nent visual discontinuity. This problem was resolved by the application of soil to the surface of the fill prior to curing, allowing for the superficial layer to obtain the same color as the substrate (Fig. 15.5).

Final assessment on site

The Paraloid/perlite fills used heavily during the 2014 and 2013 seasons showed a mixed range of performance, however most were found to have lost their adherence to the substrate along with numerous cracks forming and breaking apart the mixture. Additional consistency issues and lack of adequate polymer became apparent as well. The lime putty /perlite mixture showed improved adherence in comparison to earlier treatments, however shrinkage during cracking causing the formation of fractures within the fill may be a cause for concern due to drastic temperature fluctuations of the site. Freeze/thaw cycles as well as salt crystallization within the walls may cause the further deterioration of the site and are likely responsible for the failure of any fills performed on site. The performance of the lime putty/perlite mixture will be assessed in the following seasons to determine a reliable and calculable gap-filling agent appropriate for use on site.

Conservation and observations regarding wall paintings in TPC Area Space 562

Ian Channell and Olja Mladjenović

Introduction

During the 2015 field season, extensive wall paintings were uncovered and conserved in the TPC trenches by the conservation team (Figs. 15.6 and 15.7). Wall painting conservation techniques involved the mechanical removal of thin layers of overlying plaster from the 'painted' surface, consolidation of the artwork with a spray application of 2.5% Paraloid B48N w/v in acetone, covering in Japanese tissue paper, geotextile, and perlite bags to promote preservation off-season. Close examination of the artwork whilst conservation tasks were being performed allowed for observations regarding its technology and production. It is posited that the designs were created by application of a binder and plaster mixture directly onto the plaster wall with a brush or tool. The following report will focus on firstly, a description of the geometric paintings uncovered, followed by an elaboration of the conservation treatments performed on the wall paintings. Lastly, observations as to the paintings manufacture will be provided.

Figure 15.6. *North wall and bench structure of Sp.562.*

Figure 15.7. *Eastern and south facing walls of Sp.562.*

Wall painting description

Wall paintings are located in Sp.562 in the TPC Area trenches. The geometric motifs are comparable to those previously revealed in B.121 in the 2013 season (see 2013 Archive Report). The geometric motifs are prominently featured on the north and east walls of the space, an area that is cited as the most frequent location for wall paintings in buildings at the site (Çamurcuoğlu 2013). In the north wall, the painting envelops a large bench or 'alter' structure, which has two cylindrical white plaster constructions emerging from its eastern and western terminations. These structures appear to be internally hollow and were covered in white, powdery plaster with infrequent reddish, pink detail. It was difficult to discern the entirety of the design, but vertical lines and a diamond pattern could be surmised. On upper areas of the north wall, the painting is composed of vertical lines on the western and eastern corners. The distinctive shape of these features is due to a previous bell-shaped cut into the building. On the back of the upper section of the platform are large angular rhomboidal designs with an extensive border free of detail. Surrounding the rhomboidal designs are a continuation of the vertical lines. On the western section of the wall painting, it was detected that the vertical lines appeared to continue directly on top of the bench surface. After investigations, only intermittent detail was detectable and a slight single borderline was apparent between the bench surface and wall interfaces. A large section midway behind the bench appears to have extensive burrowing damage that has left the artwork in the vicinity in poor condition.

Below the bench are beautiful horizontally elongated lozenges with internal wave-like detail; a thick border that crosses over between every rhomboid shape binds each lozenge. On the eastern wall, vertical lines were found in its northern section, with lines decreasing in size along the length of the wall. It is unknown whether this design was intentional or whether it reflected further burrowing damage.

The building is divided by a platform that extends across the width of the room. On the eastern wall in this demarcated area, is a continuation of the painting uncovered by the conservation team early in the season. Both the above and below paintings reflect a circular pattern surrounding a central ovoid shape. These patterns extend around the corner to the south-facing wall. The upward portion of the painting is located on a protruding layer with the inferior portion on a depressed layer. It is postulated that this painting continues along the length of the south facing wall, however, further conservation and archaeological work will be needed to determine the extent of this feature.

Conservation techniques

The paintings were revealed by mechanically removing layers of plaster from the painting surface. Mechanical removal allowed for detailed and controlled removal of the overlying plaster layers. Due to the three-dimensional and protruding aspect of the plaster/binder designs, most overlying plaster fractured easily from the artwork surface. Vertical lines were easier to uncover as the scalpel could be grazed over the design and the overlying plaster could be readily sheared off. Horizontal detail, such as those located below the bench, were more difficult to remove as the directionality of application of the scalpel made it difficult to remove the overlying plaster without damaging and shearing off the design with the covering plaster layers.

Following mechanical removal, the paintings were consolidated with a spray of 2.5% Paraloid B48N w/v in acetone. Paraloid B48N is an acrylic resin first developed by the Rohm and Haas Company as an alternative to commonly used Paraloid B72 (Horie 2010). Paraloid B48N is composed of a 75: 25 ratio of methyl methacrylate to butyl methacrylate with a high glass transition temperature (Tg) of 50°C which is suitable to the site's hotter summer environment (*ibid*). Paraloid B72 adhesive is frequently utilized within Çatalhöyük's conservation laboratory, but due to its Tg of 40°C, it is most frequently used on important small finds being stored in controlled conditions. Paraloid B48N is regularly utilized as metal coating (Freyer et al 2011) and as an adhesive for ceramics (Paterakis 1997) and stone objects (Jorjani *et al.* 2002; Riccardelli *et al.* 2010). The Paraloid B48N pellets are mixed in acetone in the conservation laboratory and applied to the surface with a spray bottle. It was determined that applying the consolidant spray in the lower portion of the wall increased structural support for the upper sections.

