Zender, and David Stuart
2007 *Universals and the Logic of the Material Implication: A Case Study from Maya Hieroglyphic Writing*. Research Reports on Ancient Maya Writing 62. Electronic document, http://repositories.lib.utexas.edu/handle/2152/17706.

Robertson, Merle Greene
1974 The Quadripartite Badge: A Badge of Rulership. In *Primera Mesa Redonda de Palenque, Part I: A Conference on the Art, Iconography, and Dynastic History of Palenque, 1973*, edited by Merle Greene Robertson, pp. 77-93. Robert Louis Stevenson School, Pebble Beach.
1985a *The Sculpture of Palenque, Volume II: The Early Buildings of the Palace and the Wall Paintings*. Princeton University Press, Princeton.
1985b *The Sculpture of Palenque, Volume III: The Late Buildings of the Palace*. Princeton University Press, Princeton.
2000 Murals Found in Subterranean Tomb of Temple XX, Palenque. *Pre-Columbian Art Research Institute Newsletter* 31:1-4.
2001 Los murales de la tumba del Templo XX Sub de Palenque. In *La pintura mural prehispánica en México, II, Área maya. Tomo IV, Estudios*, edited by Leticia Staines Cicero, pp. 381-388. Instituto de Investigaciones Estéticas, Universidad Nacional Autónoma de México, Mexico.

Robichaux, Hubert R.
1990 Hieroglyphic Texts of Río Azul, Guatemala. M.A. thesis, University of Texas at San Antonio.

Robichaux, Hubert R., and Brett A. Houk
2005 A Hieroglyphic Plate Fragment from Dos Hombres, Belize: Epigraphic and Archaeological Evidence Relating to Political Organization in the Three Rivers Region of Northwestern Belize and Northeastern Guatemala. *Mono y Conejo* 3:4-12.

Robicsek, Francis, and Donald M. Hales
1981 *The Maya Book of the Dead, The Ceramic Codex. The Corpus of Codex-Style Ceramics of the Late Classic Period*. University of Virginia Art Museum, Charlottesville.
1982 *Maya Ceramic Vases from the Late Classic Period: The November Collection of Maya Ceramics*. University of Virginia Art Museum, Charlottesville.

Rodríguez, María del Carmen, and Ponciano Ortíz
2000 A Massive Offering of Axes at La Merced, Hidalgotitlán, Veracruz, Mexico. In *Olmec Art and Archaeology in Mesoamerica*, edited by John E. Clark and Mary E. Pye, pp. 155-167. National Gallery of Art, Washington, D.C.

Roys, Ralph L.
1933 *The Book of Chilam Balam of Chumayel*. Publication 438. Carnegie Institution of Washington, Washington, D.C.
1965 *The Ritual of the Bacabs*. University of Oklahoma Press, Norman.

Ruvalcaba, José L., Sandra Zetina, Helena Calvo del Castillo, Elsa Arroyo, Eumelia Hernández, Marie Van der Meeren, and Laura Sotelo
2007 The Grolier Codex: A Non Destructive Study of a Possible Maya Document Using Imaging and Ion Beam Techniques. *Materials Research Society Symposium Proceedings* 1047:299-306.

Ruz Lhuillier, Alberto
1962 Exploraciones arqueológicas en Palenque: 1957. *Anales* 14(43):35-90. Instituto Nacional de Antropología e Historia, Mexico.
1991 *Costumbres funerarias de los antiguos mayas*. Universidad Nacional Autónoma de México, Mexico.

Sabloff, Jeremy A.
1975 *Excavations at Seibal, Department of Peten, Guatemala. Ceramics*. Memoirs 13(2). Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Sahagún, Fray Bernardino de
1950-1982 *Florentine Codex: General History of the Things of New Spain*. Translated from the Aztec into English, with Notes and Illustrations by Arthur J. O. Anderson and Charles E. Dibble. 12 vols. School of American Research Press; University of Utah, Santa Fe.

San Román Martín, María Elena
2007 La cerámica de Palenque: buscando una metodología para su estudio y clasificación. Report submitted to the Foundation for the Advancement of Mesoamerican Studies. Available: www.famsi.org/reports/03097es/03097esSanRoman01.pdf.

Satterthwaite, Linton
1964 Long Count Positions of Maya Dates in the Dresden Codex, with Notes on Lunar Positions and the Correlation Problem. *Proceedings of the 35th International Congress of Americanists, Mexico City* 2:47-67.

Saturno, William A.
2007 San Bartolo and the Preclassic Maya Lowlands. Paper presented at the 25th University of Pennsylvania Museum Maya Weekend, "The Dawn of Maya Civilization," Philadelphia.

