

Reconstructing Ancient Kellis Part III: Clothing

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Abstract: The third in a series which overviews the reconstruction of ancient Kellis through digital graphic and animation technologies, this report introduces the utility of 3D human figure models as visualisation aids for recent investigations into fabrics and clothing at fourth century Kellis.

Introduction

This brief report updates readers on recent developments in the ongoing digital reconstruction of the Roman period village of Ismant el-Kharab (ancient Kellis) published in previous *Buried History* Volume 41 and 42. In *Buried History* Volume 41 the authors introduced the virtual reconstruction process and overviewed ways in which digital visualisation of architecture might assist the documentation and communication of archaeological research at Kellis. The article published subsequently in *Buried History* Volume 42 was accompanied by an online website and presented a more specific, and interactive, study of Houses 1-3 and the excavated artefacts found within them. This edition again deals with a more specific study with the introduction of virtual human figure models to support recent investigations into fabrics and clothing in fourth century CE Kellis. An overview of dress in fourth century Kellis is provided by Rosanne Livingstone, Centre for Archaeology and Ancient History, Monash University, and as in previous articles, the discussion of the application of virtual technologies is provided by Thomas Chandler and Derrick Martin, Faculty of Information Technology, Monash University.

Dress in fourth century CE Kellis

Kellis was a Roman-period village located in the Dakhleh Oasis in Egypt's Western Desert. Excavation of this village has been ongoing since 1986, undertaken by a team from the Centre for Archaeology and Ancient History under the direction of Associate Professor Colin Hope. An abundance of artefacts have been recovered from the site, and included among them are numerous textiles dating mainly to the fourth century CE (Hope 1991, 42).

One of the authors¹ is studying the textiles for her doctoral thesis, which focuses on the relationship between dress and identity in fourth century Kellis. Identity in Egypt was complex during this period as a result of the population's mixed Egyptian, Greek and Roman heritage. The material culture reflects this heritage in different ways; whereas the population followed traditional Egyptian funerary practices, their dress was essentially Roman in style (Bagnall 2000, 29).

The Kellis textiles consist mainly of small fragments, but some larger pieces and a few complete garments have also been found (Bowen 2002). Three tunics, some textile fragments identified as being from tunics, and some accessories (footwear, headwear and jewellery) recovered from the site are used here to show how the people of Kellis dressed during the fourth century. Additional information on dress has been obtained from other contemporary sources. These include the numerous papyrus documents that have also been recovered from the site, tunics and textiles held in museum and gallery collections around the world, and people depicted in wall paintings, mosaics and other fourth century CE works of art.

The main form of dress was the tunic. Those worn by the more affluent (and by the less wealthy on special occasions) were decorated with *clavi*, matching bands that extended down the tunic either side of the neckline, back and front. *Clavi* could end above the waistline or extend as far as the hem, and tunics sometimes had additional decorative ornaments on the shoulders and/or at knee length. Fourth century tunics could be sleeveless, or have sleeves which were either very narrow or very wide. Sleeves were decorated with one or two matching bands near the wrist (Pritchard 2006: 47-48).

Four tunics have been recovered from Kellis, three of which are plain and sleeveless. Sleeveless tunics were commonly worn as part of everyday dress. These tunics were extraordinarily wide and they draped over the upper arms when worn (Pritchard 2006: 46). The largest of the plain sleeveless tunics was found covering a man's body in a third to fourth century burial in one of the North Tombs in Kellis (Hope 2004: 25, 27). It is an extremely coarse, heavy linen tunic, well-worn and mended with several large patches, and was probably everyday work wear. The man depicted in the virtual reconstruction (Figure 1) is wearing a tunic identical to the one from the North Tomb. The boy standing behind the donkey is wearing a plain sleeveless tunic similar to that of the man's. It represents a coarse linen tunic found buried with a child in a fourth century cemetery (Bowen 2002: 93).



Figure 1: An assembled scene of virtual 3D posed figures and artificially fitted clothes placed near previous reconstructed Houses 1-3 at Kellis

In contrast to the man and the boy, the baby (Figure 1) is wearing a decorated tunic. This is based on a tiny tunic found in association with a baby buried in the fourth century Christian cemetery in Kellis (Bowen 2002: 93). Unlike the other tunics, it is not wholly complete, but enough remains for it to be identified as a wide-sleeved, hooded tunic. This tunic is made from wool and is decorated with embroidery worked in wool yarns dyed purple, blue-green, yellow, orange and red. The decoration consists of embroidered *clavi* and sleevebands, as well as circular motifs (*orbiculi*) on the hood. Five multicoloured wool pompoms are attached to the top of the hood (Bowen 2002: 93, 95).

