Chalcolithic Marble Working at Kulaksızlar in Western Anatolia

Kalkolitik Dönem Batı Anadolu'da Kulaksızlar Mermer Üretimi

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Keywords: Chalcolithic period, western Anatolia, marble production, exchange, consumption
Anahtar Sözcükler: Kalkolitik dönem, Batı Anadolu, mermer üretimi, ticaret, kullanım

Bu çalışma Kalkolitik dönem Batı Anadolu'da bugünkü Akhisar yakınlarında mermer heykelcik ve kap üretimi üzerine yoğunlaşan Kulaksızlar üretiminin teknolojik ve sosyo-ekonomik yönlerini inceler ve şehircilik öncesi köy topluluklarının el sanatlarında uzmanlaşıp bundan ekonomik ve sosyal kazanç sağlayabileceğini gösterir. Bu da Batı Anadolu halklarının Kalkolitik dönemde yalnızca tarım ve hayvancılığa dayalı basit bir sosyo-ekonomik düzene sahip olmadığını, bunun aksine bu dönemde gelişkin bir üretim ve ticaret sisteminin bölgede var olduğunu ortaya koymaktadır. Gediz Nehri havzası üzerinde böylesine gelişkin bir üretim sisteminin ortaya çıkması bölgenin doğu ve batı arası kültürel iletişim ağı içinde etken rol oynadığı savını da desteklemektedir.

Introduction

An early example of structured and specialized marble working has recently been recovered during the surveys at a site near the village of Kulaksızlar in western Anatolia (Fig. 1). Surface surveys identified a manufacturing debris of a workshop that consists largely of blanks, waste byproducts, manufacturing errors, and stone tools associated with multiple stages of marble working (Dinç 1996a and 1996b; Takaoğlu 2000 and 2001). Analyses of these surface finds and their spatial distribution over the surface of the site reveal that the Kulaksızlar workshop was oriented towards production of the so-called Kilia figurines and stone vessels (pointed beakers and bowls)(Fig. 2), although several fragments attest to the occasional manufacture of globular jars, flat-based bowls, and other types of schematic figurines. Because the homogeneous pottery assemblage associated with the manufacturing debris dates to the Chalcolithic period, Kulaksızlar marble working evidence complements our knowledge of production, exchange, and consumption systems in pre-urban western Anatolia.

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Although marble working was a feature of prehistoric western Anatolian communities as early as the Neolithic period, the technological and socio-economic aspects of marble working have never been examined in detail. This is because as yet there is no direct evidence such as manufacturing debris associated with the production of marble artifacts was available. The relative paucity of information available on production systems in Chalcolithic western Anatolia prompted me to concentrate on this issue of marble working to obtain more information about the culture and society during this poorly understood period. Kulaksızlar evidence presents an opportunity to deal with not only technological aspects of marble working but also the social and symbolic contexts that gave meaning to technological actions and products. Thus, available archaeological evidence is utilized in order to understand how the marble figurines and vessels were made, where the raw materials were acquired, what kinds of tools were used, how craftsmen utilized these tools, and how the marble artifacts were exchanged and used.

The site

The site of Kulaksızlar, which derived its name from a modern village nearby, is located ca. 16 km south of the town of Akhisar in Manisa Province. The site covers an area of approximately 200 x 300 m on a natural rise on the eastern part of the alluvial plain, at an elevation of 115 m above sea level (Fig. 10). The surface of the site slightly undulates towards a perennial spring which flowed across the site in a NW-SE direction during the time of the site's occupation. The surface artifacts, which consist largely of blanks, waste byproducts, manufacturing rejects, and tools, confirm that this area was the locus of marble working (Fig. 3). The enormous quantity of artifacts associated with marble working (90%), relative to artifacts relating to daily life such as pottery and food processing implements (10%), shows that marble working occupied a central role in the lives of the site's population. This idea that marble working dominated the village economy can be supported by the location of the site near or in the forest on the foothills, since the remnants of original natural vegetation such as pine, oak, and juniper trees are still encountered on the several hundred meters northeast of the site. It was the abundance of marble, as well as rocks such as gabbro, basalt, and sandstone that were suitable for shaping it, that induced these people to adopt a manufacturing strategy involving non-agricultural production. The fact that most agricultural communities of the region preferred to live in the alluvial plain during the Chalcolithic period clearly demonstrates why this locality was chosen.

