10. DISCUSSION

ANALYSIS OF THE MIDDLE NEOLITHIC STONE TOOL ASSEMBLAGES FROM CHEK LAP KOK

By Robert Esser

INTRODUCTION

Two sites in the southern part of the island, Fu Tei and Kwo Lo Wan (upper), are Middle Neolithic areas of activity. A total of three months was spent on the excavation of these two sites, gathering information about many aspects of Middle Neolithic material culture.

The stone tool assemblages from both of these sites are well-representative of the area as a whole, displaying familiar types and presumably, usages. My aim is to analyze these tools to a degree of detail not previously applied in Hong Kong, specifically in use-wear analysis. These studies will include qualification of silica polish to be found on edges of ground stone tools, as well as descriptions of other use-wear traces.

THE SITES: FU TEI AND KWO LO WAN

The site of Fu Tei is on a terrace approximately 12 m above the beach, overlooking a bay and infilled former lagoon. The site itself is oriented basically north-south, but the terrace faces west, as does the bay. 24 excavation pits totalling 315 square meters were dug, all of them to decomposed granite (DG), the limit of cultural activity. This depth averaged approximately one m.

Two basic layers were identified, by changes in both soil texture and color, as well as material contained within the layer. Layer one was a mixture of topsoil, root and other vegetal intrusions, as well as a mixture of historical and modern period sherds and disturbances. Layer two was identified as soon as all traces of disturbance were absent, and the soil changed to a firm, sandy, light-brown matrix, containing only Middle Neolithic material.

Kwo Lo Wan is similarly located, on a terrace overlooking a bay and about 10 m above the beach. This site is also oriented north-south, but its terrace faces east, as does the bay. 18 excavation pits totalling 271 sq. m. were dug, all of them to decomposed granite, also the limit of cultural activity. This depth averaged approximately .5 m. The layers answered largely to the description of those at Fu Tei, although they were much thinner, given the relative shallowness of deposit at Kwo Lo Wan.

The pottery of this period is characterized by two types. Chalky ware, both plain and incised, is distinctive for both its color of white to light-orange, and the fine paste texture of the material, lacking in large-sized temper. Coarse ware, both plain, or more commonly, cord-marked, is discernible by its dark color, from dark orange to black, and its large, sandy temper. Both types are fired at relatively low temperatures, certainly under 900 degrees centigrade, evidenced by their lack of cohesion, and near-ability to go back into solution if left soaking.

These two pottery types are common throughout the region, from southern China to Thailand and in various forms indicate the middle neolithic (cf. Meacham, et. al.1978;

Tang and Au, 1991; Finn, 1956; Davis and Tregear, 1960; Van Heekeren and Knuth, 1967; and Lu, 1988, among others). C-14 dates from Fu Tei are 4830 + 160 (Beta-42858), and 5050 + 100 (Beta-42857); calibrated to 3890-3355 B.C. and 4100-3655 B.C., respectively (Klein, et.al., 1982:103-150). The one C-14 date from Kwo Lo Wan is 4410 + 80 (Beta-45150), calibrated to 3465-2885 B.C. (Klein, et.al.,1982:103-150). These put both Kwo Lo Wan and Fu Tei in a strong middle neolithic context (Meacham, 1982).

The stone tools from the sites fall into three main categories; polished flaked (chipped), and use-formed. The polished stone tools are all adzes of varying sizes, from tiny (four grams) re-ground flakes, to fairly large (270 g) adzes ground from a prepared stone blank. There are also polished stone ornaments, e.g. rings and bracelets, not dealt with here.

ADZES: MANUFACTURE AND USE

[See Figures 2.21-22, 3.31, 3.51, 3.53-59, 5.24-28]

The process of manufacture of the adzes is fairly simple (cf. Kamminga, 1990:3-5). Raw materials are first selected as large pebbles, complete with cortex, or large flakes produced in nature or from breakage of larger adzes. These are then preformed by direct percussion with a hammerstone. This is fairly obvious from the size of the bulb of percussion, as well as the height of the rings. Striking platforms on the cortex flakes are generally shattered and thick, and hinge fractures on the main core are common and large. The second step is finer flaking along edges either by bipolar percussion, or with a bar hammer of wood or bone to turn out the final preform.

I stress here the necessity of stone hammers as a result of some experimental flaking carried out on similar raw material. Lamprophyte, a hard siliceous stone with a red-brown cortex, is the most common raw material from Chek Lap Kok used in this period. It comes from local sources (either the island itself or nearby north Lantau coast). This particular stone is very hard and difficult to flake; at edge angles greater than about 30 degrees, a wooden hammer was totally ineffective, while a small, finely controlled hammerstone on an anvil continued to remove finishing flakes easily.