Acetone was utilized as the dispersive solvent for the acrylic resin, firstly, as it efficiently dissolved the Paraloid B48N pellets and, secondly, because it resulted in little color change on the painting. Ethanol was not used in this instance as ethanol frequently results in color alterations on the painting and fails to dissolve the Paraloid pellets effectively. However, acetone evaporates quickly during hotter environments and does not have the penetrative power of ethanol. In this circumstance, it was deemed best to use acetone as the solvent as adhering the plaster designs to the plaster wall was deemed paramount to actively penetrating the wall painting.

As the painting was only finished at the conclusion of the season and the large and curved attributes of the painting would have made removal a long and laborious task, the painting was covered in Japanese tissue paper, geotextile and perlite bags for preservation between the 2015 and 2016 seasons.

Wall painting production techniques

Close examination of the painting during conservation treatments allowed for thorough observations of the painting construction. It became apparent that the design was not constructed through pigmented media, but was created entirely through plaster designs. Removal of the overlying plaster occasionally removed plaster from the design, revealing a yellowish brown and peach shade underneath (Figs. 15.8 and 15.9). It is suggested that this material is a binder or film-forming layer. A binder, possibly egg/yolk, linseed/olive oil, milk, rabbit skin glue (see Çamurcuoğlu 2013), holds and solidifies the material. It is postulated that the

plaster was mixed with the binder media, allowing for drying and setting on the wall surface. Fourier transform infrared (FTIR) analysis (Perkin Elmer Spectrum One) of the material at Cardiff University failed to discern the composition of the binder, most likely do to mixing with plaster or long-term degradation of the binder component. FTIR analysis did confirm the white material as calcium sulphate (gypsum).

Figure 15.8. *Brown colored binder underlying plaster detail.*

Figure 15.9. *Yellow colored binder underlying plaster detail.*

Microscopic evaluation with raking light of the binder reverse located numerous ridges, suggesting the plaster and binder material was applied via a brush, tool or cloth to the wall surface (see Çamurcuoğlu 2013 for discussion of application methods). Mirrored marks were also apparent on the wall when the binder was removed. Microscopy was preformed using Nikon SMZ1000 Stereomicroscope, Intralux 500 fibre optic illuminator, and NIS Elements D 3.0 Microscopic Imaging Software (Figs. 15.10 and 15.11).

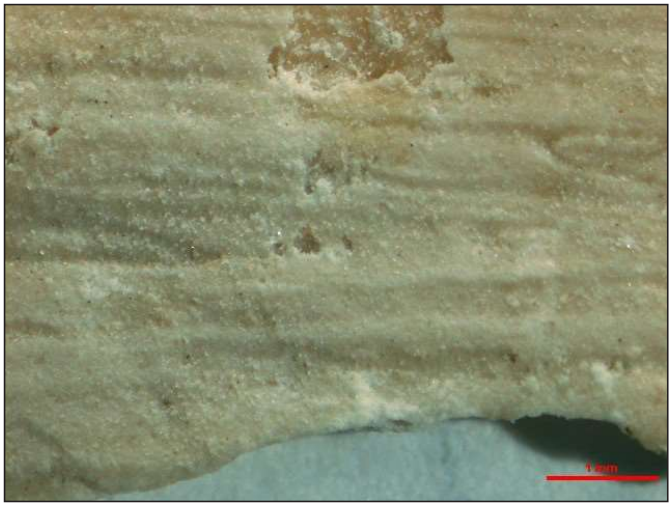

Figure 15.10. *Microscopic evaluation of binder reverse, x15 magnification.*

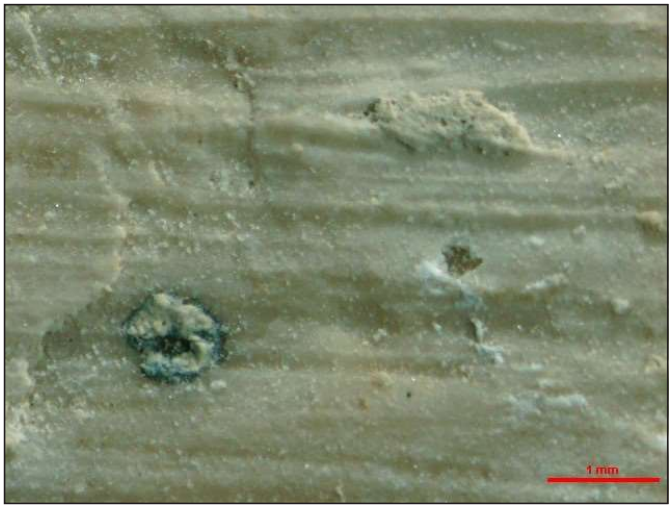

Figure 15.11. *Optical microscopy evaluation of binder reverse, x15 magnification.*

Conclusion

It is suggested that the wall paintings- or better plaster designs- located in Sp.562 in the TPC Area reflect extensive vertical, transverse and rhomboidal motifs and are comparable to those found in earlier excavations in the same vicinity. The wall paintings were mechanically revealed and consolidated by the conservation team. Based on laboratory analysis it is most likely the plaster designs were created by mixing plaster with an organic binder. The material was then applied to the wall with a brush or tool, leaving microscopic detail on the binder reverse and the wall.

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