



Maya Archaeology Reports

## The Murals of Chiik Nahb Structure Sub 1-4, Calakmul, Mexico

Ramón Carrasco Vargas  
María Cordeiro Baqueiro

The ruins of Calakmul, Campeche, have produced a series of significant archaeological finds over the years. Among the most recent and important is a buried platform whose exterior is covered in figural murals (Figure 1). Mural paintings are among the greatest artistic achievements of the Maya, and yet very few have survived ancient destruction or the subsequent ravages of the tropical climate. Thanks to these well-preserved images we are offered an important view of Maya society, one very different from the normal representations of the lordly elite or supernatural worlds.

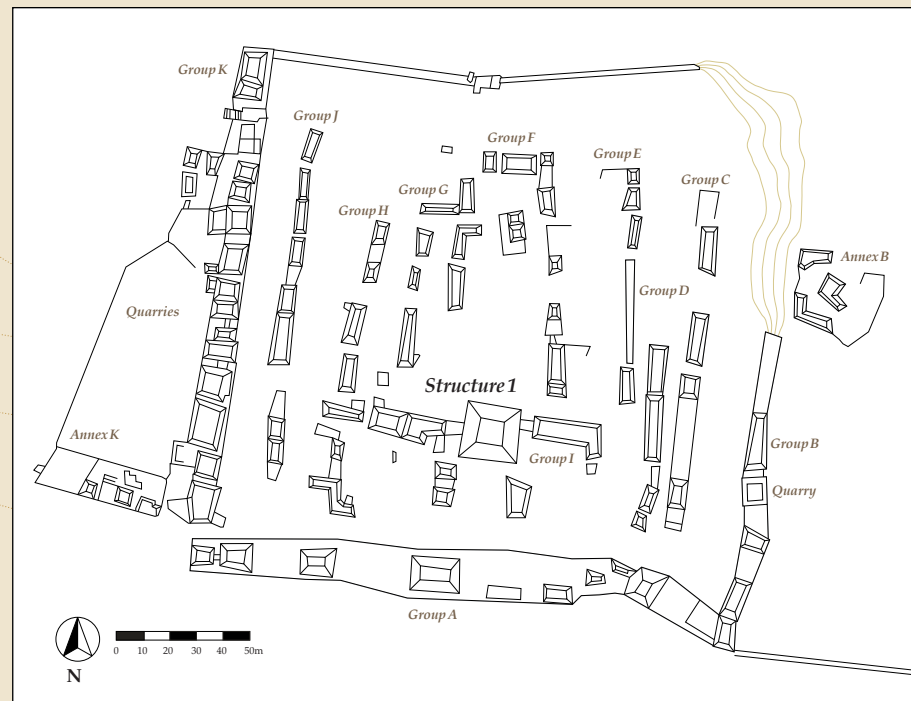
We have brought together a wide range of specialists to conserve and study the paintings, ranging from archaeology to pigment and ceramic analysis, multi-spectral photography, iconography, and epigraphy (Aguirre Tanús and Cordeiro Baqueiro 2007; Baglioni and Giorgi 2006:299; Boucher and Quiñones 2007; Carrasco Vargas and Bojalil 2005; Carrasco

Vargas and Colón González 2005; Carrasco Vargas and Vázquez López 2007; Carrasco Vargas, Vázquez López, and Martin 2009; Desprat 2006; García Barrios and Carrasco Vargas 2008; Martin this volume, n.d.b; Vázquez López 2006; Ware 2008). This article presents an overview of the finds made so far. A fuller description will be possible when the technical analyses are completed and the remaining images are exposed and studied.

Calakmul is the largest settlement yet identified for the Classic Maya. First reported to the outside world in 1931, it was visited a year later by a Carnegie Institution expedition, which produced a map of the core area and a report on its monuments (Lundell 1933; Morley 1933; Ruppert and Denison 1943). More recently, mapping of Calakmul's epicenter and surrounding settlement have revealed a city covering some 30 km<sup>2</sup> (Folan 1992; May Hau et al. 1990). Since 1993 the site has been the

Figure 1. Detail of scene SE-S1 of the southeast corner, first tier.  
Photo: Rogelio Valencia Rivera / PAC.