The shallow nature of the cultural deposit implies that the marble working was a short-lived activity, perhaps lasting several generations. The stylistically homogenous nature of the pottery assemblage also points to a short-lived occupation at this locality. The dark-gray to black handmade pottery, characterized with large bowls with high uprising handles with knob-like projections, deep bowls with vertical strap handles, and globular jars with collar-necks find their closest parallels in the repertoires of the levels X-VIII at Emporio and the levels II-III at Tigani on the eastern Aegean islands of Chios and Samos. This type of pottery has rarely been documented among the repertoires of western Anatolia and known to us only from excavations at Karain Cave and Bağbaşı in the Antalya region in the southwest Anatolia. Therefore, Kulaksızlar pottery belongs to one of the most vaguely known periods of western Anatolian cultural history, that is the period of transition from the poorly known Middle Chalcolithic to the earlier stages of the Late Chalcolithic period (Takaoğlu 2000: 90).

Sequences of Kulaksızlar marble working

Current lithic studies place more emphasis on explaining cultural processes that are closely linked to the production system.

The processes by which artifacts are produced, distributed and exchanged are often integrated into the study of lithics (e.g. Runnels 1985; Perlès 1992).I also attempt to study the evidence of Kulaksızlar marble working in a similar conceptual framework that includes the study of related processes such as the choice of raw material to be utilized, prospecting and extraction of raw materials, manufacture of artifacts, and the distribution and use of finished figurines and vessels.

1.Selection and extraction of raw materials

Archaeological studies dealing with the patterns of lithic production often include in their studies the ways how the raw materials were extracted before they were transformed into artifacts. In this framework, the factors such as workability, relative coast involved in extraction, and aesthetic associations are seen as the main factors that shape the strategies involving the selection of a particular raw material to be utilized (Runnels 1985). The feedback relationship between raw material availability and the adopted behavior, which can be seen as a characteristic feature of home- or village-based craft production systems, was determined in part by basic economic forces. If the raw materials used were locally available or found in abundance close to the place of manufacture, then it can be assumed that the relative cost was an important consideration in raw material selection and extraction. In such a circumstance, access to raw materials becomes essentially unlimited for the people and the simple mechanism adopted for the acquisition of raw materials becomes an incentive for independent craft specialization to emerge and develop.

Archaeological evidence from Anatolia demonstrates that quarrying and collecting were the main two patterns involved in the extraction of the lithic raw materials during the prehistoric times. For example, excavations of obsidian workshops at the Neolithic site of Kaletepe in central Anatolia demonstrate that obsidian workers adopted a strategy involving the quarrying the stream bed (Balkan-Atlı et al. 1999), while the core preparation and reduction debris found at Neolithic Aşıklı Höyük in the same region indicates that craftsmen at settlements located near obsidian sources preferred to collect unmodified raw materials and then knap them in the settlements rather than near the source (Balkan-Atlı 1994).

How the marbles were extracted before they were transformed into vessels and figurines at the site rather than near the source can be examined in light of the surface evidence from Kulaksızlar. A collecting strategy was preferred to quarrying, since the geological sources exploited at the Kulaksızlar marble workshop were located within walking distance from the site. The lack of homogeneity in physical properties combined with the variability in the colors of marbles found at the site clearly shows that marble used in the various stages of production were actually collected from the immediate vicinity of the site by the craftsmen or their subordinates. A great quantity of large marble cobbles found during the site survey have water-worn surfaces, suggesting that these pieces were collected from stream beds. It is clear that they were originally broken off from the slopes of the marble-rich mountainside by erosion and were gradually wore down into small cobbles, and eventually deposited in stream beds and alluvial plains. Cobbles naturally occurred in sizes that would have been adequate for figurine and vessel production at Kulaksızlar.

Archaeological evidence pointing to an extracting pattern involving collecting is in accord with the results of archaeometric study. Archaeologists utilize a wide range of techniques such as trace element analysis, electron-spin resonance spectroscopy, strontium isotopic ratio, and stable isotopic analysis of oxygen and carbon to identify the source where the marbles were obta-