Saturno, William, David Stuart, Anthony Aveni, and Franco Rossi
2012 Ancient Maya Astronomical Tables at Xultun, Guatemala. *Science* 336(6082):714-717.

Saturno, William A., Karl A. Taube, and David Stuart
2005 *The Murals of San Bartolo, El Petén, Guatemala, Part 1: The North Wall*. Ancient America 7. Center for Ancient American Studies, Barnardsville.

Saville, Marshall H.
1926 Mosaic Decorated Stone Masks in Ancient Mexico. *Indian Notes* 3(1):1-9. Museum of the American Indian, Heye Foundation, New York.

Schele, Linda
1987 New Data on the Paddlers from Butz'-Chan of Copán. *Copán Notes* 29. Copán Mosaics Project; Instituto Hondureño de Antropología e Historia, Austin.
1991 An Epigraphic History of the Western Maya Region. In *Classic Maya Political History: Hieroglyphic and Archaeological Evidence*, edited by T. Patrick Culbert, pp. 72-101. School of American Research Advanced Seminar Series. Cambridge University Press, New York.
1993 The Demotion of Chak-Zutz': Lineage Compounds and Subordinate Lords at Palenque. In *Sixth Palenque Round Table, 1986*, edited by Virginia Fields, pp. 6-11. University of Oklahoma Press, Norman.
1995 The Olmec Mountain and Tree of Creation in Mesoamerican Cosmology. In *The Olmec World: Ritual and Rulership*, edited by Jill Guthrie, pp. 104-117. The Art Museum, Princeton University, Princeton.
1997 *Hidden Faces of the Maya*. Alti Publishing, Singapore.

Schele, Linda, and Nikolai Grube
2002 Introduction to Maya Hieroglyphic Writing. In *Notebook for the XXVIIth Maya Hieroglyphic Forum at Texas*, edited by Nikolai Grube, pp. 1-88. Maya Workshop Foundation; University of Texas, Austin.

Schele, Linda, and Peter Mathews
1998 *The Code of Kings: The Language of Seven Sacred Maya Temples and Tombs*. Scribner, New York.

Schele, Linda, and Jeffrey Miller
1983 *Mirror, the Rabbit, and the Bundle: Accession Expressions from the Classic Maya Inscriptions*. Studies in Pre-Columbian Art and Archaeology 25. Dumbarton Oaks, Washington, D.C.

Schele, Linda, and Mary Miller
1986 *The Blood of Kings: Dynasty and Ritual in Maya Art*. Braziller; Kimbell Art Museum, Fort Worth.

Schellhas, Paul
1904 *Representation of Deities of the Maya Manuscripts*. 2nd ed. Papers 4(1). Peabody Museum of American Archaeology and Ethnology, Harvard University, Cambridge.

Schmidt, Peter J.
2007 Birds, Ceramics, and Cacao: New Excavations at Chichén Itzá, Yucatan. In *Twin Tollans: Chichén Itzá, Tula, and the Epiclassic to Early Postclassic Mesoamerican World*, edited by Jeff Karl Kowalski and Cynthia Kristan-Graham, pp. 150-203. Dumbarton Oaks, Washington, D.C.

Schmidt, Peter J., Mercedes de la Garza, and Enrique Nalda
1998 *Maya*. Rizzoli, New York.

Schmidt, Peter J., David Stuart, and Bruce Love
2012 Inscriptions and Iconography of Castillo Viejo, Chichen Itza. *The PARI Journal* 9(2):1-17.

Seler, Eduard
[1887]1990 *Collected Works in Mesoamerican Linguistics and Archaeology*, Vol. 1. 2nd ed. J. Eric S. Thompson and Francis B. Richardson, eds. Labyrinthos, Culver City.
1898 Quetzalcouatl-Kukulcan in Yucatan. *Zeitschrift für Ethnologie* 30:377-410.
1904 Venus Period in the Picture Writings of the Borgian Codex Group. In *Mexican and Central American Antiquities, Calendar Systems, and History*, edited and translated under the supervision of Charles P. Bowditch, pp. 355-391. Bulletin 28. Bureau of American Ethnology, Washington, D.C.
[1905]1993 *Collected Works in Mesoamerican Linguistics and Archaeology*, Vol. 2. 2nd ed. J. Eric S. Thompson and Francis B. Richardson, eds. Labyrinthos, Culver City.
1963 *Comentarios al Códice Borgia*. 3 vols. M. Fenk, trans. Fondo de Cultura Económica, Mexico.

