study this season; the remaining five items were in the form of ovate bifaces made of Kaletepe-Kömürcü/Göllü Dağ obsidian (the largest measuring 11.68cm long), and 'quarry flakes' (thick, partly patinated/natural surface blanks), that represent the raw material for in-house blade-like flake production.[4] These are typical components of these earlier Pottery Neolithic hoards. The second cache, U.20639, was the larger of the two with 15 X-finds, four of which were unavailable to study due to aDNA sampling. The remaining material included complete and fragmentary examples of ovate bifaces made of Nenezi Dağ obsidian, together with a few products. The use of this raw material in this particular form is very interesting, somewhat 'hybrid' in nature, thus fitting in more generally with how this horizon is viewed by us within the overall technological patterning / raw material consumption at Çatalhöyük. Close by these hoards, was a third and smaller example U.20334, with five pieces of obsidian, arguably the remnants of a larger retrieved cache. This comprised biface related material made from Kaletepe-Kömürcü/Göllü Dağ obsidian, plus thicker flakes with patination and retouch that we believe to be ancient workshop debris / tools that were collected at source and transported to Çatalhöyük for re-use.

TP Study

With the final matrix having been produced for the TP stratigraphic sequence, it provided us with an opportunity to reorganise the chipped stone from this excavation area into chronological sequence (Table 13.1).[5] Concerning raw materials, the data fits the general pattern we see at Çatalhöyük throughout the Neolithic sequence, i.e. the great majority of the chipped stone artefacts are made from obsidian, plus a small proportion of chert. In turn, a visual characterisation of the former component would indicate that most of this obsidian came from Cappadocia, albeit with a handful of visually distinct peralkaline (green) products of the Bingöl A and/or Nemrut Dağ sources from eastern Anatolia, some 650-800 km distant as-the-crow-flies. This material is documented at the site in tiny quantities on the East Mound post 6500 cal BC,[6] also being attested on the West Mound in Early Chalcolithic levels (pers. obs.).

Phase	Total CS	Obsidian		Flint	
TP.Q	1287	1235	96 %	52	4%
TP.P	1352	1331	98.4%	21	1.6%
TP.O	1457	1440	98.8%	17	1.2%
TP.N	2495	2431	97.4%	64	2.6%
TP.M	34	29	85.3%	5	14.7%

[4] Carter, T., Conolly, J. and Spasojević, A. (2005), 'The chipped stone', in I. Hodder (ed.), *Changing Materialities at Çatalhöyük: Reports from the 1995-1999 Seasons*. McDonald Institute Monographs and BIAA, Cambridge: 221-83.

[5] The following information is intended as a supplement to the main study undertaken on the TP material by our colleague Marcin Wąs.

[6] Carter, T. Dubernet, S., King, R., Le Bourdonnec, F.-X., Milić, M., Poupeau, G. and Shackley, M.S. (2008), 'Eastern Anatolian obsidians at Çatalhöyük and the reconfiguration of regional interaction in the Early Ceramic Neolithic', *Antiquity* 82(318): 900-909.

Table 13.1: General chipped stone raw material proportions throughout the TP sequence (dry sieve)

Turning to the dominant Cappadocian products, we see that Nenezi Dag products are dominant (Table 13.2), in keeping with what we view in the upper levels of the South and North Areas. A small elemental characterisation project involving TP material has also been recently completed at the McMaster Archaeological XRF Lab [MAX Lab];[7] the results of this study are now being prepared for publication. With regard to the chert component, we view a variety of raw materials and end-products, including some fine retouched prismatic blades. We provide a précis of the assemblages below, starting with the earliest stratum.

Phase	Obsidian	Göllü Dağ	Nenezi Dağ	Bingöl A / NMRD	Other
TP.Q	1225 (1235)*	236 (**19.3%**)	989 (**80.7%**)	-	-
TP.P	1321 (1331)*	242 (**18.3%**)	1079 (**81.7%**)	-	-
TP.O	1432 (1440)*	319 (**22.3%**)	1111 (**77.6%**)	2 (0.14%)	-
TP.N	2411 (2431)*	465 (**19.3%**)	1943 (**80.6%**)	2 (0.08%)	1 (0.04%)
TP.M	29	11 (**37.9%**)	18 (**62.1%**)	-	-

Table 13.2: Quantity and relative proportion of obsidian by level and source based on a visual characterisation study (NMRD = Nemrut Dağ; * - some obsidian not visually characterised as these are at the MAX Lab being elementally analysed).