ined. Trace element analysis is the method utilized in this study to determine where Kulaksızlar craftsmen acquired the marble. In trace element analysis, the chemical properties of the archaeological marble artifacts are matched with the source or quarry from which they may have been obtained. Mass spectrometry determines up to thirty minor and trace elements in white marbles with a good precision. It is a non-destructive method and a marble fragment weighing an average of 200 mg is sufficient to obtain the elemental ratios within the raw material. The values of elements are monitored as ppb (parts per billion) and compared to those of geological samples from which archaeological materials were made. Eight samples taken from marble vessels and figurines and two geological samples taken from the vicinity of the workshop were used (Takaoğlu 2000:115). The ratios of trace elements listed in the Figure 5 shows that chemical properties of analyzed geological sample "K" was similar to those of eight samples taken from Kulaksızlar marble figurine and vessels. This is particularly evident in the values of strontium, which is one of the diagnostic elements in marble provenance studies. Two diagrams were also created from the trace values provided for the trace elements to show the homogeneity in the chemical properties of the marbles used at the Kulaksızlar workshop. For example, the diagram based on the ratio of dolomite to barium (Figure 6) demonstrates that the properties of geological sample "K" and six archaeological samples are very close since they occur almost in straight line. (The anomaly represented by the two archaeological samples in this diagram is probably due to the contamination). The diagram based on the ratio of rubidium/strontium to uranium/lead (Figure 7) also displays a similar affinity in terms of chemical properties. Therefore, the results obtained from the trace element analysis alone confirm that those eight samples taken from the marble pieces that were collected from an area where the analyzed geological sample "K" was taken, that is a stream bed within the immediate region of the place of manufacture.

The results of chemical analysis of selected archaeological and geological samples show that there was a homogeneity in the properties of marbles used by the Kulaksızlar craftsmen. This homogeneity was apparently due to the exploitation of the immediate vicinity of site rather than traveling far from the workshop area. Difficulties involved in the transportation of marble probably prevented longer trips. Collecting seems to have occurred in an area within a 2-3 kilometers radius from the workshop area. Therefore, relative cost can be accepted as an important consideration for craft specialists working independently, leading Kulaksızlar craftsmen or their subordinates to adopt a less costly strategy involving collecting. This implies that the distance from the production site to the source and the simple mechanism involved in the acquisition of the raw materials determined the nature of the strategy involved in the extraction of marble.

The simple mechanism used for the acquisition of marble is also evident in the stone tools used at the workshop. The rocks of ophiolite sequence such as gabbro and basalt were preferred for flaking and pecking actions as they are abundant within walking distance from the workshop area (Fig. 16a-c). Sandstone is another local raw material that was widely utilized in the workshop for abrasive actions. The reddish-yellow sandstone used by Kulaksızlar craftsmen for fashioning drill-bits was taken from the source near the village of Sarıçalı, which is located in a walking distance from the workshop. The river-pebbles used in the act of polishing may have been collected from the banks of the Ilıcak stream to the west of the workshop. In a similar way, the local cobble flint used at the workshop seems to have been obtained from various erosional deposits such as gravel beds and alluvial deposits located nearby, since the color of flint artifacts displays no homogeneity in color and texture.

Besides the relative cost, workability is also important factor for the selection of

raw materials. Flaking and pecking actions require fine-grained or crystalline hard stones. The hardness of the igneous rocks such as gabbro and basalt (6-7 on Mohs' scale) was suitable for percussive actions. These rocks are nearly twice as hard as marble which makes them appropriate materials for marble working. Sandstone was evidently the predominant raw material preferred for abrasive actions such as drilling and removing flaking and pecking marks. Flint is another workable material that was used for tools because it breaks with a conchoidal fracture, making it easy to knap and create bladelets for incision and scrapping and awls for piercing vertical lugs of beakers.

The aesthetic quality of marble also played an important role for the selection of marble. Marble is a distinctive material, and its crystalline form with a compact structure enables it to take a high polish and attractive final appearance. It was probably variability in the color of the marbles with varying shades ranging from yellow to blue that made marble as a valuable raw material for Kulaksızlar craftsmen as well as for the consumers of their products.

2. Manufacture

No complete finished artifacts were found on the surface of the site, due in part to their burial through cultural or natural processes or their removal from the workshop for exchange. The main products of the workshop have been identified on the basis of manufacturing debris. Based on morphology and function, the unfinished fragments permit the identification of two major classes of artifacts: vessels and Kilia figurines. Marble vessels are further subdivided into types as pointed beakers and bowls with pointed bases. Kilia figurine, which derives its name from the site of Kilia in the Gallipoli Peninsula where the first example was identified, is the main form that received the most attention at the workshop. Kilia figurines demonstrate very fine craftsmanship with stylized anatomical details that show slight variations. The height of the figurines vary from 7 cm to 23 cm. They are characterized by large heads, which contrast with flat body, delicate cylindrical necks, broad shoulders sloping in graceful curves that end abruptly at the elbows, and arms sharply bent at the elbows. Their bent arms are separated from the torso by oblique incisions, while their feet are also separated either by a slender cleft or by a superficial incision. Features such as eyes, nose, and ears often indicated by raised projections. A broad pubic triangle is emphasized by incision.