**Figure 2.** The Chiik Nahb complex (inset) and its location in the northern site core. Scale is approximate.

subject of research by the Proyecto Arqueológico Calakmul (PAC) of Mexico's Instituto Nacional de Antropología e Historia (INAH). Programs of excavation have been conducted across a range of locations in the epicenter, including the massive platforms of Structures 1 and 2; Structures 4, 5, 6, and 7 around the Great Plaza; the Ballcourt and Structures 13, 14, and 15 in the West Plaza; and several complexes within the Great Acropolis and the more remote Northeast Acropolis (Carrasco Vargas 1996, 1998, 2005; Carrasco Vargas and Colón González 2005; Carrasco Vargas and Rodríguez Campero 2003; Rodríguez Campero 2008). Each has added to our knowledge of the site and its developmental history. It is now clear that Calakmul was founded around 550 BC and that it continued to be occupied for more than 1500 years until the general demise of Classic Maya civilization in the ninth century AD, with a much-reduced presence that extended into the Postclassic period.



**Figure 3.** View of Structure 1 after initial consolidation in 2006. Photo: Simon Martin/PAC.

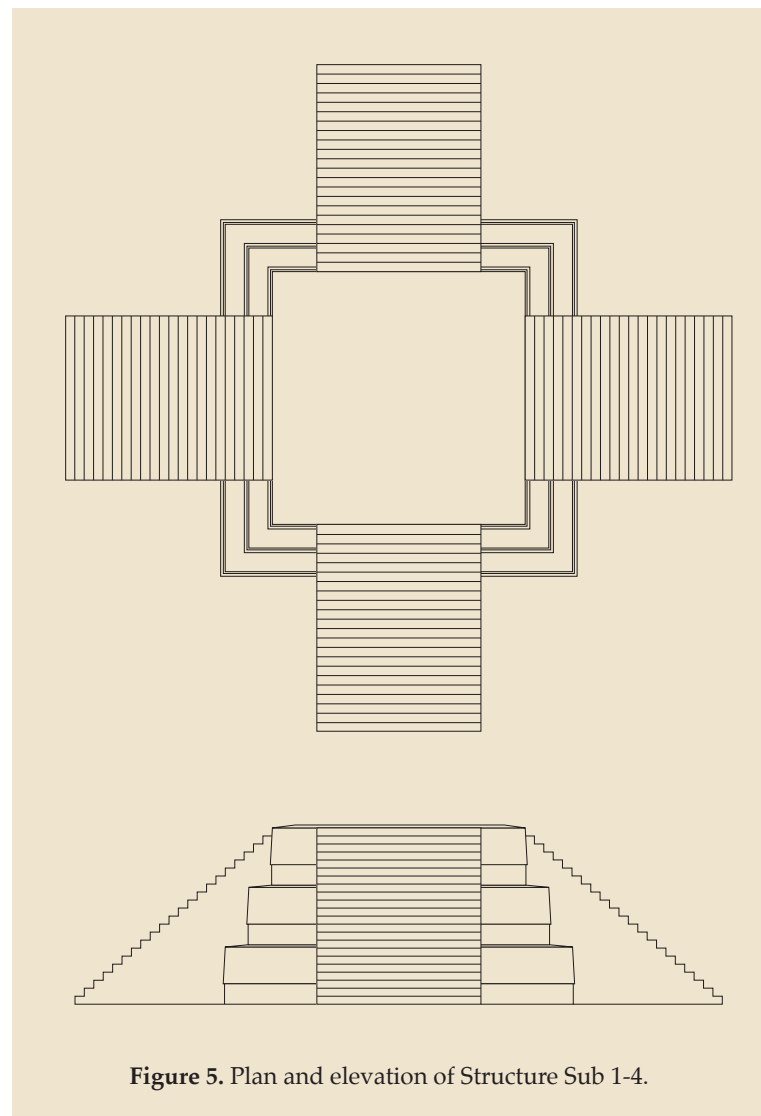


**Figure 4.** The third tier of the southeast corner exposed, revealing panel SE-S3. Photo: María Cordeiro Baqueiro/PAC.

### Archaeological Investigations

In 2004, we directed our investigations toward the northern portion of the site core and to an architectural group now called the Chiik Nahb complex (Figure 2). Broadly square in design, this compound as defined measures about 150 m on each side and covers approximately 2.5 hectares. Mapping of surface features revealed at least 68 structures within its limits, broadly separated into 11 clusters that we have labeled as Groups A through K. The complex is fronted by Group A, which has a substructure in the form of a walkway painted with a mural that covers its full width. This depicts birds, aquatic scenes, and a recurring hieroglyph reading *Chiik Nahb Kot*, a probable reference to the larger architectural complex as a public space of Calakmul (Carrasco Vargas and Bojalil 2005; García Barrios and Carrasco Vargas 2008). The tallest building—a mound in Group I, close to the center line of the complex—was