Examination of this tunic has revealed that it was re-made from an adult's tunic. This is evident from the remains of a plain purple *clavus* and a row of twining (used to reinforce the neck opening) along the top of the hood, together with a section of underarm reinforcement further down. The position of the underarm reinforcement indicates that the adult tunic had long narrow sleeves.

The tunic the woman (Figure 1) is wearing is a reconstruction based on the original adult tunic. However, instead of having plain *clavi* and sleevebands, her tunic is decorated with more ornate ones incorporating a simple pattern com-

monly found on the Kellis textiles. The tunic is ankle length and fastened under the breast in keeping with the fashion of the time (Pritchard 2006: 46, 49). Her hairstyle is typical of the mid-late fourth century and her head is covered with a blue-green and yellow hairnet made in the *sprang* technique (interlinked and intertwined warp threads). She is also wearing leather sandals and a glass bead necklace. Examples of all these items have been recovered from Kellis (Hope 1995: 53; Bowen 2002: 88, 91, 100, 103).

All these garments and accessories would have been made in Kellis. This is evident from the archaeology, biology and contemporary texts. Linen was grown locally, and wool fleece and spinning and weaving tools have been recovered from houses (Bowen 2002: 87-89). There is also evidence for glassmaking in the village (Hope 1995: 53).

In the virtual reconstruction the people are standing on the street outside Houses 1-3 in Kellis, as described below (Bowen *et al* 2005). Kellis was an agricultural village, and it was the practice then, as now, in Egypt for fodder to be cut in the fields and transported by donkey to where the farm animals were accommodated. In fourth century Kellis farm animals lived in mangers constructed in the courtyards of houses (Hope 1992: 41-42). Thus a man standing with his donkey in a street conversing with his neighbour would probably have been a common sight.²

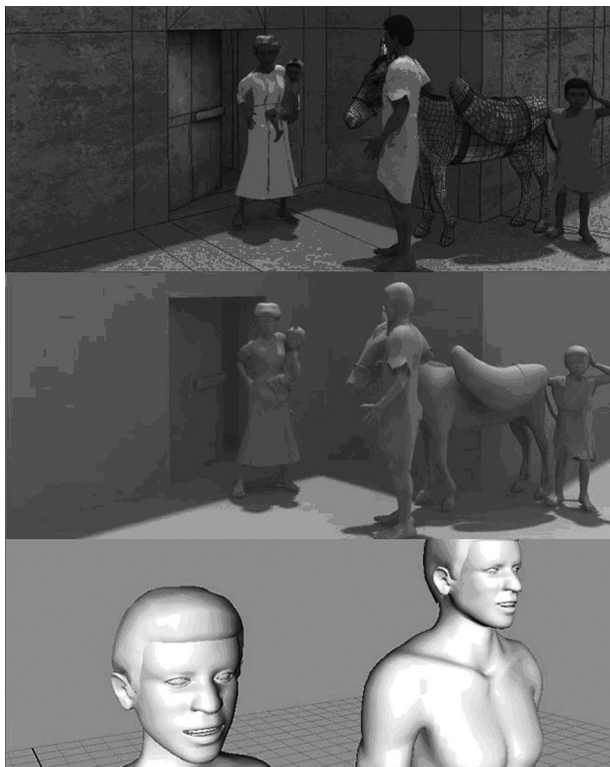


Figure 2: The construction of the geometry of the figure models.

Virtual People and Virtual Fabrics

The rendered image shown above is the result of several preparatory stages of digital editing. The architectural structures and the general environment, in this case a partial scene of an exterior wall of Houses 1-3 at Kellis, were already constructed, but in order to show reconstituted fabrics as they might have been worn it was first necessary to create the human figures that would wear them. In commencing the creation of 3D human figure models the reconstructive process departs from strict architectural studies and begins to move over into a new area where organic modelling techniques are drawn more from animation studies.