Kulaksızlar beaker has a conical shape with two opposed vertical lugs on the upper part of the body. These vertically elongated lugs are pierced so that the vessels may be suspended. Open shaped vessels with pointed bases constituted the second major vessel form that was manufactured at the Kulaksızlar workshop. The vessel is shaped into a short cone with a conical interior.

2.1. Pointed beaker and bowl making

The sequences of marble beaker and bowl production can be reconstructed from the analysis of percussive and abrasive use-wear observed on the manufacturing errors, by-products, and stone tools (Fig 4). The first step in the manufacture of marble vessel production after the procurement of the marble to be worked into the workshop area appears to be the flaking of the selected marble into the shape approaching the approximate height and diameter of the beaker or bowl (Step 1). The examination of the percussion marks on the manufacturing errors confirms the use of heavy hammerstones when transforming the marble cobble into vessel preform. The percussive traces left on the exteriors of unfinished bowls confirm that pointed hammerstones were successively used to thin out the large flaking marks (Step 2). In the beaker manufacture, two vertical projections for lugs were roughly shaped opposite to one another

on the upper half of the beakers at this stage. In the manufacture of large bowls, craftsmen crudely chipped out the interiors of the performs.

The third step in the marble beaker and bowl manufacture is the drilling process. The implement used in drilling at the Kulaksızlar workshop was a bow drill. Over one hundred drill-bits and several drill-heads found at the workshop area so far the only physical remnant from the drilling implements. All of the drill-bits have bevels on their upper parts for attachment to the drill shaft, probably of wooden. The parallel horizontal concentric lines observed on the interiors of the vessels suggest that drill was moved back and forth by using a bow-drill. It is clear that drill-bits with sizes ranging from 3 cm to 10 cm (e.g. Fig.16d-h) were successively inserted into the interior as boring progressed. The aim of this process is that their internal contours could follow the external shape of the conical beaker. A pointed vessel consequently required a conical cavity, which could have been created by the successive use of drill-bits with crescent and conical shapes. The drilling marks seen on the interior of several unfinished bowls confirm the use of at least two different drill-bits to create a cavity that matches the exterior contour of the bowl. The first drill-bit must have had a crescent-shape, since the bevel observed around the rims often have a different angle than the marks left by the second drill-bit (Fig. 14).

The preform fragments with drilling marks show that the hollowing out of interior was done while vessel was held in a vertical location. Because the pulverized marble acted as a polishing agent, the bottom interiors have almost polished appearances, while the horizontal lines of rotary drilling is more visible on the upper interiors. Another evidence of vertical drilling is that the projections left on the interior bottom of the beakers are identical to the cavities observed on the lower ends of sandstone drill-bits. This may indicate that craftsman actually secured the roughly shaped vessel in a previously dug pit in the workshop area before the drilling process began.

The final stage in the production of beakers is the process of refinement, which is in my case the transformation of the drilled preform into a finished beaker. This step of abrading of the pecking marks on the exterior of the beaker requires substantial labor input, since the hollowing out process originally produced a thick wall of almost 1.5 cm with horizontal lines of rotary drilling on the interior. Sandstone abrasives were rubbed over the surface either vertically or diagonally to remove the pecking marks on the exterior and the drilling marks on the interior by hand-held sandstone abrasives. It is at this stage that the vertical lugs were also given their final shapes on the upper part of the body. The formation of thin elongated vertical lugs evidently required straight-angled abrasives blocks. The quartz particles in the sandstone left deep traces lines on the beaker, which were subsequently removed by fine grained rocks such as river-pebbles used in conjunction with water. Recovery of unifacial and bifacial marble river pebbles in great numbers confirms the use of such technique in refinement process. It is possible that organic materials such as leather or wool were used to polish the marble vessels.