Shook, Edwin M., and Robert Heizer
1976 An Olmec Sculpture from the South (Pacific) Coast of Guatemala. *Journal of New World Archaeology* 1(3):1-8.

Smailus, Ortwin
1975 *El maya-chontal de Acalán. Análisis lingüístico de un documento de los años 1610-12*. Universidad Nacional Autónoma de México, Mexico.

Smith, A. Ledyard
1950 *Uaxactun, Guatemala: Excavations of 1931-1937*. Publication 588. Carnegie Institution of Washington, Washington, D.C.
1982 Major Architecture and Caches. In *Excavations at Seibal, Department of Peten, Guatemala*, edited by Gordon R. Willey, pp. 1-263. Memoirs 15(1). Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Smith, A. Ledyard, and Alfred V. Kidder
1951 *Excavations at Nebaj, Guatemala*. Publication 594. Carnegie Institution of Washington, Washington, D.C.

Smith, Robert E., and James C. Gifford
1966 Maya Ceramic Varieties, Types, and Wares at Uaxactun: Supplement to "Ceramic Sequence at Uaxactun, Guatemala." Preprint of *Middle American Research Records* 3:125-174. Publication 28. Middle American Research Institute, Tulane University, New Orleans.

Solís, Felipe, gen. org.
2009 *Teotihuacan: Cité des Dieux*. Musée du quai Branly; Somogy, Paris.

Sosa, John
1985 The Maya Sky, The Maya World: A Symbolic Analysis of Yucatec Maya Cosmology. Ph.D. dissertation, State University of New York at Albany.

Soustelle, Jacques
1940 *La Pensée Cosmologique des Anciens Mexicains*. Hermann et Cie, Paris.

Spinden, Herbert J.
1913 *A Study of Maya Art: Its Subject Matter and Historical Development*. Memoirs 6. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
1928 Maya Inscriptions Dealing with Venus and the Moon. *Bulletin of the Buffalo Society of Natural Sciences* 14(1):5-59.

Steinbrenner, Larry
2005 The Grolier Codex: A Venus Table for a Quetzalcoatl Cult? In *Art for Archaeology's Sake: Material Culture and Style Across the Disciplines*, edited by Andrea Waters-Rist, Christine Cluney, Calla McNamee, and Larry Steinbrenner, pp. 76-81. The Archaeological Association of the University at Calgary, Calgary.

Stone, Andrea
1983 The Zoomorphs of Quirigua, Guatemala. Ph.D. dissertation, University of Texas at Austin.
1985 Variety and Transformation in the Cosmic Monster Theme at Quirigua, Guatemala. In *Fifth Palenque Round Table, 1983*, edited by Virginia M. Fields, pp. 39-48. Pre-Columbian Art Research Institute, San Francisco.
1989 Disconnection, Foreign Insignia, and Political Expansion: Teotihuacan and the Warrior Stelae of Piedras Negras. In *Mesoamerica after the Decline of Teotihuacan, A.D. 700–900*, edited by Richard A. Diehl and Janet C. Berlo, pp. 153-172. Dumbarton Oaks, Washington, D.C.
1995 *Images from the Underworld: Naj Tunich and the Tradition of Maya Cave Painting*. University of Texas Press, Austin.

Stone, Andrea, and Marc Zender
2011 *Reading Maya Art: A Hieroglyphic Guide to Ancient Maya Painting and Sculpture*. Thames and Hudson, London.

Straight, Kirk D.
2003 Reporte de la cerámica de la Estructura XIX: observaciones preliminares; reporte de análisis de materiales. In Informe arqueológico del Proyecto Grupo de las Cruces de la temporada 2002. Report submitted to the Instituto Nacional de Antropología e Historia, Mexico.
2007 A House of Cards: Construction, Proportion, and Form at Temple XIX, Palenque, Chiapas, Mexico. In *Palenque: Recent Investigations at the Classic Maya Center*, edited by Damien B. Marken, pp. 175-204. Altamira Press, Walnut Creek.

Stross, Brian
1989 A Note on the Copan Emblem Glyph. *Copán Notes* 54. Copán Mosaics Project; Instituto Hondureño de Antropología e Historia, Austin.
1991 La Mojarra Stela 1: Fish and Maize in Late Formative Iconography. Paper presented at the First Sibley Family Symposium on World Traditions of Culture and Art, "The Symbols of Kingship: Comparative Strategies around the World." University of Texas, Austin.