TP.M

A small assemblage (n=44 [Table 13.1]), dominated by material relating to the manufacture of pressure-flaked blades, involving the use of both Nenezi Dağ and Göllü Dağ raw materials, the former in the majority (Table 13.2). Production appears to have occurred on-site, with exhausted blade cores documented in 'both' Cappadocian obsidians. No projectiles and no obvious opposed platform material. Chert is present in the form of flakes, including some part-cortical material that could be relatively local.

TP.N

The assemblage is very similar to that from TP.M in that it is dominated by pressure-flaked blades and their associated manufacturing debris (though typically for Çatalhöyük, cortical blanks are rare, if not absent). Over 80% of the obsidian is visually characterised as coming from Nenezi Dağ, the remainder from Göllü Dağ (Table 13.2). In both cases we have evidence for pressure blades being made on-site, albeit from a relatively advanced stage of production, i.e. we lack crested blades (this is typical throughout the post 6500 cal BC assemblages on the East Mound), though we have a few secondary series examples with remnant cresting scars. Amongst the Nenezi Dağ assemblage there are a number of exhausted cores, plus core-tablets and rejuvenation flakes from the face of a nucleus, together with less regular end-of-sequence blades; the Göllü Dağ material includes a similar range of material, together with a few wider

[7] http://maxlab.ca

and less regular blades from a percussion technology. There are a handful of opposed platform blades, the majority made of Nenezi Dağ obsidian and modified into projectiles, usually relatively short and with carefully modified tangs (e.g. U.17638.X9, 4.56cm long). One highly distinctive piece made of Göllü Dağ (Kaletepe) obsidian is both tanged *and* barbed, a rare type that may be restricted to these upper levels (U.17637.X10); the significance of the barbs is that this is a feature one associated with the killing of people, rather than animals.[8]

Amongst the Göllü Dağ obsidian is a single flake that has been carefully ground on both faces and margins; it conceivably represents a preform for a piece of jewellery, examples of which are better known from SE Anatolia during the slightly later Halaf period, as for example at Domuztepe.[9] The two green (peralkaline) pieces of obsidian from Bingöl A and/or Nemrut Dağ were both in the form of broken pressure-flaked blades, one with 90% covering dorsal retouch (U.13532) whose function is unclear (it is too curved longitudinally to be a projectile), the other

The chert artefacts again embodied a variety of raw materials that represent both relatively local resources (often represented by cortical blanks), plus finer quality blade products that were almost certainly procured ready-made, quite possibly of distant origins. The latter implements were almost invariably modified into various retouched tool-types, including perforator / drills, one of which (U. 7621) might be from an opposed platform technology, as was a bifacially modified projectile (U. 7623). One thick blade had been modified into a narrow tanged projectile with covering bifacial retouch (U.13532.X43, 4.97cm long). Some blades were clearly pressure-flaked in a manner analogous to how obsidian was being mainly worked at this time, while there are also some significantly wider blades that derive from yet another technique, conceivably the highly skilled lever-produced mechanism, a method that was introduced to SE Anatolia from the east in the 9th millennium cal BC.[10] The largest blades came from the tomb fill (Space 327) – a number of which are now stored in Konya Museum and not detailed in this report – up to 12.4cm long percussion blades, with heavy marginal retouch and use, possibly butchery knives of some form. Interestingly, as we see with many of these large chert 'characterful' objects,[11] some of these large blades were heavily worn and dulled, obviously heirlooms of some antiquity by the time they were deposited in the burial chamber.

TP.O

Structurally the TP.O assemblage closely resembles that from TP.N (Tables 13.1-2). The dominant Nenezi Dağ obsidian component is once again comprised mainly of pressure-flaked blades, together with a few related exhausted cores, plus rejuvenation material such as core tablets and flakes from the face of a nucleus. Smaller quantities of these items are also evidenced in Göllü Dağ obsidian. Similarly, there is evidence in both obsidians for a few larger

[8] C. Knüssel pers. comm.

[9] Healey, E. and Campbell, S. (2009), 'The challenge of characterising large assemblages of exotic materials: The case study of the obsidian from Domuztepe, SE Turkey', *Internet Archaeology* 26.

[10] See Altınbilek-Algül, C., Astruc, L., Binder, D. and Pelegrin, J. (2012), Pressure blade production with a lever in the Early and Late Neolithic of the Near East', in P.M. Desrosiers (ed.), The *Emergence of Pressure Blade Making: From Origin to Modern Experimentation*. Springer, New York: 157-79.