Replication experiments undertaken during the course of the study provide a more practical understanding of how stone tools were used in flaking, pecking, drilling, and refinement actions. Gabbro and basalt hammerstones were utilized to replicate the production of a beaker and a bowl. I observed similarities between the percussion marks produced experimentally on the vessel preforms and on the stone tools when compared to those observed on the archaeological materials from the Kulaksızlar workshop (Takaoğlu 2000: Figs 6.6 and 6.14). Replication experiments also confirmed the techniques adopted during the hollowing out process. Experimentally produ-

ced bow drill was set into oscillatory motion in order to understand how the horizontal lines of rotary drilling observed on the interiors of the unfinished beaker and bowl fragments were formed. I confirmed that the drilling marks observed on the experimental vessels were identical to those seen archaeological materials. Replication experiments also clarified that sandstone drill-bits were not run wet, mainly due to the fact that sandstone dissolves when water used as a lubricant. Moreover, when the sandstone drill-bit is run wet, it leaves no horizontal lines on the interior of the marble vessel, confirming that the horizontal lines of rotary drilling observed on the unfinished vessel fragments were created by drill-bits that were run dry.

2.2. Kilia figurine making

In addition to the methods of manufacture of marble beakers and bowls, I documented much of the technique used in Kilia figurine manufacture. Unlike vessels, the manufacture of the figurines appears to have required greater amount of time, labor input, and skill than the manufacture marble vessels. The first step in the manufacture of Kilia figurines is the trimming of selected marble piece to a flat blank, approaching the approximate height, thickness, and the width of the figurine to be made (Fig. 15). It is difficult to determine whether or not the craftsmen drew the outlines of the figurine on the marble blank in order to avoid time-consuming errors. The lack of any such evidence on the marble roughed-out blocks implies that drawing of the outlines of the figurine would not have been necessary after craftsmen achieved motor habits on the methods of preforming the raw material into intended figurine form.

The second step of manufacturing Kilia figurines was the thinning of the blank, removal of large flake scars and creation of the general anatomical details with pointed tools. Craftsmen simply started to outline the silhouette of the figurine form by removing small flakes from the previously prepared flat blank. They first slightly thinned the neck-division and tapered the lower half of the blank to a shape in keeping with the final figurine form. Examination of the blanks and a great amount of lower end fragments of preforms indicate that removing small flakes from the marble blank was the main technique used in this step. The working of vulnerable points such as the delicate neck was the most risky stage in the entire process of manufacturing Kilia figurines.

The last step of Kilia figurine manufacture was the refinement of the marble preform into a finished figurine. This step of removing of the pecking marks was relatively complex and arduous process. Much of the fashioning of the figurine was evidently achieved by the use of sandstone tools. The formation of a flat body and a head that was twice as thick as the body required extensive abrasive work. It is possible that the figurine preform was rubbed repeatedly over a flat abrasive such as the bifacial flat sandstone blocks that were found among the stone tool repertoire. This process could have reduced the amount of time necessary to form a flat body that contrasts with a thicker head. The formation of the delicate circular neck required careful abrading work. Abrasive marks observed on one head fragment that had broken off at the neck demonstrate how craftsmen may have formed a circular neck (Fig. 15). It was at this stage that the nose, ears, and eyes were sculpturally raised by crushed sandstone. Flint scrappers may have also employed to form the anatomical details such as the bent forearms, eyes, and noses. The flint blades were used to incise the leg divisions and pubic triangle. The clefts between the bent arms and body could have been achieved by crushed sandstone and sharp-edged tools such as flint blades. The diagonal breakage observed on the corners of a number of flint tools leads me to believe that division between the bent arms and the body was probably created by using sharp-edged tools such as flint blades. The use-wear documented along the cutting edges of a number of

flint blades may have been caused by incising. After the incision process is completed, the surface was finished by polishing, giving the figurines a highly reflective sheen. Such polishing might have been achieved by the use of fine-grained marble river-pebbles.

Experiments to replicate the entire manufacturing process were also undertaken to understand how complex it was to make a Kilia figurine and confirm the craftsmen's stone tool use (Takaoğlu 2000: Fig. 6.16). I worked on locally available marbles using stone tools that I also collected from the immediate vicinity of the site. The first step of the experiment involved the removal of large flakes from the marble block into a shape approaching the maximum thickness, width, and length of the figurine to be made. Following continuing use, the edges of hammerstones would become less effective, but instead of discarding them, they were probably split into pieces and retouched to obtain pointed ends. These newly split hammerstones helped to thin out the large flaking marks and form the neck division. This must have been a main strategy at the Kulaksızlar workshop since such deliberately split gabbro tools occur among the manufacturing debris identified through surface surveys. The replication experiment confirms that most breakage occurred when thinning the necks by pecking. The working marks produced experimentally appears to be very similar to those abrasion marks observed on the manufacturing errors of Kilia figurine manufacture.