Once created however, the organic forms of the human figures could be used in a specialised process to instruct the automatic form and simulated placement of the clothes. Instead of being already fitted or laboriously sculpted into place, items such as the tunics were instead introduced into the 3D scene as flat, cut out planes which then wrapped around the figure models in sequential steps (Figure 3). In this case the 3D software did the thinking on its own and estimated a rough approximation of the gravity and flexible folds of the simulated fabric. The colours of the fabrics were sampled directly from photographs of fragments found at Kellis and prepared as samples in Adobe Photoshop and then applied as textures to the virtual models. In Figure 3, the interaction of the lighting and shadows of the virtual environment and the closely focused image shows the rough weave of the original fabric.

In modelling hands, eyebrows and knee joints the 3D art-

ist must be able to sculpt and emulate entirely different forms, and imbue them with much more complexity, than the modelling of architectural structures would require. An example of the differences of detail in the 3D geometry between organic modelled figures and the walls of the building behind them can be seen in Figure 2. Here the wireframe structure of the donkey is made up of thousands of mostly imperceptible subdivisions (as is the model of the young boy in Figure 3), while the walls of the building and the ground beneath the feet of the figures seem to be constructed of large and clearly visible blocks or panels. Compared with the subtle curves of a human face (see base of Figure 2), the angular architecture of Kellis, particularly as viewed from the outside, is relatively easy to reconstruct in 3D, and, in preparing architectural models, a 3D artist does not have to account for the fact that they start to move and walk around. In an organic model, many subdivisions are necessary not only to convey smooth and flowing curves and contours, but also to enable the model to stretch and bend when it adjusts its position.

This difference in detail is an important one, because although the scene in Figure 1 portrays a static image, each of the figure models represented incorporates a system of simulated bones inside the limbs and torsos (see Figure 4) that enabled joint movements so the figures could be 'posed' and manipulated in a manner similar to a puppet. As in previous studies, each step in the reconstructive process opens up its own subsequent opportunities; with the

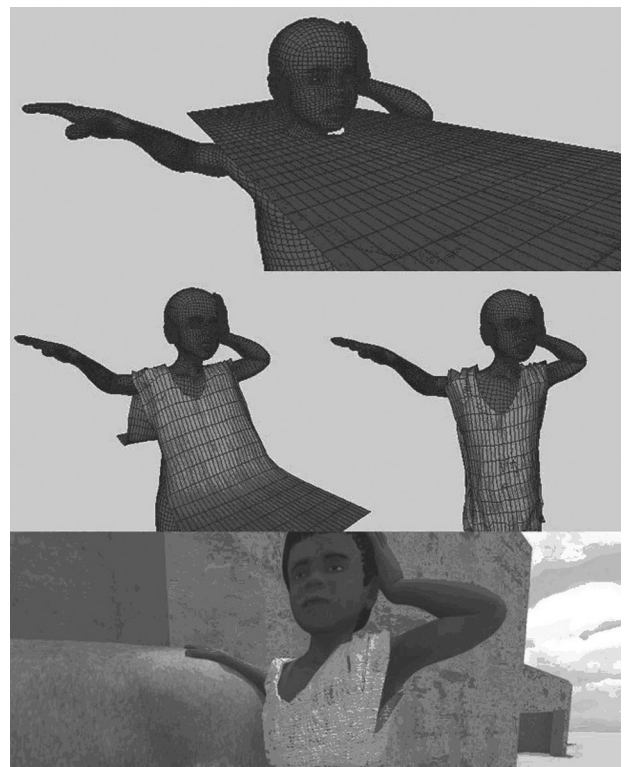


Figure 3: An illustration of the 3D reconstructive process showing the simulated 'fitting' of a tunic where the fabric begins as a two dimensional board and is then gradually adapted to follow the contours of the virtual figure model.