designated Structure 1 (Figure 3). The excavation of Structure 1 began with the clearing of covering vegetation and surface debris. Once the outlines of the in situ architecture became clear we consolidated its remains, resetting fallen masonry blocks using a limestone mortar mixed with small amounts of cement.

Exploration of the interior began with a tunnel dug at ground level in a northerly direction, starting at the building's southeastern corner. This encountered a sequence of previous versions, demonstrating that Structure 1, like most Maya buildings, was not the result of a single construction episode but rather a series of structures superimposed one over another. The tunnel passed through the outer facings of Sub 1-1, Sub 1-2, and Sub 1-3 before encountering the painted facade of Sub 1-4. This became the main focus of our excavation and conservation efforts. We later penetrated the interior of this version by means

of a tunnel driven in a westerly direction through the remains of its east stairway. This found evidence for two earlier construction episodes, Sub 1-5 and Sub 1-6. An excavation around the whole southeastern corner of Sub 1-4 freed the building from its overburden and exposed its polychrome murals up to the height of the second tier. This strategy was repeated for the southwest, northeast, and northwest corners, leaving the consolidated final version of Structure 1 as a protective encasement. In 2009 we conducted an exploratory excavation on the southeast corner of the third tier from above (Figure 4). This was reburied until such time as the third tier could be fully exposed and conserved as part of an expanded enclosure, due for completion in the Fall of 2012.

By now Structure Sub 1-4 was revealed as square in plan and measuring approximately 11 m on each side (Figure 5). Four stairways, each about 5 m in width, provided access to the summit in a radial arrangement aligned to the cardinal directions. The building rose in three tiers of slightly inclined panels separated by recessed moldings, reaching a maximum height of 4.7 meters. Maya platforms of this kind were typically designed to support a superstructure, which is certainly true of the final version. In the case of Sub 1-4, the construction of the subsequent version, Sub 1-3, destroyed any trace of a surmounting building. In all other ways Sub 1-3 had a major role in preserving its predecessor. In most cases new construction would begin with breaking up the stucco facings of the architecture to be built over, in order to provide better adhesion for the new fill. However, during the construction of Sub 1-3 the stucco facing of Sub 1-4 was packed with mud and small stones to protect the surface, a method that favored conservation over structural stability. Once the larger covering stones had been removed in the excavation, the paintings beneath were revealed (Figure 6).

The painted scenes of Sub 1-4 appear on the corner panels of all three tiers, but



Figure 6. Panel NE-N1 of the northeast corner is exposed, with Ramón Carrasco Vargas at work in the inset photo. Photos: Simon Martin/PAC.



also extend laterally, with additional images on the sides of the adjacent stairways. Some of the recessed moldings between the panels were also painted, either with continuations of the scenes or with short hieroglyphic texts. This layout provides space for a possible 48 separate scenes, with 16 on each tier and 12 on each corner. As of early 2012, 30 had been exposed on the lowest two tiers of Sub 1-4, while nine more had been uncovered on the third. Each corner of the building presents scenes of groups and individuals engaged in various activities. The groups are generally depicted in framed panels on the substructure, with individuals generally isolated on the sides of the four stairways. On the basis of this distribution of the scenes and in consideration of the form of the structure, a descriptive scheme was established (Figure 7). Scenes which appear on the corners are distinguished as northeast (*nordeste*), southeast (*sudeste*), southwest (*sudoeste*), and northwest (*noroeste*) by the abbreviations “NE,” “SE,” “SO,” and “NO.” The tiers are identified by the numbers “1,” “2,” and “3”—with “1” at the base and “3” at the top. A scene is described according to its orientation. Thus “SE-S1” refers to the scene on the southeast corner oriented to the south, on the first tier. With regard to the scenes that appear on the stairways, these are described according to the orientation of the given stairway (*escalinata* in Spanish, abbreviated as “Es”)—thus “EsN” for the north stairway, “EsE” for the east, etc.—as well as the orientation of the image on the stairway side (*lateral* in Spanish, abbreviated as “Lt”), and the level occupied by the scene. Thus “EsN-LtE3” refers to the scene of the north stairway, east side, third level.