Stuart, David
1984 Royal Auto-Sacrifice among the Maya: A Study of Image and Meaning. *Res: Anthropology and Aesthetics* 7/8:6-20.
1985 The Yaxha Emblem Glyph as *Yax-ha*. *Research Reports on Ancient Maya Writing* 1:1-6. Center for Maya Research, Washington, D.C.
1986 The Chronology of Stela 4 at Copán. *Copán Notes* 12. Copán Mosaics Project; Instituto Hondureño de Antropología e Historia, Austin.
1987a *Ten Phonetic Syllables*. Research Reports on Ancient Maya Writing 14. Center for Maya Research, Washington, D.C.

Stuart, David (continued)
1987b The Paintings of Tomb 12, Río Azul. In *Río Azul Reports, No. 3: The 1985 Season*, edited by Richard E. W. Adams, pp. 161-167. Center for Archaeological Research, University of Texas, San Antonio.
1988 Blood Symbolism in Maya Iconography. In *Maya Iconography*, edited by Elizabeth P. Benson and Gillett G. Griffin, pp. 175-221. Princeton University Press, Princeton.
1989 Hieroglyphs on Maya Vessels. In *The Maya Vase Book: A Corpus of Rollout Photographs of Maya Vases, Volume 1*, pp. 159-160. Kerr Associates, New York.
[1992]2010 The LAKAM Sign. Manuscript. Available: decipherment.wordpress.com/2010/03/08/the-lakam-logogram.
1993a Breaking the Code: Rabbit Story. In *Lost Kingdoms of the Maya*, by Gene S. Stuart and George E. Stuart, pp. 170-171. National Geographic Society, Washington, D.C.
1993b Historical Inscriptions and the Maya Collapse. In *Lowland Maya Civilization in the Eighth Century A.D.: A Symposium at Dumbarton Oaks 7th and 8th October 1989*, edited by Jeremy A. Sabloff and John S. Henderson, pp. 321-354. Dumbarton Oaks, Washington, D.C.
1997 The Hills are Alive: Sacred Mountains and the Maya Cosmos. *Symbols* (Spring):13-17.
1998 "The Fire Enters His House": Architecture and Ritual in Classic Maya Texts. In *Function and Meaning in Classic Maya Architecture*, edited by Stephen D. Houston, pp. 373-425. Dumbarton Oaks, Washington, D.C.
[2000]2007 The Maya Hieroglyphs for Mam, "Grandfather, Grandson, Ancestor." Manuscript. Available: decipherment.files.wordpress.com/2007/09/mam-glyph.pdf.
2003 A Cosmological Throne at Palenque. *Mesoweb*: www.mesoweb.com/stuart/notes/Throne.pdf.
2004a New Year Records in Classic Maya Inscriptions. *The PARI Journal* 5(2):1-6.
2004b The Entering of the Day: An Unusual Date from Northern Campeche. *Mesoweb*: www.mesoweb.com/stuart/notes/EnteringDay.pdf.
2005a A Foreign Past: The Writing and Representation of History on a Royal Ancestral Shrine at Copan. In *Copán: The History of an Ancient Maya Kingdom*, edited by E. Wyllys Andrews and William L. Fash, pp. 373-394. School of American Research Press, Santa Fe.
2005b Glyphs on Pots: Decoding Classic Maya Ceramics. In *Sourcebook for the 29th Maya Hieroglyph Forum, March 11-16, 2005*, pp. 110-165. Department of Art and Art History, University of Texas, Austin.
2005c *The Inscriptions from Temple XIX at Palenque*. Pre-Columbian Art Research Institute, San Francisco.
2006a Jade and Chocolate: Bundles of Wealth in Classic Maya Economics and Ritual. In *Sacred Bundles: Ritual Acts of Wrapping and Binding in Mesoamerica*, edited by Julia Guernsey and F. Kent Reilly, pp. 127-144. Boundary End Archaeology Research Center, Barnardsville.
2006b The Palenque Mythology. In *Sourcebook for the 30th Maya Meetings, March 14-19, 2006*, pp. 85-194. Mesoamerica Center; Department of Art and Art History, University of Texas, Austin.
2007a Old Notes on the Possible ITZAM sign. *Maya Decipherment*: decipherment.wordpress.com/2007/09/29/old-notes-on-the-possible-itzam-sign/.
2007b Presentation at the Hieroglyphic Forum, The 31st Maya Meetings at Texas, University of Texas, Austin.
2007c Reading the Water Serpent as WITZ'. *Maya Decipherment*: decipherment.wordpress.com/2007/04/13/reading-the-water-serpent/.
2010 Shining Stones: Observations on the Ritual Meaning of Early Maya Stelae. In *The Place of Stone Monuments: Context, Use and Meaning in Mesoamerica's Preclassic Transition*, edited by Julia Guernsey, John E. Clark, and Barbara Arroyo, pp. 283-298. Dumbarton Oaks, Washington, D.C.
2011 Some Working Notes on the Text of Tikal Stela 31. *Mesoweb*: www.mesoweb.com/stuart/notes/Tikal.pdf.
2012 *The Order of Days: Unlocking the Secrets of the Ancient Maya*. Three Rivers Press, New York.