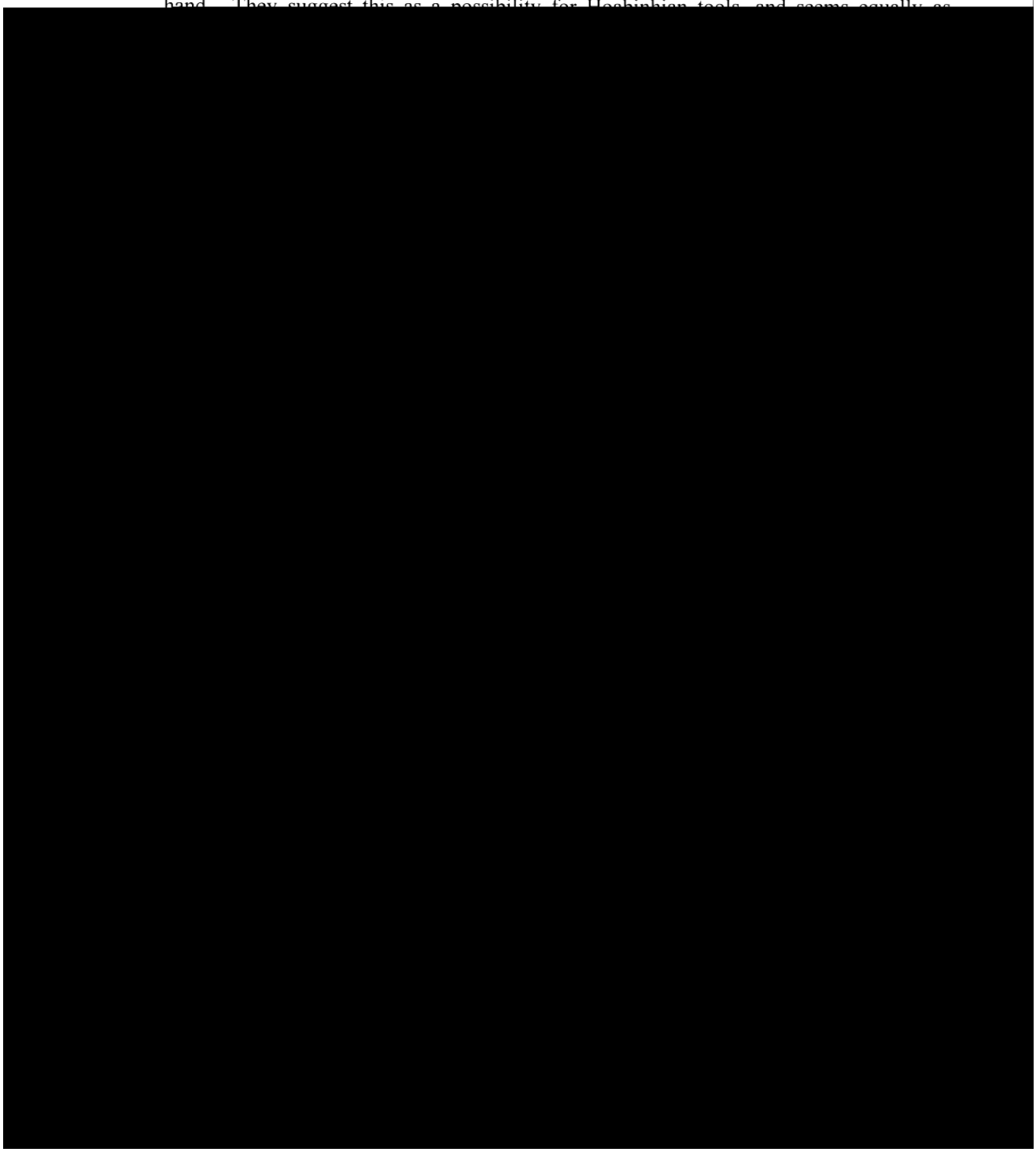
This particular raw material is typical of those to be found at Fu Tei; difficult to finely flake, but easy to grind with water and "gritty stone, like sandstone"(Kamminga, 1990:4). The ground edge produced is superb in that it doesn't spall easily under use, and preserves a good edge, even at high angles.

Preforms, or "adze rough-outs" were found in widely varying sizes, ranging from 1.7 to over 24 cm long; almost every step of the manufacture process is represented. The final preform is then ground into the final adze shape on a concave surface polishing stone (see below). These polishers were found of differing grits, used perhaps in sequence to achieve the finished surface; on some implements so fine that they reflect light. The edge is ground by classic adze guidelines, to produce an off-center blade, typically with curved edge and convex cutting surface, both top and bottom.

The adzes are then hafted for use, with the blade perpendicular to the angle of the usage-swing. Antler cut to preserve the acute angle between the handle and hafting head, at an angle optimally of 65 degrees (Tong, 1989(2):346-347), is the most obvious method. Lantau island still has populations of barking deer, and although they are hornless, larger, horned species could have been present in the middle neolithic. Alternately, and more simple, would be similar use of a tree branch, cut to preserve a crotch that grew at the correct angle. For axes, and adzes hafted parallel to the plane of the usage-swing, Wang

(1989:132-133) has proposed a forked-, or split-stick handle, mounted 90 degrees to the shaft based on ethnographic data from Southeast Asia.

A more original approach comes from Australian ethnographic data. Van Heekeren and Knuth (1967:39-40), suggest a hafting design based on the aboriginal *kodj*. This is a ball of gum, strengthened by kneading animal hair into it, set on the end of a wooden handle. The gum is then heated and blades and even hammers are set into it, allowing it to cool afterwards. The resultant tool is strong and versatile, with the ability to change heads quickly, in case of breakage, or perhaps even depending on the job at hand. They suggest this as a possibility for Hoabinhian tools, and seems equally as



trees (and) hollowing tree trunks" they were "probably for agricultural work". However likely the first supposition may seem , the size of these tools seems to preclude them from any such heavy usage. Khoach suggests that the small ones might be for "carpentry". The smaller adzes display, under examination, striations in both the stone and the polish at approximately 75 degrees to the blade (average, as opposed to 90 degrees for the larger adzes). In modern carpentry, smaller chisels are pushed with the blade at an angle to the cut; the correlation indicates a similar usage, like cutting hafting notches in handles (for other tools), and final finishing on planks and other things initially rough-hewn by larger adzes.

Keeley (1974:327) rightly points out that "technological effects", or traces from the process of manufacture can be confused with traces of use. He goes on to add that this is most common on ground stone tools. I attempted to obviate this problem by comparing striations on the extreme edge with those from further back, a method that generally served to differentiate.

Slight discoloration of the leading edge of the blade, as well as rounding from use is present on virtually all artifacts examined; even those adzes present in recognized burial contexts showed traces of use.

CHIPPED STONE TOOLS

[see Figures 3.65, 5.29]

Flaked stone tools form the second part of the tool assemblage from the Middle Neolithic. These tools fall naturally into three categories, discoidal-type scrapers, "pick-like" pebble tools, with use concentrated on or around a point, and other "scrapers", smaller and made from large flakes rather than cores.

The discoidal scrapers are usually only unifacially-flaked, with the wear concentrated at the very edge, in an arc of about 180 degrees. Differentiating wear flaking from initial manufacture was difficult, because, as Meacham, et.al. (1978:198) explain, "the rock types employed do not lend themselves to good chipping control; virtually all of the tools were only roughly shaped (if at all) before use. The coarse texture of many of the pebbles does not always permit a clear distinction to be drawn between deliberate chipping for shape, and accidental flaking due to wear." This is clearly the case here, as well.

High angles, of 85 degrees. or more, were observed on the working edges of some of these scrapers. The back is usually blunted to facilitate use, or even left deliberately unflaked, as many of them still possess the original cortex. These tools are of a size generally larger than the largest adzes, averaging about twice the length.