Ceramics recovered from construction fill—a total of 2,091 sherds—have been analyzed to provide a developmental chronology for Structure 1 (Boucher and Quiñones 2007:29-34). The tunnel driven into its core from the east stairway provided a sample from the earliest version, Sub 1-6. This contained the typical local wares of Ciricote, Águila, Balanza,

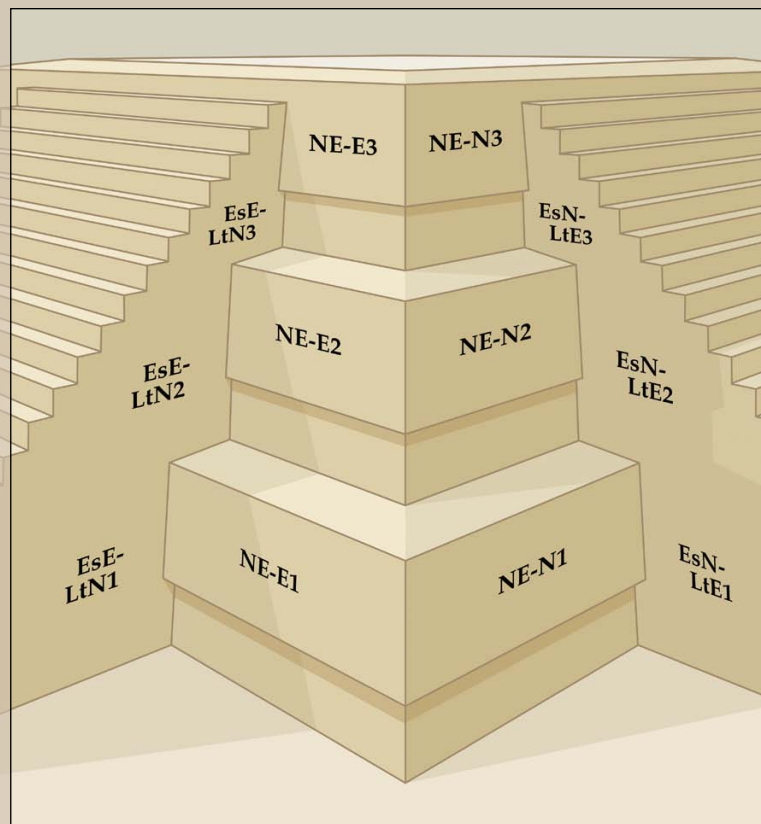


Figure 7. Diagram of numbering system showing the northeast corner.

group, found in the constituent fills of Sub 1-6, Sub 1-5, and Sub 1-4, is elsewhere associated with Saxche Orange, a polychrome assigned to the Tepeu 1 phase (Boucher et al. 2006:137-138). This would appear to favor a seventh-century construction date.

In using ceramic styles to place Sub 1-4 within a temporal sequence we also have information from the vessels depicted in the murals. For example, the wide serving dishes in the scenes SE-E1 and NE-N1 (Figure 8a and Figure 9) are typical of the Águila Orange group from the second half of the Early Classic, while the large vessel in the first of these scenes probably corresponds to Ciricote Compuesto, another Early Classic type. On the other hand, the blue-painted drinking vessel from SE-E1 can be assigned to the Tepeu 1 phase, and similar pots—covered in a blue stucco wash—have been found in tombs from the first part of the Late Classic. Tall cylinder vessels of the kind seen in EsE-LtS2 (Figure 8b) are common in the Late Classic and represented in groups such as Sibal Ante, Juleki Cream, and Zacatal Cream. In total, 11 vessels shown in the murals can be assigned to Early Classic groups, while 11 can be assigned to Late Classic ones. Together these factors suggest a rather later and narrower date-range for Sub 1-4 of AD 620-700 (Boucher and Quiñones 2007:47).