Stuart, David, and Stephen Houston
1994 *Classic Maya Place Names*. Studies in Pre-Columbian Art and Archaeology 33. Dumbarton Oaks, Washington, D.C.

Stuart, David, Stephen D. Houston and John Robertson
1999 Recovering the Past: Classic Mayan Language and Classic Maya Gods. In *Notebook for the XXIIIrd Maya Hieroglyphic Forum at Texas, March, 1999*, pt. 2. Department of Art and Art History; College of Fine Arts; Institute of Latin American Studies, University of Texas, Austin.

Stuart, David, and George Stuart
2008 *Palenque: Eternal City of the Maya*. Thames and Hudson, London.

Stuart, George
1988 A Guide to the Style and Content of the Series Research Reports on Ancient Maya Writing. Special Supplement to *Research Reports on Ancient Maya Writing 15*. Center for Maya Research, Washington, D.C.

Swadesh, Morris, Christina Álvarez, and Juan Ramón Bastarrachea Manzano
1970 *Diccionario de elementos del maya yucateco colonial*. Centro de Estudios Mayas, Cuadernos 3. Coordinación de Humanidades, Universidad Nacional Autónoma de México, Mexico.

Tarn, Nathaniel, and Martin Prechtel
1997 *Scandals in the House of Birds: Shamans and Priests on Lake Atitlán*. Marsilio, New York.

Taube, Karl Andreas
1986 The Teotihuacan Cave of Origin: The Iconography and Architecture of Emergence Mythology in Mesoamerica and the American Southwest. *Res: Anthropology and Aesthetics* 12:51-82.
1987 A Representation of the Principal Bird Deity in the Paris Codex. *Research Reports on Ancient Maya Writing* 6:1-10. Center for Maya Research, Washington, D.C.
1988 The Ancient Yucatec New Year Festival: The Liminal Period in Maya Ritual and Cosmology. Ph.D. dissertation, Department of Anthropology, Yale University.
1989a Itzam Cab Ain: Caimans, Cosmology, and Calendrics in Postclassic Yucatán. *Research Reports on Ancient Maya Writing* 26:1-12. Center for Maya Research, Washington, D.C.
1989b The Maize Tamale in Classic Maya Diet, Epigraphy, and Art. *American Antiquity* 54(1):31-51.
1992a The Iconography of Mirrors at Teotihuacan. In *Art, Polity, and the City of Teotihuacan*, edited by Janet C. Berlo, pp. 169-204. Dumbarton Oaks, Washington, D.C
1992b *The Major Gods of Yucatan: Schellhas Revisited*. Studies in Pre-Columbian Art and Archaeology 32. Dumbarton Oaks, Washington, D.C..
1994 The Iconography of Toltec Period Chichen Itza. In *Hidden among the Hills: Maya Archaeology of the Northwestern Yucatan Peninsula*, edited by Hanns J. Prem, pp. 212-246. Acta Mesoamericana 7. Verlag von Flemming, Möckmühl.
1994 The Birth Vase: Natal Imagery in Ancient Maya Myth and Ritual. In *The Maya Vase Book: A Corpus of Rollout Photographs of Maya Vases, Volume 4*, edited by Barbara Kerr and Justin Kerr, pp. 652-685. Kerr Associates, New York.
1998 The Jade Hearth: Centrality, Rulership, and the Classic Maya Temple. In *Function and Meaning in Classic Maya Architecture*, edited by Stephen D. Houston, pp. 427-478. Dumbarton Oaks, Washington, D.C.
2000 The Turquoise Hearth: Fire, Self-Sacrifice, and the Central Mexican Cult of War. In *Mesoamerica's Classic Heritage: From Teotihuacan to the Aztecs*, edited by Davíd Carrasco, Lindsay Jones, and Scott Sessions, pp. 269-340. University Press of Colorado, Boulder
2001 The Breath of Life: The Symbolism of Wind in Mesoamerica and the American Southwest. In *The Road to Aztlan: Art From a Mythic Homeland*, edited by Virginia M. Fields and Victor Zamudio-Taylor, pp. 102-123. Los Angeles County Museum of Art, Los Angeles.
2003 Tetitla and the Maya Presence at Teotihuacan. In *Teotihuacan and the Maya: Reinterpreting Early Classic Maya Interaction*, edited by Geoffrey E. Braswell, pp. 273-314. University of Texas Press, Austin.
2003 Maws of Heaven and Hell: The Symbolism of the Centipede and Serpent in Classic Maya Religion. In *Antropología de la eternidad: la muerte en la cultura maya*, edited by Andrés Ciudad Ruiz, Mario Humberto Ruz Sosa, and María Josefa Iglesias Ponce de León, pp. 405-442. Sociedad Española de Estudios Mayas, Madrid.
2004a Aztec Religion: Creation, Sacrifice, and Renewal. In *The Aztec Empire*, pp. 168-177. Guggenheim Museum, New York.
2004b Flower Mountain: Concepts of Life, Beauty and Paradise among the Classic Maya. *Res: Anthropology and Aesthetics* 45:69-98.
2004c *Olmec Art at Dumbarton Oaks*. Dumbarton Oaks, Washington, D.C.
2005 The Symbolism of Jade in Classic Maya Religion. *Ancient Mesoamerica* 16(1):23-50.
2007 In the World of the Sun: Solar Imagery and Symbolism among the Classic Maya. Paper presented at the 31st Maya Meetings at Texas, University of Texas, Austin.
2009 The Womb of the World: The Cuauhxicalli and Other Offering Bowls of Ancient and Contemporary Mesoamerica. In *Maya Archaeology 1*, edited by Charles Golden, Stephen Houston, and Joel Skidmore, pp. 86-106. Precolumbia Mesoweb Press, San Francisco.
2010 At Dawn's Edge: Tulum, Santa Rita and Floral Symbolism of Late Postclassic Yucatan. In *Astronomers, Scribes, and Priests: Intellectual Interchange between the Northern Maya Lowlands and Highland Mexico in the Late Postclassic Period*, edited by Gabrielle Vail and Christine Hernandez, pp. 145-191. Dumbarton Oaks, Washington, D.C.
2012 The Symbolism of Turquoise in Postclassic Mexico. In *Turquoise in Mexico and North America: Science, Conservation, Culture and Collections*, edited by J. C. H. King, Max Carocci, Carolyn Cartwright, Colin McEwan, and Rebecca Stacy, pp. 117-134. British Museum, London.