The "pick-like" tools are so called because they very obviously have a point, however, wear can be concentrated along the edges leading up to the point, and in some cases, the point itself is relatively unused. These points are always rounded, either from use on an abrasive but yielding medium (like sandy soil or tree bark), or from repeated use on hard materials that flake easily (like bivalve shells, or bones of not great thickness). The end opposite the point is generally heavy and unflaked, rectangular to triangular in cross-section, with cortex still present and providing a good handle. Wear along the edges is generally unifacial and produces a very high angled cutting or scraping surface. Of note is the fact that while Fu Tei has many examples of this type, they are comparatively rare at Kwo Lo Wan

The remaining tools have been labeled "scrapers", for lack of a better term. These

are large flakes or cores, chipped to give at least one working edge, and sometimes more. These edges come in many forms. Convex edges are found on some tools, with lower angles than discoidal types. Those with one edge used usually have a straight, high-angle profile on that side. The remainder have conventionally been called "notched scrapers" (Meacham, et. al. 1977:203). These have a concave, medium (30-60 degrees.) angle cutting edge, and unworked edges that generally meet at an angle near 90 degrees. opposite the blade (consequently giving them the other name of "triangle scrapers"). They are comparatively few on Chek Lap Kok, given the large numbers generally found at other sites in the region.

These tools are perhaps most significant for their non-specialized nature. Flaking is generally primary and rough, with large striking platforms and hinge fractures common. Edge retouch is difficult to discern from edge wear, but is generally absent. Areas of use as hammers are present on some examples, and used edges are uneven and discontinuous. Almost all examples found still possess cortex in one place or another. Speculation on use is possible in only very general terms. Two very large examples (approx 22 x 32 cm and over 2 kg each), are suitably pointed and shaped to be useful as hoes or shovels, but are much rougher than similar tools found at contemporaneous sites in Taiwan (Chang, 1969:160). No silica polish was observed on any of these specimens studied. Heavy damage due to constant percussive use was not present. Wear was constant with moderate use on firm media, such as wood shaving or scraping of bone or hide, cutting of roots and fibers, and perhaps opening marine shells, or cracking bone. Occurrence (per sq.m.) of the three types combined was roughly equal to that of the adzes.

USE-FORMED TOOLS

This group includes those tools which underwent no initial preparation before use, but were probably chosen due to their natural shape and constitution for specific uses, namely hammering, grinding, and polishing. The final tool type is created and identifiable by its wear patterns. The four types are: pitted pebbles, end-used pebbles, convex polishing stones, and grooved polishing stones.

1. PITTED PEBBLES

[see Figure 3.66]

These are naturally smooth pebbles, of medium size (avg weight 350 g, and amorphous and variable size generally greater than 10 cm in one dimension), that have at least one flat surface, and have been used in the middle of that surface, creating a small crater. That this action was gradual and regular is evinced by the circularity of the pit outline, and the regular depth (of about 1/4 the diameter of the hole). Use wear traces are small pits, removing only minute amounts of stone each time. The common shape is relatively circular or oval, flat on both sides and used on both. Use is sometimes also seen along the edges, and at either end; rare examples were selected for the natural "handle" they possess, being elongated, and finishing in a flat base with the characteristic pit. The other, rounded, end is also used for some sort of grinding. Davis and Treagar (1960:199) found similar ones at Man Kok Tsui, in Hong Kong, and called them hammerstones, saying that the "indentations show their various uses". What specifically is "shown" is not speculated on. These go by the name of "nutcracker" in Japan, and Barrett (in Meacham, et.al., 1977:214) cites this tradition, providing Southeast Asian examples as well. Chang (1969:164) suggests multi uses, such a opening shells,

hammering, and pressing leather.

2. END-USED PEBBLES
[see Figures 2.24, 3.67, 5.29]

"End-used pebbles" represent a group of generally larger (avg weight 750 g-1 kg) pebbles, apparently selected for both their ovaloid shape and weight, and used variously for grinding and hammering. The stone chosen is usually a medium to fine grit hard stone, granitic or porphyritic, and used on one or both ends, and sometimes on the sides as well. Hammerstones demonstrate no clear grinding "platform", and have large use flakes removed around the flattened end. These flake scars are characteristic of both very hard (e.g. stone) and softer (e.g. wood, bone, shell) striking media. Grinding stones have a very flat, smooth end profile, from constant use on a fine-grained substance. Stones were found in every stage of use, from minimal end flaking and grind-scarring, to very flattened and flaked ends from prolonged usage. Most examples had both ends, and occasionally sides, used.

3. CONCAVE POLISHING STONES
[see Figures 3.61, 3.64]

This type of stone is very common from neolithic-type sites the world over. A stone, usually large, is selected for its grit and shape, and subsequently used to polish items in such a way that long, shallow depressions (three or four times as long as they are wide) are worn into the stone on one or more faces. The larger stones are generally used on one side only, although the smaller ones are used on several sides. These stones can be quite large, up to 28 kg at Fu Tei, with average size ranging from 600 g - 1 kg. The grit on these stones is variable, from coarse sandstone, to granitic or sedimentary stones, or even very fine sandstones. It seems possible that these were used in steps to achieve the finely ground surface seen on many adzes. The use wear pattern suggests an object shorter than the grindstone itself, as the concavity depth is uneven, and generally increases in the center. The ends of grinding pebbles presumably used on something placed upon these flat stones would make such a mark, although the faces tend to be canted at an angle when the base is placed on the ground. It would be difficult to keep anything being ground on the surface of the stone. Adzes, however, are held in the hand, and about 30 minutes experimental polishing of a flaked preform on one of these stones produced a good edge, with striations observed under magnification to be the same as those seen on finished adzes.

4. GROOVED POLISHING STONES
[see Figures 3.62-64]

These polishing stones are common in the entire region, from South China to Southeast Asia. They are generally rectangular, but the only important features are the grooves that crisscross the surface randomly. These grooves are semi-circular in cross section, rounded at the bottom, and even going deeper in some cases than the width of the cut--giving the diameter of that being polished as approximately .5 cm. (although this varies slightly in either direction). The grooves run the entire length of the stone, and are of uniform depth throughout, indicating that the item being polished is longer than the stone. When the groove is not of equal depth it either increases or decreases at the same angle throughout its length. Lastly, nothing has yet been recovered that corresponds to

the image created by the negative of these stones, i.e. that whatever was being polished or smoothed is apparently not archaeologically preservable under normal circumstances. These are a prominent feature throughout the region. In Vietnam, the type-site of Phung Nguyen has them (Khoach, 1980:28). Boriskovsky (1966:84) calls these "abrasives with narrow grooves", and says with no reservations that they were for "grinding long sticks". Previous speculation on examples from the site of Sham Wan, Lamma Island, in Hong Kong have labeled them as "arrow-shaft smoothers" (Barrett, in Meacham, et.al. 1977:220). This seems logical, in light of the fact that many projectile points have been found, but the shafts of the arrows have certainly decomposed. Even during the bronze age (on Chek Lap Kok, as well as other sites), these grinding stones are present, suggesting that the advent of metal, as well as a few millennia of other advances, had not rendered them obsolete.