and undesignated Mudanza, consistent with a construction date in the second half of the Early Classic period or the first half of the Late Classic period, or between AD 420 and 620. The same excavation provided a sample from the fill of Sub 1-5, which, with the addition of Triunfo, reflected a similar mix of pottery and points to the same broad time-span. An excavation on the first tier of Sub 1-4 recovered sherds of the Triunfo, Ciricote, Águila, Balanza, and Pucte groups as well as a variety of undesignated Mudanza and undesignated polychromes. These data provide no greater definition and place the painted version of the building within the aforementioned two-century range. However, the Ciricote



Figure 8. Wide serving dishes and tall cylinder vessels: (a) scene SE-E1 of the southeast corner, first tier; (b) scene EsE-LtS2 of the southeast corner, second tier. Photos: Gene Ware/PAC.

### The Study and Conservation of the Paintings

The condition of the murals ranges widely. Some from the southeastern corner are among the best-preserved paintings anywhere in the Maya world, whereas others—particularly in the northwestern and southwestern corners—are badly degraded (Aguirre Tanús and Cordeiro Baqueiro 2007). Some scenes were broken in the ancient remodeling of the building, but for the most part the damage has been caused by the breakdown of the original binder in the pigments, leading to a flaking and powdering of the surface layer. Since the very high humidity in the region continues to accelerate these natural processes of decay, some remedial intervention was clearly required.





Figure 9. Scene NE-N1 of the northeast corner, first tier. Photo: Gene Ware/PAC.



We therefore invited Piero Baglioni and his colleagues of the Consorzio per lo Sviluppo dei Sistemi a Grande Interfase (CSGI) at the University of Florence to conduct a physical and chemical study of the murals, with a view to applying the latest conservation technologies. For the physical analysis, samples were taken and embedded in epoxy resin blocks, which were then sliced to obtain cross-sections of the paint layer, revealing the stratigraphy of the painting technique. Analysis of the pigments was carried out by X-ray spectroscopy, coupled to a scanning electron microscope. X-ray microanalysis, effective for inorganic pigments, was used to study the element composition, while infrared spectroscopy provided additional information about organic components, including the colorants and binding media of the paint layer. In order to arrest further deterioration and consolidate the pictorial surface, select areas of the painting were treated with a suspension of calcium hydroxide nanoparticles (Figure 10). The special properties of this material work to reproduce the original reaction that converts lime into plaster, restoring integrity and stability to the stucco surface. As an added benefit, the renewed cohesion of the pigments with their substrate restores some of the intensity of their color (Baglioni and Giorgi 2006:299). Although their study has yet to be completed, initial results indicate that the pigments form a durable bond with the plaster surface similar to that of mezzo fresco, although they were not produced by a true fresco technique.

**Figure 10.** Conservation of the murals on the southeast corner. Photo: Rogelio Valencia Rivera/PAC.







Damage to the painted surface reveals that there was more than one phase to the mural program. The precise details of the layering must await the full technical report, but preliminary analysis suggests that there were three phases that can be isolated by their artistic style and the physical evidence of superimposition. Scenes from the final Phase 3 are the best preserved and numerous, but in various areas portions of the underlying Phase 2 and Phase 1 show through. There are uneven patterns of damage, especially on the northwest and southwest corners, where scenes that mix separate phases can be observed. A clear case of this phenomenon is seen on EsS-LtE1 where Phase 2 can be distinguished from Phase 3 (Figure 11). Where the final phase of painting was devoid of information and too destroyed to save, it was removed in order to study and conserve the painting surviving beneath.



**Figure 11.** Figure from scene EsS-LtE1 of the southeast corner, first tier, with drawings showing painting from phase 3 (left) and phase 2 (right). Photos: Rogelio Valencia Rivera/PAC; drawings: Simon Martin/PAC.







**Figure 12.** Multispectral image (center) of glyphs from scene NO-N2 of the northwest corner, second tier, with photograph (left) and drawing (right). Photo: Rogelio Valencia Rivera/PAC; multispectral image: Gene Ware/PAC; drawing: Simon Martin/PAC.