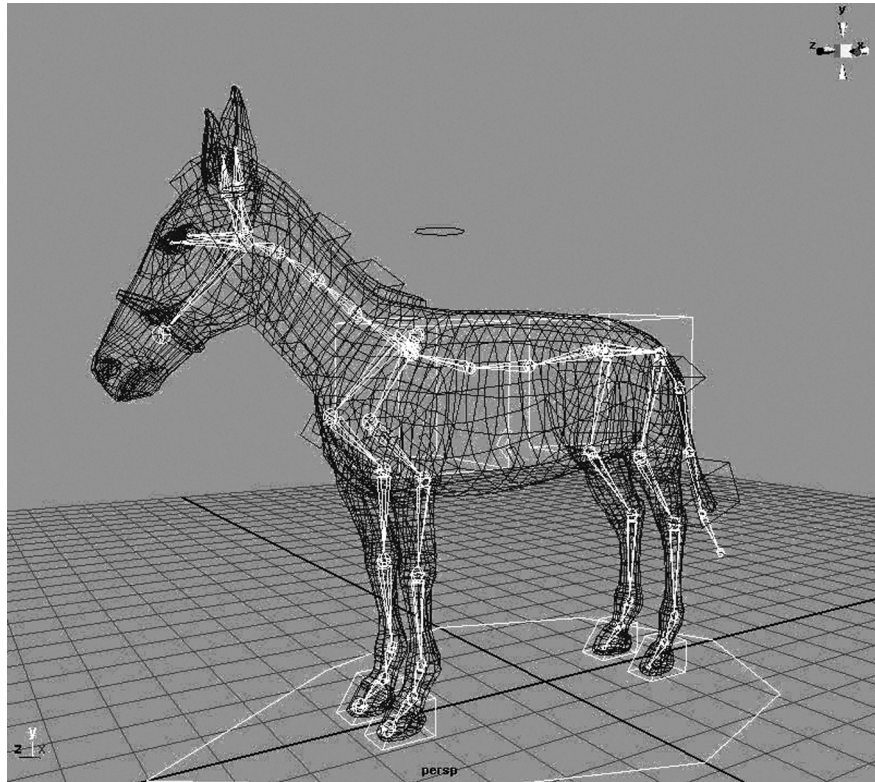


Figure 4: The underlying virtual skeleton within a figure model which allows it not only to be positioned but also to walk and move convincingly in an animation

introduction of human figures the possibility of animating scenes of daily life at Kellis is much closer at hand.

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References:

- Bagnall, Roger 2000, 'The Fayum and its People', *Ancient Faces: Mummy Portraits from Roman Egypt*, Susan Walker (ed.), London: British Museum Press, 26-29
- Bowen, Gillian E. 2002 'Textiles, Basketry and Leather Goods from Ismant el-Kharab', *Dakhleh Oasis Project: Preliminary Reports on the 1994-1995 to 1998-1999 Field Seasons*, C.A. Hope & G.E. Bowen eds., Oxbow Books: Oxford, 87-104
- Bowen, Gillian E., Thomas Chandler and Derrick Martin 2005 'Reconstructing Ancient Kellis', *Buried History*, 41, 51-64
- Green, Gill., Tom Chandler and Andrea Innocent, 2006 'Virtual Fashion, Angkorian Style', *Taasa Review*, 15, No 3, 14-15
- Gardiner, Iain, Anthony Alcock and Wolf-Peter Funk 1999 *Coptic Documentary Texts from Kellis Volume 1*, Oxford: Oxbow Books.

Hope, Colin A. 1991 'The 1991 excavations at Ismant el-Kharab in the Dakhleh Oasis', *The Bulletin of the Australian Centre for Egyptology*, 2, 41-50.

Hope, Colin A. 1992 'Excavations at Ismant el-Kharab – 1992', *The Bulletin for the Australian Centre of Egyptology*, 3, 41-49

Hope, Colin A. 1995 'The excavations at Ismant el-Kharab in 1995: a brief report', *The Bulletin of the Australian Centre of Egyptology*, 6, 51-58

Hope, Colin A. 2004 'The excavations at Ismant el-Kharab and Mut el-Kharab in 2004', *The Bulletin of the Australian Centre of Egyptology*, 15, 19-49

Magenat-Thalmann N., Cordier F., Seo, H., Papagiannakis, G. 2004 'Modeling of Bodies and Clothes for Virtual Environments', in *Proceedings of Cyberworlds 04*, IEEE Computer Society, 201-208

Pritchard, Frances 2006 *Clothing Culture: Dress in Egypt in the first millennium AD*, Manchester: Whitworth Art Gallery.

Endnotes

- 1 Rosanne Livingstone, who studied the Kellis textiles during the 2007 and 2008 fieldwork seasons in the Dakhleh Oasis.
- 2 For the purposes of this paper the woman and child are dressed in tunics with *clavi*, based on the Kellis finds, even though they may not have worn such tunics for everyday wear.