Taube, Karl A., Heather Hurst, Yasmin O'Grady, Angelyn Bass, William Saturno, and David Stuart
2014 Pigmento y pintura: resumen de los estudios iniciales de reconstruir los fragmentos de las pinturas de San Bartolo. Paper presented at XXVIII Simposio de Investigaciones Arqueológicas en Guatemala, Guatemala.

Taube, Karl A., and Reiko Ishihara-Brito
2012 Mosaic Mask. In *Ancient Maya Art at Dumbarton Oaks*, edited by Joanne Pillsbury, Miriam Doutriaux, Reiko Ishihara-Brito, and Alexandre Tokovinine, pp. 464-474. Dumbarton Oaks, Washington, D.C.

Taube, Karl A., William A. Saturno, David Stuart, and Heather Hurst
2010 *The Murals of San Bartolo, El Petén, Guatemala, Part 2: The West Wall*. Ancient America 10. Boundary End Archaeology Research Center, Barnardsville.

Tedlock, Barbara
1982 *Time and the Highland Maya*. University of New Mexico Press, Albuquerque.

Tedlock, Dennis
1985 *Popol Vuh: The Mayan Book of the Dawn of Life*. Simon and Schuster, New York.
1996 *Popol Vuh: The Mayan Book of the Dawn of Life*. Rev. ed. Simon and Schuster, New York.

Thompson, Donald E.
1955 An Altar and Platform at Mayapan. *Current Reports* 2(28):281-288. Carnegie Institution of Washington, Washington, D.C.