The paintings have been further analyzed with multispectral imaging conducted by Gene Ware of the Ancient Textual Imaging Group at Brigham Young University (Ware 2008). This technology takes digital photographs through a series of filters sensitive to wavelengths ranging from 400 to 1000 nanometers. The resulting images are in black and white, but their different tonal values serve to enhance or subdue different colors, bringing some details into greater prominence. Although the technique could not penetrate the stucco layers that separate one phase from another, it did clarify some areas within the same phase (Figure 12). In particular, multispectral images provided useful reference for producing the line renderings of the scenes that are part of the wider effort at recording Structure Sub 1-4 (see Martin, this volume) (Figure 13).

**Figure 13.** Multispectral image (center) of scene EsS-LtE2 of the southeast corner, second tier, with photograph (left) and drawing (right). Photo: Simon Martin/PAC; multispectral image: Gene Ware/PAC; drawing: Simon Martin/PAC.



The process of creating the murals began with the application of stucco, which was covered by a fine surface layer on which the first guidelines were laid down (Figure 14). Then, guided by this underpainting, colors were applied one by one. Finally the artist made the outlines and certain details in a dark reddish brown color. The color palette varies depending on the phase of painting. In the first phase, the palette consists of five colors, while in the third there are 12 distinct colors using different binders.

**Figure 14.** Detail of scene SE-S1 of the southeast corner, first tier, with guidelines visible.  
Photo: Rogelio Valencia Rivera / PAC.



Since the murals are applied to the exterior surfaces of the Sub 1-4 platform, they were originally open to the sky (Figure 15). The bright colors and almost unblemished surface of at least some portions of the final phase could suggest that they were not exposed for very long, but until we know more about the stability of the pigments it would be premature to speculate on this issue. No fragments of painted stucco recovered in our excavations can be definitively assigned to any other version of Structure 1 than Sub 1-4, and so if earlier or later versions were also painted we currently lack physical evidence of the fact.

**Figure 15.** Before they were covered by successive layers of construction, the murals of Sub 1-4 were exposed to the sky. The final version of Structure 1 serves as their protective encasement. In the center of the photo is panel SE-E2 of the southeast corner, second tier. Photo: Rogelio Valencia Rivera/PAC.







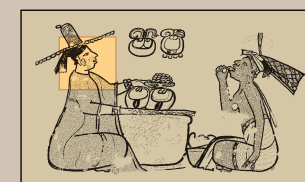
The contents of the murals—the figural scenes and their accompanying hieroglyphs—have the potential to illuminate important aspects of life in a major ancient Maya settlement and are open to art historical, iconographic, and epigraphic analysis. The scenes illustrate a range of people engaged in different activities. Many involve depictions of food and drink, with some people dispensing comestibles and others consuming them. There are a number of materials depicted, from wood, ceramic, and textile, to cords and basketry. Some figures are engaged in transportation, with pots or sacks carried on tumplines (e.g., Figure 13). One scene shows a scarlet macaw perched on a wooden stand (for photo, see back cover of this volume). Earlier phases of painting show broadly similar topics, although as far as we can judge they are not direct replicas. Some 76 full or partial human figures were identified during the cleaning and consolidation work performed so far. The final phase contributes about 52 of these, of which about a third are female. This 3:1 ratio is much higher than we see in other wall paintings or in the secular scenes found on polychrome ceramics. The portrait of a child is one of very few in Maya art (Figure 36), while that of an old woman may be unique outside a mythological context (Figure 39).

The paintings are a rich source on the clothing of the ancient Maya of Calakmul, as well as the hairstyles and personal adornment of the elite (García Barrios and Carrasco Vargas 2008) (Figures 16-44). Textiles with different designs are apparent in every preserved scene, as are various hats and tied headscarves. Headscarves are a garment worn only by men. With the sole exception of a

male figure who wears a bowler, hats are worn by women. These are sombreros with wide brims woven from fibers and decorated with beads and painted designs. Most of the women wear red face-paint, sometimes with a stepped border applied across the cheek. It is also common for both sexes to wear ear ornaments and necklaces with pendants, and some have wristlets and tattoos on the ankle as well.