CONCLUSIONS

The stone artifact assemblages from these two sites show homogeneity in most aspects, but there are a few differences worth noting. The two sites are very similar in their occupation profiles seen in the soil. They average about 5 kg of potsherds per 3 sq m, and approximately 100 g of sherd per flake found, and their sq.m./adze are nearly the

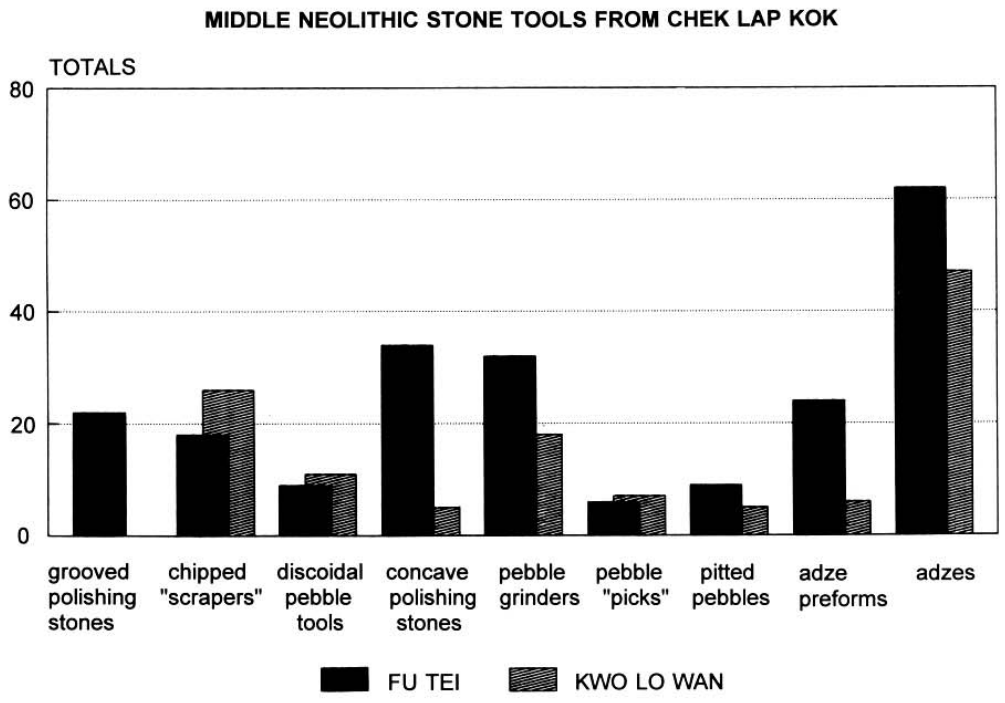


Figure 10.1 -- Graph comparing totals of the tool types from the two sites.

same, 5-6. The depth of soil and deposit is less at Kwo Lo Wan. But while Fu Tei has a large inventory of grooved polishing stones, Kwo Lo Wan has none. Fu Tei has large numbers of both heavy pitted and grinding pebbles, compared with one and a few examples from Kwo Lo Wan, respectively, and those are much smaller by comparison. In general, although the pottery types and numbers (and therefore the cultural activity) at both sites is very similar, the stone inventory overall is much more massive and present at Fu Tei.

In comparison, the tools can be grouped two ways; implements involved directly in food preparation, e.g. the grinding and pitted stones, and involved in making other implements, e.g. grooved and concave polishing stones. The fact that these two groups are largely not present at Kwo Lo Wan suggests that in the Middle Neolithic, the inhabitants were not pursuing these types of activities. The two sites are contemporaneous (within two sigmas); it seems logical to conclude that there was some specialization going on between sites. With an assemblage composed mainly of adzes and lighter scraping tools, Kwo Lo Wan was perhaps a woodworking or gathering center, whereas Fu Tei, with its more numerous polishing and grinding stones, was used mainly for food preparation or gathering, as well as construction of other implements, such as arrow and spear shafts, projectile points, and adzes.

The adze inventories are characteristic of the Southeast Asian Neolithic, from coastal southeast China to Thailand (Duff, 1970). Notable is the fact that although large adze preforms have been found on this site (over 1 kg and 30 cm), no adzes found were over 400 g. Many of the adzes examined demonstrated evidence of several regrinds and reforms, a result of reshaping into use as larger adzes spalled flakes under use. Adzes were found in every state of dis- and re-repair, as well as flakes with polished surfaces, some examples of which were even able to be refit. A fair conclusion is that adzes were repeatedly reground and reused, changing in shape and decreasing in size. Consequently, only new adzes with little use are likely to be large, as reuse would quickly reduce the size.

The high degree of refinement of these and other adze assemblages in contrast with the chipped or flaked stone tools of the region is interesting. Flaked stone tools from virtually all of Southeast Asia and China display a marked crudeness in comparison with the refinement of the polished stone tools present in the same collections. The contrast invites some discussion.

Although there has been activity in the past concentrated on finding a highly developed microlithic technology in the neolithic of the region, the archaeological record doesn't support this. The tool assemblage from the Sham Wan site mentioned earlier was re-examined (Cheng and Tang, 1988:201-207), and a number of types not originally "found" were identified, including classic Magdalenian awls, bipolar flakes, and burins (!). The nearby site of Xiqiaoshan in Guangdong province of South China has a fairly developed "microlithic tool tradition" (Tang and Au, 1991:xiii-xiv). However, the dating from this preceramic locality is unclear, and the neolithic date proposed by some (Shang, 1991:xxix) has no solid dates to support it; late palaeolithic is more likely. Both of the above cases have proved to be highly dubious, and would in any case represent the only examples of this technology anywhere in China or mainland Southeast Asia.