[11] Carter, T. (2011), 'A 'true gift of mother earth': the use and significance of obsidian at Çatalhöyük', *Anatolian Studies* 61: 1-19 [5].

percussion blades for which we continue to lack evidence for associated manufacturing debris, i.e. they were likely procured ready-made. A handful of these pieces derive from opposed platform cores, usually retouched into projectiles (as before, the smaller tanged varieties); there was also an upsilon blade made of Göllü Dağ obsidian, a notably late example of this technologically diagnostic blank (U.13570). There were also a small number of large unipolar percussion blades, together with a few large scrapers made from thick core rejuvenation flakes. Two pieces had traces of grinding and polishing, one a 1.93cm long Nenezi Dağ pressure-flaked blade with ground margins from use-wear (U.15261.X26), while a large percussion blade-like flake that had been heavily retouched on both margins to produce a tip for perforating/drilling (end snapped off) has clear traces of grinding on the underside. In both instances the abrasion on these implements appears to be from use-wear, rather than deliberate modification of the piece itself. Finally, TP.O also produced another two pressure-flaked blades of green Lake Van region obsidian, one with a part-cortical surface.

The chert assemblage contained a similar range of raw materials and end-products as before, with a few pressure blades, plus percussion examples, some radiolarite flakes, a core fragment of an orange-brown chert, and the distal tip of another blade core of grey-brown chert.

TP.P

The assemblage from these deposits is much the same as before in terms of raw material relative proportions (Tables 13.1-2), the techniques used to work them, and the various tool-types represented. Pressure blades continued to be made on site using both major Cappadocian obsidians, with exhausted cores, rejuvenation material and numerous fragmentary end-products. While dominated by the translucent purple-grey raw material we associate with the Kayırlı outcrops of Göllü Dağ, there were also a few of the blue-black variants from Kömürcü. Amongst the minority larger percussion blades there were the usual examples of projectiles (again we have the impression that there is a diminished number compared to what we see in the rest of the South Area sequence), with the points again being relatively small, and often tanged. No polished / ground items were recorded, nor any Lake Van obsidian. The amount of chert is low, with two pressure blades, a blade-core fragment, some burnt flakes, a bladelet, two wider percussion blades (one retouched into a perforator), and a number of flakes.

TP.Q

The chipped stone of uppermost later Neolithic stratigraphic horizon studied this year (in 2013 TP.R will be completed), displayed significant continuity from the material of the preceding stratum (Tables 13.1-2). The on-site manufacture of pressure blades using both Nenezi Dağ and Göllü Dağ products continues, with cores, rejuvenation blanks and end products attested in both raw materials. There continue to be a few wider percussion blades, but it is uncertain as to how many, if any, of these derived from opposed platform traditions. Projectiles are extremely rare, while Lake Van products are again absent.

Various cherts are represented, the products including a backed bladelet, both pressure and percussion blades, and a quantity of part-cortical flakes that we assume to be from more local raw materials. Some of the chert blades are burnt and/or highly worn from long-term circulation. Cores are rare, but there are some rejuvenation pieces, suggesting that as

previously, not all chert blades were accessed in a ready-made state, but that some raw materials were being knapped on-site.

To summarise, the TP sequence presents us with a not insignificant amount of continuity from the later levels of the South Area sequence (South.S), and the North Area (North.I), in that they are (a) dominated by obsidian, (b) dominated by Nenezi Dağ products, (c) dominated by artefacts deriving from pressure blade traditions, the technology having been articulated on-site (using both Cappadocian obsidians) from an advanced stage of core preparation / reduction, (d) the lowest levels of the TP sequence also contain a small amount of opposed platform blades made primarily of Nenezi Dağ obsidian the blanks likely having been procured ready-made, (e) there are also handfuls of wide unipolar percussion blades (again non-locally made), plus the suggestion of a very few specialised lever-produced pressure blades, (f) much the same tool types, including a few obsidian blades with heavily ground edges that were probably used for drilling / carving stone.

There are also a handful of imported Lake Van pressure blades, that while absent from the North.I middens and South.S deposits, are nonetheless noted from later Pottery Neolithic contexts elsewhere on the site, not least B.63 excavated by the Istanbul Team.