Epigraphic analysis of the accompanying captions reveals that the majority are personal titles associated with the objects and materials pictured in the scenes. These include: *aj ul* “atole person,” *aj waaaj* “tamale person,” *aj mahy* “tobacco person,” *aj jaay* “clay vessel person,” *aj atz’aam* “salt person,” *aj ixiim* “maize grain person,” among others (see Martin, this volume). We are still investigating in what ways these illuminate the actions that the depicted characters perform.

The future holds a number of technical and research challenges. We will continue to consolidate the paintings with conservative interventions while we implement a plan for their long-term preservation. For this, we are creating a climate-controlled environment to stabilize their future condition. This environment will allow for the excavation and conservation of the third tier. It will take time, together with the full study of Structure Sub 1-4 and a wider investigation of the Chiik Nahb complex as a whole, before the full implications of these important finds can be assessed. There can be little question that the activities shown in the paintings portray a complex social and ideological system (Carrasco Vargas and Bojalil 2005; García Barrios and Carrasco Vargas 2008).



**Figure 16.** Detail of scene SE-S2 of the southeast corner, second tier. Photo: Rogelio Valencia Rivera/PAC.





Figures 17 and 18. Details of scene SE-S2 of the southeast corner, second tier. Photos: Rogelio Valencia Rivera/PAC.







**Figures 19 and 20.** Scene SE-S2 of the southeast corner, second tier, and a detail of the scene.  
Photos: Gene Ware/PAC and Rogelio Valencia Rivera/PAC.





Figures 21 and 22. Detail of scene NO-O2 of the northwest corner, second tier, and view of the southeast corner, first and second tiers. Photos: Rogelio Valencia Rivera/PAC.







Figures 23 and 24. Details of scene SE-S1 of the southeast corner, first tier. Photos: Gene Ware/PAC and Rogelio Valencia Rivera/PAC.







Figures 25 and 26.  
Details of scene SE-S1  
of the southeast corner,  
first tier. Photos:  
Rogelio Valencia  
Rivera/PAC.





Figure 27. Scene SE-E2 of the southeast corner, second tier. Photo: Gene Ware/PAC.



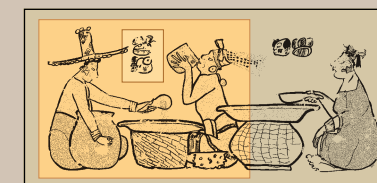
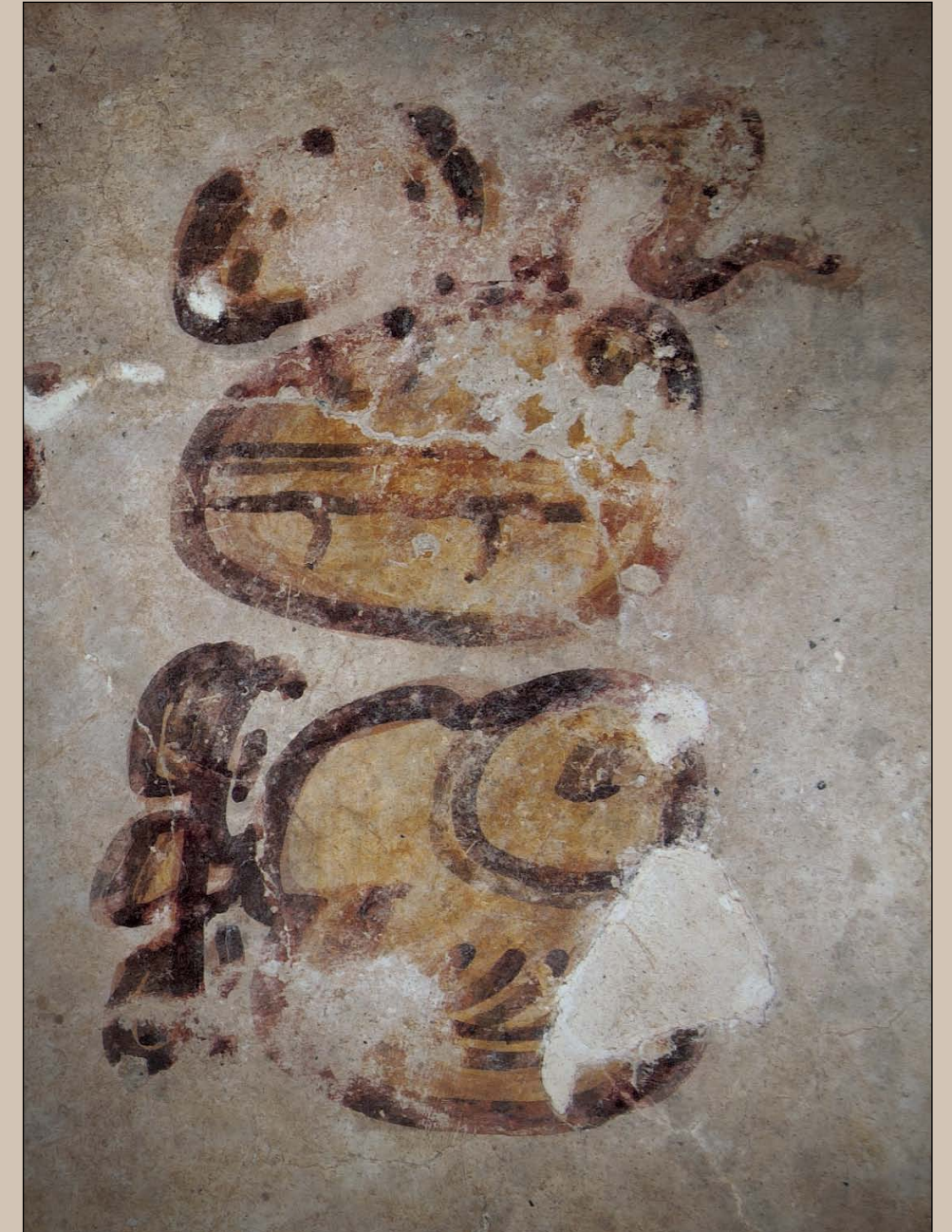