It seems unlikely that the region in this period is suffering from "retarded technical and economic development" (Van Heekeren and Knuth, 1969:109). Quite the contrary, as evinced by the rare, but highly complex obsidian flaked-tool assemblages from

Indonesia (Subagus, 1979:35-40). These sites, however, are the exceptions, and occur entirely in Island Southeast Asia. The situation on the mainland is different. Lithic complexity is expressed in polished stone implements, a tradition of great antiquity in the region, beginning with "edge-ground" tools in Australia ca. 23,000 B.P. (Meacham, 1977:423), and found in the Vietnamese Bacsonian (ca. 10,00 B.P.) (Matthews, 1966:93).

Mainland assemblages (including the more temperate zone islands of Taiwan and the Hong Kong group) are characterized by highly developed stone adzes, axes and knives in association with larger, crudely chipped stone tools (cf. Van Heekeren and Knuth, 1968; Lien, 1990; and Lu, 1988). These chipped implements generally defy a rigorous typology based on shape (Anderson, 1990:7), the sort of typology able to be applied to both highly specialized flaked stone types, and to highly developed polished stone types, e.g. adzes.

Why then is there such a dichotomy within these collections? The answers can be best found in an environmental explanation, and may be derived from two conditions, namely the absence of the raw materials necessary, and the presence of other materials that do not preserve archaeologically that are better than the stone implements for the purposes they serve. The raw materials from the region are generally similar to those found on Chek Lap Kok: hard, siliceous siltstone that is difficult to flake accurately, and whose flaked stone tools are "not functional without large applied loads" (Kamminga, 1990:3). This same stone performs excellently as a ground edge: sharp, solid, and capable of grinding retouch. The chipped stone tools that do occur in addition to these specialized polished ones are comparatively rough and almost opportunistic. The core "discoidal" scrapers still possess original cortex, without extensive finishing flakes or retouch. In most cases, these heavier tools could have been made with an initial blow to split the original pebble, then several large flakes removed unifacially. After a few minutes of work, these simply formed choppers would be ready for use in initial chopping or scraping of bone, bark, fiber, or soil.

Finally, purposes that are generally served by stone in more temperate (and therefore perhaps more frequently studied) regions, are better served by vegetal and animal materials in tropical and subtropical Southeast Asia. The extensive use of other resources, and specifically bamboo in lieu of stone (Pope, 1985:73-74, and Solheim's "Lignic Era" 1970: 153) is a logical and probable answer to local technological needs. In light of these discussions, the middle neolithic stone tool assemblages from Chek Lap Kok provide a fairly complete archaeological record of an advanced lithic technology maximizing the use of the resources of this geographical region.

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A MORE PRECISE CHRONOLOGY FOR HONG KONG'S PREHISTORY BASED ON THE C-14 DATES FROM CHEK LAP KOK, YUNG LONG AND OTHER RECENTLY EXCAVATED SITES

Large-scale salvage operations conducted by the Society over the past three years (1990-92) at Chek Lap Kok and Yung Long have yielded a large number of C-14 dates, which in turn have shed much light on the dating of the Neolithic and Bronze Age in Hong Kong. Previous excavations had obtained one or two dates from each cultural phase, but we now have a series of dates for each phase with only minor inconsistencies. There are of course still problems and unanswered questions in the chronology. But when one views the data as a whole instead of focusing on individual dates, the position of the Neolithic phases and of the Bronze Age is much clearer than before, and certain parts of the chronology can be considered as established beyond dispute.

The earliest known occupation of the Hong Kong area is now clearly shown to be the painted pottery phase, which I previously called the "Chung Hom Wan phase" (JHKAS xi:10 [Journal of the Hong Kong Archaeological Society]). The dates from Yung Long South near Tuen Mun indicate very clearly that this phase is distinct from and earlier than the better known "Sham Wan Phase" with fine chalky incised ware, represented by the recently excavated sites of Fu Tei and Kwo Lo Wan (upper) on Chek Lap Kok. This division of the Middle Neolithic period is now very well established, and abbreviated MNI for the earlier painted pottery "Chung Hom Wan phase" and MNII for the later incised chalky ware "Sham Wan phase". (For further discussion of the dating of the painted pottery phase see below.) The weighted average of C-14 dates from the MNI layer at Yung Long South is 3980-3701 B.C. but a broader mean of the MNI phase at 4100-3600 B.C. could be suggested from the dates. The weighted average of MNII dates from Fu Tei and Kwo Lo Wan (upper) is 3618-3340 B.C.; the dates from the two sites seem to suggest two different periods of occupation, however, with the two dates from Fu Tei over-lapping with *some of* the MNI dates at Yung Long. Again, it is important to stress that one or two dates do not constitute enough evidence to draw conclusions on the placement of a cultural phase; one needs to keep a much wider view. The previous dates on the "Sham Wan phase" clustered around 3500-3000 B.C. It is on the other hand just possible that Fu Tei was inhabited very early in the MNII phase, just after the decline of painted pottery, at around 3700-3600 B.C.

Perhaps the most unexpected aspect of the new dates is the very early position of what may be termed the "Yung Long Phase" of the Late Neolithic. This site yielded a very well-fired geometric pottery, just slightly lower fired than Bronze Age stoneware, and it was at first believed to be a borderline Late Neolithic/Bronze Age site. The dates clearly refute this notion, and show that the Yung Long phase dates to the early part of the geometric pottery period, abbreviated LNI. The weighted average of the LNI dates from Yung Long is 2579-2459 B.C., probably representing an occupation of the site at around 2650-2400 B.C. From other "soft geometric" sites, 5 charcoal samples gave a weighted average of 2130-1770 B.C. and 13 shell samples gave a weighted average of 1910-1740 B.C. Certainly these sites are later than the Yung Long phase, and they are characterized by a greater variety of and more elaborate geometric patterns, which I call "classic soft geometric". This phase may be termed LNII. The two dates from Lung Kwu Sheung Tan fall within the LNI bracket, although the associated pottery is not of Yung Long type.