Looking forward in time to the relationship between the Late Neolithic TP material and that from the Early Chalcolithic West Mound, a few preliminary statements can be made. Firstly, there is a significant difference in the relative proportion of Cappadocian obsidian between the two, with a shift from a dominance of Nenezi Dağ products in the earlier material (~80% [Table 13.2]), to a 50 : 50 ratio by the Early Chalcolithic. Secondly, over the long term one appears to view a diminishment in both the relative number of projectiles, together with a reduction in their size and form, with the TP assemblages containing a few small tanged variants (one wonders if now almost all are arrows, rather than spears), while the West Mound produces a few tanged points, together with a handful of trapezoidal arrows. Thirdly, we witness the gradual loss of the large opposed platform blade tradition, while conversely the wide percussion unipolar technology continues, including a few whose scale and regularity of form suggests lever produced pressure products / Canaanite blades (something we first witness in the later Pottery Neolithic strata of the South Area and North.I middens).

In terms of consumption, one thing we have yet to recover from the TP sequence are sub-floor obsidian hoards, a practice that seems to have been abandoned post-6500 cal BC (similarly none are recorded from the West Mound). While this negative evidence is in keeping with what we see in the uppermost strata of the South Area / North sequence, there are also clear differences in practice between the later Pottery Neolithic and Late Neolithic, specifically with regard to the deposition of 'characterful' objects. During the later Pottery Neolithic we have numerous instances where skillfully made, distinctive implements – not least projectiles – were left on a building's floor, or within a bin or some other construction, in the final phase of activity prior to the building's abandonment / burnt destruction, and their subsequent infills.[12] Such material seems to be absent from the TP buildings, suggesting a new set of abandonment practices and

[12] See Carter (2011: 8-11), and Twiss, K.C., Bogaard, A., Bogdan, D., Carter, T., Charles, M.P., Farid, S., Russell, N., Stevanović, M., Yalman, E.N. and Yeomans, L.), 'Arson or accident? The burning of a Neolithic house at Çatalhöyük', *Journal of Field Archaeology* 33(1): 41-57.

the reconfiguration of the social roles of skillfully crafted and idiosyncratic stone implements.[13] This is not to say that certain tools did not play a dynamic role in the construction, maintenance and representation of particular social identities, far from it; indeed we have the deposition of projectiles and large butchery-knives, some clearly being heirlooms, in the burial chamber from Space 327.

TPC Study

This was the first year of excavation in this area of the site, the aim being to link the TP and South Area sequence. We dedicated a number of priority tours to midden deposits from this area to gain a rapid overview of the assemblages' nature from these periods. Unfortunately virtually all of these deposits were mixed,[14] containing not only historic material, but also a melange of later Neolithic and Chalcolithic finds (D. Tarkan pers. comm.). Thus it is impossible at this stage to say anything meaningful concerning the chipped stone from these strata, as most of our artefacts simply cannot be dated that specifically on their own. The general *impression* that one has – for what it is worth – is that these mixed later Neolithic and Chalcolithic strata are dominated by the products of pressure-flaked blade technologies (more than one is attested on the basis of size and form), with Nenezi Dağ obsidian dominant. There are few if any projectiles, while opposed platform blades are rare, or absent.

Other Projects

Alongside the main study of the East Mound chipped stone are a number of more focused research projects. In 2012 we were joined by Dr. Christina Lemorini of Rome University, who will be running a new use-wear analysis programme at Çatalhöyük; in consultation with a number of the team, not least Lilian Dogiama, Dr. Lemorini is planning a number of different research strategies to investigate various aspects of tool function at the site. These variously include a use-wear analysis of those implements currently (typologically) defined as 'projectiles', together with diachronic considerations of other tool-types and considerations of functional :: raw material relations.

Lilian Dogiama, a PhD candidate from McMaster University, continued her doctoral research (*Points of Reference: Projectiles, Hunting and Identity at Neolithic Çatalhöyük, Turkey*), working through a multi-attribute study of projectiles from the upper half of the East Mound sequence. Her work also involved a pilot study dedicated to the extraction of aDNA from projectiles found in the 2011-12 seasons (with a protocol developed for in-field handling and associated soil sampling), the aim being to run these analyses – of samples extracted from the surface of these weapons – at the McMaster Ancient DNA Laboratory. Lilian, along with Arzu Demirergi of the faunal lab, also organised an experimental obsidian knapping session (carried out by Matteo Pilati), the aim being to produce a series of blanks to be used in butchery experiments and use-wear analysis in the 2013 season.

[13] See Gero, J. (1989), 'Assessing social information in material objects: how well do lithics measure up?', in R. Torrence (Ed.), *Time, Energy and Stone Tools*. Cambridge University Press, Cambridge: 92-105.

[14] Including 20124, 20127, 20215a, 20215b, 20232.