Figures 28 and 29. Details of scene SE-E2 of the southeast corner, second tier. Photos: Rogelio Valencia Rivera/PAC.

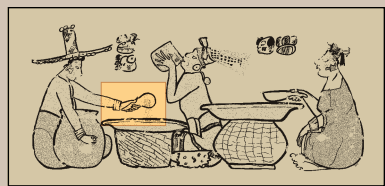






**Figures 30 and 31.** Details of scene SE-E1 of the southeast corner, first tier. Photos: Gene Ware/PAC and Rogelio Valencia Rivera/PAC.

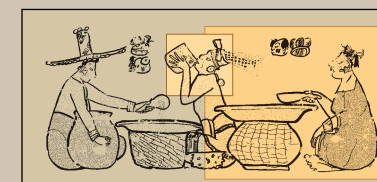




**Figure 32.** Detail of scene SE-E1 of the southeast corner, first tier. Photo: Rogelio Valencia Rivera/PAC.







**Figures 33 and 34.** Details of scene SE-E1 of the southeast corner, first tier.  
Photos: Rogelio Valencia Rivera/PAC.





**Figure 35.** Detail of scene EsS-LtE1 of the southeast corner, first tier. Photo: Rogelio Valencia Rivera /PAC.



**Figure 36.** Detail of scene NE-N2 of the northeast corner, second tier. Photo: Rogelio Valencia Rivera /PAC.







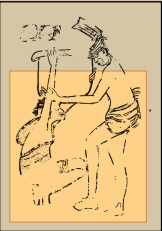
Figures 37 and 38. Details of scene EsO-LtN1 of the northwest corner, first tier. Photos: Harri Kettunen/PAC.







**Figure 40.** Detail of scene SO-S1 of the southwest corner, first tier. Photo: Rogelio Valencia Rivera/PAC.



**Figure 39.** Detail of scene EsN-LtE1 of the northeast corner, first tier. Photo: Gene Ware/PAC.





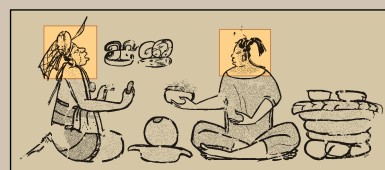
Figures 41 and 42. Details of scene NE-E1 of the northeast corner, first tier. Photos: Rogelio Valencia Rivera / PAC.







Figures 43 and 44. Details of scene NE-N1 of the northeast corner, first tier. Photos: Rogelio Valencia Rivera/PAC.





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