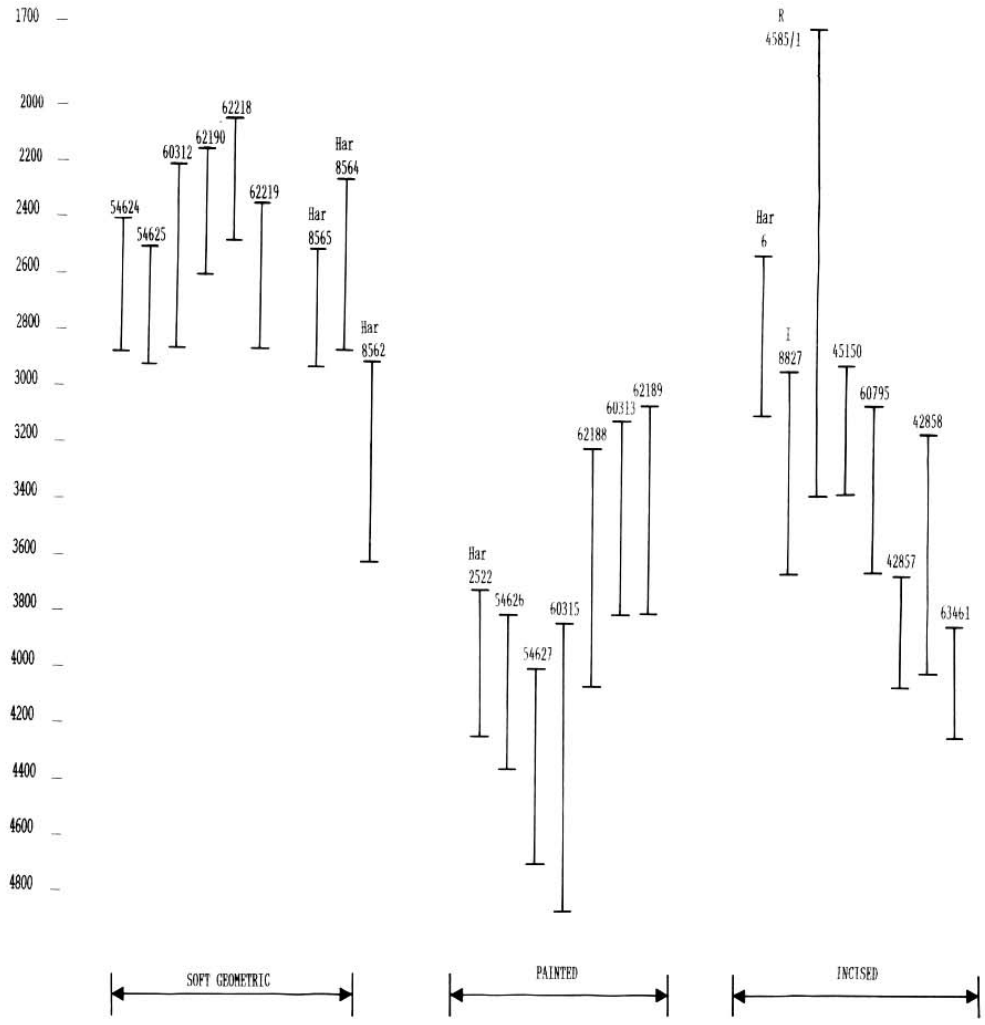

Figure 10.2 -- Graph showing recent C-14 dates on the Neolithic phases.

The Bronze Age hard geometric phase is dated by 5 samples: three from Kwo Lo Wan (lower), one from Lung Kwu Sheung Tan and one from Sha Po Tsuen. Their weighted average is 1258-1008 B.C., but the three dates from Kwo Lo Wan suggest that the site was occupied at around 1200-1100 B.C. These dates leave no doubt that the local Bronze Age dates to at least 1000 B.C., and probably to 1200 B.C. In the light of these dates, I do not believe there is any scientific basis for arguing that the local Bronze Age is not at least Western Chou in age. There is certainly a later phase of the Bronze Age, but we do not at present have sufficient data to describe it, and nor do we have dates to place it accurately in time.

This discussion of Hong Kong's prehistoric chronology has been based almost entirely on C-14 dates obtained in the last three years. Only dates on charcoal (the most reliable sample type) have been used. But it is interesting to recall that a similar article

SUMMARY :

MNI painted pottery phase :	4100-3600 B.C.
MNII incised chalkyware phase :	3600-3000 B.C.
LNI "Yung Long" phase :	2600-2400 B.C.
LNII "classic" soft geometric:	2200-1700 B.C.
Bronze Age hard geometric phase:	1250-1000 B.C.

which I wrote more than ten years ago (JHKAS ix:77-78) had a chronology generally in agreement with that proposed here, except that the sub-divisions of Middle and Late Neolithic were not known then. Conversely, a division of the Bronze Age into early and late phases proposed then has not been substantiated in the recent work.

ON THE DATING OF PAINTED POTTERY IN HONG KONG

INTRODUCTION

The first discovery of painted pottery in Hong Kong was made by Fr. Finn in 1933-34 at Tai Wan, Lamma (Finn 1958:38). From the considerable depth at which the painted pieces were found and their completely different style, Finn surmised that this type of pottery was earlier than the geometric wares. Another early archaeologist, Walter Schofield, divided the geometric pottery into two phases: Bronze Age with high fired stoneware, and Late Neolithic with soft, fine paste geometric pottery. Thus, from the pre-war work in Hong Kong, and from the early work by Chinese archaeologists in Guangdong and Fujian, it was clear that the soft geometric pottery dominated the later part of the Neolithic. The painted pottery found in the 1930's by Finn at Tai Wan and by another priest, Fr. Maglioni (1975:32-35), in Haifeng district, was assigned to an earlier phase of the Neolithic, but the precise date of this phase was the subject of much speculation.

The matter rested there until the 1960's, when K.C. Chang's theories of a "Lungshanoid" expansion from the Central Plains into South China began to be applied locally. James Watt (1968:13-15) believed that the Lungshanoid expansion brought painted and other fine pottery types into Guangdong, and provided the basis for the early geometric pottery which followed. Chang himself (1967:107) cited some pottery traits from Maglioni's site in Haifeng as evidence of a deep penetration of the Lungshanoid into coastal South China. Watt believed that the Lungshanoid only reached Hong Kong very late, and was followed closely by the early geometric. Dating remained largely a matter of conjecture, especially after the C-14 dates from South China in the late 1970's began to unravel the very concept of a Lungshanoid expansion.