Thompson, J. Eric S.
1929 Maya Chronology: Glyph G of the Lunar Series. *American Anthropologist* 31(2):223-231.
1930 *Ethnology of the Mayas of Southern and Central British Honduras*. Anthropological Series 17(2). Publication 274. Field Museum of Natural History, Chicago.
1936 *Exploration in Campeche and Quintana Roo and Excavations at San José, British Honduras*. Year Book 35. Carnegie Institution of Washington, Washington, D.C.
1939 The Moon Goddess in Middle America, with Notes on Related Deities. *Contributions to American Anthropology and History* 5(29):121-174. Publication 509. Carnegie Institution of Washington, Washington, D.C.
1942 Representations of Tezcatlipoca at Chichen Itza. *Notes on Middle American Archaeology and Ethnology* 1(12):48-50. Division of Historical Research, Carnegie Institution of Washington, Cambridge.
1950 *Maya Hieroglyphic Writing: Introduction*. Publication 589. Carnegie Institute of Washington, Washington, D.C.
1957 Deities Portrayed on Censers at Mayapan. *Current Reports* 2(40):599-632. Carnegie Institution of Washington, Cambridge.
1962 *A Catalog of Maya Hieroglyphs*. University of Oklahoma Press, Norman.
1963 *Maya Archaeologist*. University of Oklahoma Press, Norman.
1970a Bacabs: Their Portraits and their Glyphs. In *Monographs and Papers in Maya Archaeology*, edited by William R. Bullard, pp. 459-465. Papers 61. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
1970b *Maya History and Religion*. University of Oklahoma Press, Norman.
1972 *A Commentary on the Dresden Codex: A Maya Hieroglyphic Book*. Transactions 71. American Philosophical Society, Philadelphia.
1975 The Grolier Codex. In *Studies in Ancient Mesoamerica* 2, edited by John A. Graham, pp. 1-9. Contributions of the University of California Archaeological Research Facility 27. Department of Anthropology, University of California, Berkeley.
1976 *A Commentary on the Dresden Codex*. American Philosophical Society, Philadelphia.

Thurber, Floyd, and Valerie Thurber
1959 Itzamna Cocahmut, the Possible "Spark-Bird" God of the Maya. *Southwestern Journal of Anthropology* 15(2):185-188.

Tiesler, Vera
1999 Rasgos bioculturales entre los antiguos mayas: aspectos arqueológicos y sociales. Ph.D. dissertation, Universidad Nacional Autónoma de México, Mexico.

Tobin, Thomas J.
2001 The Construction of the Codex in Classic- and Postclassic-Period Maya Civilization. Electronic document, www.mathcs.duq.edu/~tobin/maya/.

Tokovinine, Alexandre
2008 The Power of Place: Political Landscape and Identity in Classic Maya Inscriptions, Imagery, and Architecture. Ph.D. dissertation, Department of Anthropology, Harvard University, Cambridge.

2013 *Place and Identity in Classic Maya Narratives*. Studies in Pre-Columbian Art and Archaeology 37. Dumbarton Oaks, Washington, D.C.

Tourtellot, Gair, III, and Norman Hammond
2007 Serendipity at Seibal: Gordon Willey in the Pasión Valley. In *Gordon R. Willey and American Archaeology*, edited by Jeremy A. Sabloff and William L. Fash, pp. 126-140. University of Oklahoma Press, Norman.

Townsend, Richard F.
1991 The Mt. Tlaloc Project. In *To Change Place: Aztec Ceremonial Landscapes*, edited by Davíd Carrasco, pp. 26-30. University of Colorado Press, Niwot.

Tozzer, Alfred M.
1957 *Chichen Itza and its Cenote of Sacrifice: A Comparative Study of Contemporaneous Maya and Toltec*. 2 vols. Memoirs 11-12. Peabody Museum of American Archaeology and Ethnology, Harvard University, Cambridge.

Tozzer, Alfred M., ed.
1941 *Landa's Relación de las Cosas de Yucatán*. A translation edited with notes by Alfred M. Tozzer. Papers 18. Peabody Museum of American Archaeology and Ethnology, Harvard University, Cambridge.

Trik, Aubrey S., and Michael E. Kampen
1983 *The Graffiti of Tikal*. Tikal Report 31. Monograph 57. University Museum, University of Pennsylvania, Philadelphia.

Tsukamoto, Kenichiro, Hirokazu Kotegawa, and Luz Evelia Campaña
2012 Secuencia constructiva de las plazas en el grupo principal de El Palmar, Campeche, México. *Estudios de Cultura Maya* 39:13-30.

Tsukamoto, Kenichiro, Javier López Camacho, and Octavio Q. Esparza Olguín
2010 El Palmar, Campeche. *Arqueología Mexicana* 17(101):72-77.

Tunesi, Raphael
2008 Some Thoughts about a New Vase and an Old God. *The PARI Journal* 8(2):13-19.

Vail, Gabrielle
2000 Pre-Hispanic Maya Religion: Conceptions of Divinity in the Postclassic Maya Codices. *Ancient Mesoamerica* 11(1):123-147.
2006 The Maya Codices. *Annual Review of Anthropology* 35:497-519.