The excavations at Sham Wan in the 1970's (Meacham 1978) brought the question of painted pottery into sharper focus, on account of its total absence in a rich cultural deposit that was clearly pre-geometric and that had most of the other traits formerly attributed to the Lungshanoid. However, at another Lamma island site, Tai Wan, excavated in 1979 (Peters and Bard 1982), painted sherds were found in abundance and seemingly from the same culture as present at Sham Wan. It was the consensus among Hong Kong archaeologists at the time that the painted ware was contemporary with the other fine incised chalky wares found at Sham Wan, since the forms of painted vessels

were virtually identical to those of the plain and incised wares. The survival of the pigment was deemed to depend on the soil conditions at each site, while the possibility that painted wares were reserved for ritual or burial areas was also considered.

This phase, believed to have had both painted and incised chalky wares, was termed "Middle Neolithic", and at Sham Wan it was very clearly separated stratigraphically from the soft geometric phase, termed "Late Neolithic". The Middle Neolithic was estimated at around 4000-2000 B.C. based on a small number of C-14 and TL dates from Sham Wan and other Hong Kong and Guangdong sites, in addition to the belief that the earliest geometric pottery probably dated to around 2000 B.C.

RELATIVE DATING BASED ON STRATIGRAPHY

The crucial point in our understanding of the periodization of the local Middle Neolithic came with the excavations at the Hac Sa Wan site in Macau. There, two distinct Middle Neolithic layers were identified: the upper with pottery types closely related to Sham Wan incised wares, and the lower with painted pottery. In an article written shortly after the Macau excavation, I argued that the existence of an earlier painted pottery phase should be recognized, and proposed a dating of 4500-3500 B.C. In the light of the data from Macau, it was possible to see that:

> There was in fact some evidence already for such a subdivision of the Middle Neolithic, but it had escaped notice until the recent work at Hac Sa. Several sites had a high occurrence (i.e. greater than 1%) of painted pottery, notably Tung Kwu, Tai Wan, Hai Dei Wan, while other sites such as Sham Wan, Sai Wan and the archaeologically excavated parts of Chung Hom Wan yielded not a single painted sherd among the ... tens of thousands. (Meacham 1986:107)

A recent re-examination of the 1979 material from Tai Wan showed that the ShamWan-type incised or plain, white or buff yellow chalky ware was prevalent in the upper levels, whereas buff red or orange painted or plain pottery was prevalent in the lower levels. The arbitrary 20 cm collection levels may have obscured the separation of earlier and later occupation of the site during the Middle Neolithic, or the deposit may not have been well separated stratigraphically. But the tendency for the white incised wares to be in the upper levels and the painted red pieces in the lower levels is clear. Re-examination of the field notes from Hai Dei Wan indicate that the few pieces of painted pottery were at the very base of the Middle Neolithic deposit.

Excavations on Chek Lap Kok in 1991 brought to light another example of painted pottery underlying ShamWan-type, white incised pottery. In one area near Sham Wan Tsuen, two small squares yielded painted pottery. Although no clear-cut division could be discerned from the soil stratigraphy, the white incised wares clearly belonged to one brief occupation, underlain by a sterile zone and then another cultural deposit containing painted pieces only. The existence of the sterile zone and the fact that the painted pottery was fragmentary, scattered about, and present in two different squares strongly suggested that it was an earlier phase rather than a special burial pottery from the Sham Wan phase.

Finally, recent excavations at the Yung Long site near Tuen Mun revealed an extensive, stratigraphically distinct painted pottery cultural deposit; the ShamWan-type white incised chalky pottery was totally absent from the site. The cultural layer was a typical activity deposit of potsherds, stone tools and discoloured areas; no complete vessels were found. There is thus no question of the deposit representing a special burial area of the Sham Wan phase.

In summary, there is strong evidence for an earlier phase of the Middle Neolithic represented by painted pottery, while the later phase of the Middle Neolithic well known from Sham Wan "stratum F" does not appear to have painted pottery at all. The two phases are seen in relation to each other at Hac Sa, Sham Wan Tsuen, and probably at Tai Wan and Hai Dei Wan, while the painted pottery phase is seen in isolation at Yung Long.

ABSOLUTE DATING BASED ON C-14

The first indication of the antiquity of painted pottery was the C-14 date from charcoal at the base of the cultural deposit at Hai Dei Wan, giving a result of 5100 B.C.+/-100, calibrated to 4221-3700 B.C. At the time this date was obtained it was the earliest date from an archaeological context in Hong Kong. However, for the reasons cited above, a separate painted pottery phase had not been recognized, so the date was simply seen as establishing the earlier chronological limit of the Middle Neolithic culture.

The excavation of a cultural layer clearly belonging to the painted pottery phase at Yung Long in 1992-3 provided the opportunity to obtain C-14 dates on this phase without confusion with the later Sham Wan phase, which was not present at the site. Charcoal was sparse, and in some instances samples from two different squares had to be pooled to provide enough carbon for a measurement. The first two dates obtained (54626 and 54627) were very consistent, at ca. 4500-3800 B.C. Other dates obtained later ranged from 3780-3047 B.C. at the latest to 4838-3816 B.C. at the earliest. The C-14 dates from Yung Long seem to fall into two groups: those clustered around 4700-4800 BP (lab result) and those clustered around 5100-5400 BP. But it should be noted that most of the dates do overlap at two sigma (95% probability), and a weighted average of all the dates available on the painted pottery phase gives a result of 5049 BP or 3980-3707 B.C.

This series of dates illustrates the importance of not relying on one or two C-14 dates. There are well-known possibilities of charcoal being older than the cultural layer in which they occur (old wood used by the occupants or old charcoal upturned from an earlier deposit), or younger (contamination from humic acid in the ground water or intrusion from an overlying layer). These site or sample idiosyncrasies will eventually be smoothed out when a large number of dates have been obtained. The total of seven dates for the painted pottery phase is still relatively small, but it does seem to me that the time range suggested by the weighted average, around 4000-3700 B.C., should be close to the reality.

The Sham Wan phase also has some internal discrepancies, and more results which do not overlap. The two early dates from Fu Tei (42857 and 63461) stand out in this regard, and they are earlier than some of the dates for the painted pottery at Yung Long. There is a special problem at Fu Tei in that immediately below the cultural deposit is a sterile residual soil which has some bits of charcoal. One sample of this geological charcoal dated ca 11,000 years BP, and one sample of charcoal from a pit cut into the residual soil from the cultural layer gave a date of 6840 BP, calibrated to 5807-5582 B.C. This date is more than 1000 years earlier than the painted pottery dates and clearly cannot be correct for the Sham Wan phase. Furthermore, the nearby site of Kwo Lo Wan has the same culture as Fu Tei, and its two dates (45150 and 60795) give an average considerably later than that of the two aforementioned early dates from Fu Tei.

Once again, the overall pattern is more important, and the weighted average of the eight dates for the Sham Wan phase is 4730 BP or 3633-3374 B.C. This time frame

follows directly on from the painted pottery phase, and seems a reasonable approximation of the true age of the Sham Wan phase, perhaps extending up to around 3000 B.C.

In conclusion, the evidence at present strongly points to a date of 4000-3700 B.C. for the painted pottery phase, of 3600-3300 B.C. for the Sham Wan phase. The earliest geometric pottery probably dates from just after 3000 B.C. What is still totally lacking is any evidence on the period 4500-4000 B.C. which probably witnessed the early development of painted pottery in this region.

C-14 DATES ON CHARCOAL FROM MIDDLE NEOLITHIC SITES IN HONG KONG

Lab. No	*Lab. Result BP*	*Cal. Result B.C.*	*Site*
Painted pottery culture (MNI) :			
Har-2522	5100 +/- 100	4221-3700	HaiDeiWan
54626	5230 +/- 100	4340-3789	YungLong
54627	5450 +/- 150	4665-3980	YungLong
60313	4700 +/- 120	3775-3100	YungLong
60315	5490 +/- 220	4838-3816	YungLong
62188	4880 +/- 170	4034-3199	YungLong
62189	4710 +/- 130	3780-3047	YungLong
Incised pottery culture (MNII) :			
Har-6	4220 +/- 100	3076-2505	SaiWan
I-8827	4570 +/- 130	3640-2920	ChungHomWan
R-4585/1	4000 +/- 300	3360-1696	ShamWan
42857	5050 +/- 100	4040-3640	FuTei
42858	3990 +/- 160	3990-3137	FuTei
63461	5200 +/- 60	4221-3817	FuTei
45150	4410 +/- 80	3350-2900	KwoLoWan
60795	4610 +/- 90	3628-3039	KwoLoWan

Notes : *Cal. Result B.C.* is based on the calibration program 1987 (Rev. 2.0) published by the Quaternary Isotope Lab of the University of Washington. Laboratory numbers are from Beta Analytic, USA except Har (Harwell, UK), I (Teledyne Isotopes, USA), and R (Institute of Nuclear Sciences, New Zealand).

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THE CHEK LAP KOK PROJECT -- CONCLUDING REMARKS

The work reported in this volume has shown that the history of Chek Lap Kok spans the entire period of human occupation in the Hong Kong area, from the earliest inhabitants in the painted pottery period of the Middle Neolithic, around 4000 B.C., to the recent flood of immigrants from mainland China. It is interesting to note that an island as small as Chek Lap Kok can nonetheless be so rich in archaeological remains, and provide a microcosm of Hong Kong's past. Every cultural and historical phase known in Hong Kong, with the possible exception of the Ming era, is represented on the island. In addition, there are the tantalizing hints of earlier occupation, during the Early Neolithic at the rock shelter site, and during the Palaeolithic from the charcoal dated to 11,000 years BP at Fu Tei.

This reflection of the general archaeology of the territory is also seen in what was *not* found. The Han dynasty period was only represented by four pieces of pottery from Sham Wan Tsuen; the Ming dynasty period is completely missing. For Hong Kong as a whole, almost the same situation prevails : Han artifacts are very seldom found, and Ming porcelain is even rarer (with the exception of the site at Penny's Bay). The rarity of painted pottery, found in only one small area of around 5 x 2 metres, also reflects the rarity of these Middle Neolithic phase I sites in the territory.

The information that the two sites of Fu Tei and Kwo Lo Wan upper provide on phase II of the Middle Neolithic is significant. There can be no doubt that this culture is the same as the earlier cultural layer at Sham Wan on Lamma; many of the incised

SUMMARY OF THE OCCUPATION OF MAJOR SITES ON CHEK LAP KOK

	SHAM WAN TSUEN	FU TEI WAN	HA LAW WAN	KWO LO WAN
CHING DYNASTY	✓	✓		✓
MING				
YUAN			✓	
SUNG	✓	✓	✓	✓
TANG	✓	✓	✓	✓
SIX DYNASTIES		✓		
HAN	✓			
BRONZE AGE	✓			✓
LATE NEOLITHIC	✓	✓		
MIDDLE NEOL. II	✓	✓		✓
MIDDLE NEOL. I	✓			

patterns are exactly the same, the white or yellowish chalky fabric is the same, as is the familiar foot-rimmed bowl. What is new and very important are the complete vessel shapes obtained from the two sites, not to mention the spectacular piece FT1012, with an incised pattern of a sophistication for its time not seen previously in Guangdong province if not the whole of the southeast China coastal area.

The archaeological investigations have shed no light on the large gaps from Late Bronze Age to end of Han, and from Ming to middle Ching, and strongly suggests that the island was virtually uninhabited and rarely if ever visited during these periods of 400-500 years. The conclusion derives from several lines of negative evidence: the complete absence (in the case of Ming) of graves, structures or ruins not attributable to the 19th/20th century, and the virtual absence of ceramics from the periods. The question that immediately presents itself is of course how to account for these major gaps after many centuries during which the island did attract considerable human activity. There are no obvious reasons or ready answers.

The salvage project on Chek Lap Kok was successful to a degree well beyond anyone's expectations. Not only did the site of Sham Wan Tsuen provide the crucial key for understanding the operation of the lime kilns, it also provided evidence of the existence of an earlier painted pottery phase in the Middle Neolithic. Fu Tei Wan provided a rich collection of artifacts from the later incised pottery phase of the Middle Neolithic, as well as one of the best examples of a Tang dynasty lime kiln. Ha Law Wan of course provided a totally new and unique type of kiln industry. And finally, the unbelievable richness of Kwo Lo Wan, with its Middle Neolithic *and* Bronze Age burial objects.

This salvage project was a fine example of how cultural remains and information can and should be retrieved before development takes place. Having been preserved by nature for thousands of years, this material is part and parcel of our cultural heritage. It would have been a tremendous shame if we in the 20th century had allowed this material to have been destroyed, in the haste to develop and improve our society.

The valuable objects recovered from Chek Lap Kok serve not only to teach us about the life of Hong Kong's early inhabitants, but also to remind us of our obligation not to destroy the physical evidence of life in the past.