Van Hagen, Wolfgang
1943 *The Aztec and Maya Papermakers*. J. J. Augustin, New York.

Velásquez García, Erik
2002 Una nueva interpretación del Monstruo Cósmico maya. In *Arte y Ciencia. XXIV Coloquio Internacional de Historia del Arte*, edited by Peter Krieger, pp. 419-457. Instituto de Investigaciones Estéticas, Universidad Nacional Autónoma de México, Mexico.
2004 Los escalones jeroglíficos de Dzibanché. In *Los cautivos de Dzibanché*, edited by Enrique Nalda, pp. 79-103. Instituto Nacional de Antropología e Historia, Mexico.
2006 The Maya Flood Myth and the Decapitation of the Cosmic Caiman. *The PARI Journal* 4(4):1-10.

Versnel, H. S.
2000 Thrice One: Three Greek Experiments in Oneness. In *One God or Many? Concepts of Divinity in the Ancient World*, edited by Barbara N. Porter, pp. 79-164. Transactions of the Casco Bay Assyriological Institute, New York.

Vienna Dictionary
1972 *Bocabulario de Mayathan: Das Wörterbuch der Yukatkischen Mayasprache*. 2 vols. Akademische Druck- und Verlagsanstalt, Graz.

Vogt, Evon Z.
1969 *Zinacantan: A Maya Community in the Highlands of Chiapas*. Harvard University Press, Cambridge.
1973 Gods and Politics in Zinacantan and Chamula. *Ethnology* 12(2):99-113.
1976 *Tortillas for the Gods: A Symbolic Analysis of Zinacanteco Rituals*. Harvard University Press, Cambridge.

Vogt, Evon Z., and David Stuart
2005 Some Notes on Ritual Caves among the Ancient and Modern Maya. In *In the Maw of the Earth Monster: Mesoamerican Ritual Cave Use*, edited by James E. Brady and Keith M. Prufer, pp. 155-185. University of Texas Press, Austin.

Webster, David L., ed.
1989 *The House of the Bacabs, Copan, Honduras*. Dumbarton Oaks, Washington, D.C.

Webster, David, and Elliot M. Abrams
1983 An Elite Compound at Copan, Honduras. *Journal of Field Archaeology* 10(3):285-296.

Welsh, W. Bruce M.
1988 *An Analysis of Classic Lowland Maya Burials*. International Series 409. British Archaeological Reports, Oxford.

Whittaker, Gordon
1986 The Mexican Names of Three Venus Gods in the Dresden Codex. *Mexicon* 8:56-60.

Willey, Gordon R.
1990 General Summary and Conclusions. In *Excavations at Seibal, Department of Peten, Guatemala*, edited by Gordon R. Willey, pp. 175-276. Memoirs 17(4). Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Willey, Gordon R., A. Ledyard Smith, Gair Tourtellot III, and Ian Graham
1975 *Excavations at Seibal, Department of Peten, Guatemala. Introduction: The Site and its Setting*. Memoirs 13(1). Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Wisdom, Charles
1950 Materials on the Chorti Language. Microfilm Collection of Manuscripts on Middle American Cultural Anthropology 28. University of Chicago Library, Chicago.

Wren, Linnea H., Peter Schmidt, and Ruth Krochock
1989 The Great Ball Court Stone of Chichén Itzá. *Research Reports on Ancient Maya Writing* 25:23-27. Center for Maya Research, Washington, D.C.

Zender, Marc
1999 Diacritical Marks and Underspelling in the Classic Maya Script: Implications for Decipherment. M.A. thesis, University of Calgary.
2004a A Study of Classic Maya Priesthood. Ph.D. dissertation, Department of Archaeology, University of Calgary.
2004b Glyphs for "Handspan" and "Strike" in Classic Maya Ballgame Texts. *The PARI Journal* 4(4):1-9.
2005 The Raccoon Glyph in Classic Maya Writing. *The PARI Journal* 5(4):6-11.
2011 Thoughts on the Inscriptions from Cahal Pech Burial B1-2. Paper presented at the 5th Annual Maya at the Playa Conference, Flagler County, Florida.

Zimmermann, Günter
1954 Notas para la historia de los manuscritos mayas. *Yan* 3:62-64.
1956 *Die Hieroglyphen der Maya-Handschriften*. Cram, de Gruyter, Hamburg.

Źrałka, Jarosław, Wiesław Koszkul, Simon Martin, and Bernard Hermes
2011 In the Path of the Maize God: A Royal Tomb at Nakum, Petén, Guatemala. *Antiquity* 85(3):890-908.