An examination of the finds representing the various stages of figurine manufacture shows that most of breakage (80%) occurred either during the thinning of the neck or working of the waist. Because the shaping of the figurine was done by abrasion after the silhouette of the figurine had been created the number of specimens representing breakage during the refinement process is relatively small (10%). The rate of error must have been very low for the step of refinement as the use of abrasive tools hardly requires the application of high pressure, thereby reducing the potential for breakage (10%).

3. Distribution and use

The ways how the Kulaksızlar marble figurines and vessels were exchanged probably determined the nature of the workshop. To understand why Kulaksızlar craftsmen placed special emphasis on the production of vessels with pointed bases and a figurine form with bent-arms, it is important to reconstruct the ways in which marble artifacts may have been exchanged and used (e.g. economic or non-economic motivation or both). Certain social, economic, symbolic meanings had an impact on the selection of particular technological styles, since technological behaviors often exhibit cultural values and attitudes towards the material shape the appearance of an artifact.

Archaeological evidence from Chalcolithic western Anatolia reveals vague information on the modes of production and consumption that involves prestige goods, such as marble vessels and figurines. The motivation behind the production of prestige goods might not have only been economic but also social and symbolic in nature. Exchange networks for objects of such special workmanship were either direct (interpersonal or inter-communal reciprocal exchanges) or indirect (middleman trade through transhuman pastoralists or itinerant traders). Complete and fragmental marble pointed beakers were reported from the sites of western Anatolia, Aegean islands, and the Balkans. One lower end fragment from Kumtepe and two rim fragments from Beşik-Sivritepe in the Troad, a rim fragment from Demircihöyük in the Eskişehir region, and a lower end fragment from Selendi (Akdeğirmen) in central-west represent the western Anatolian repertoire (Sperling 1976:322; Seeher 1987:fig.1; Getz-Gentle 1996:52). One rim and a wall fragment from Tigani on Samos, a complete and a fragment of pointed beakers from

Kephala on Keos, and a complete pointed beaker from Naxos represent the Aegean islands (Renfrew 1972: pl.1.2; Coleman 1977:pl.23; Felsch 1988:pl.48). The chronological priority of Kulaksızlar examples leads me the inclination that those pointed beakers from Tigani, Kephala, and Naxos may have been made after the western Anatolian products. The affinity between the pottery assemblages of Kulaksızlar and the sites of eastern Aegean islands such as Tigani and Emporio can be used to explain the presence of pointed beaker types in the eastern Aegean islands.

Pointed beakers could have been objects of social or symbolic function, in which visual display was crucial. The costs of production and transportation probably made them accessible to wealthy individuals or to those that served religious roles within the households or communities. Those western Anatolian pointed beaker fragments found at western Anatolian sites unfortunately do not provide useful information on whether they were deposited in graves as a gift or aimed to serve in the aftermath. One complete conical beaker found in Grave 20 at Late Neolithic level at Kephala on Keos (Coleman 1977: 64) provides a valuable information on one way how the marble pointed beakers were used. This marble conical beaker was found on the southwestern corner of the grave facing the head of the deceased. A similar mortuary use of marble conical beaker is evident in the Grave 41 at the Chalcolithic cemetery at Varna in Bulgaria (Ivanov 1978:16), a site that was probably contemporary with the culture of Kephala. Another evidence about the mortuary use of stone pointed vessels in this period comes from the Elamite cemetery at Susa, where they were found in association with mirrors in the female burials (Morgan 1912:8). Available comparative evidence support the argument that marble pointed marble beakers were not artifacts used in every day tasks. Because pointed beakers cannot stand independently, they must not have been artifacts of daily use. The lack of morphological connection with the pottery of the period also confirm that marble pointed beakers may have been objects that were used for socially and symbolically important contexts. Thus, it is reasonable to assume that Kulaksızlar marble working might have also had a non-economic motivation as well.

The distribution pattern of Kilia figurines is much more informative that that of pointed beakers as the figurines were found as far as away 400km from the place of manufacture (Fig. 8). Comparisons of the Kilia figurines from Kulaksızlar and those found at other sites in western Anatolia from stylistic, metrical, and technological perspectives indicates that Kulaksızlar workshop was the place where these distinctive marble figurines were manufactured (Takaoğlu 2000:166). The area of central-west ern Anatolia may be called the primary consumer area, since geographically and culturally this area formed a sub-region within western Anatolia. The widespread use of Kilia figurines in central-western Anatolia within a radius of 150km was probably due to the transportation costs involved in their distribution was lower there or the presence of shared ideology. Nearly fifteen fragments of Kilia figurines were found at Selendi. When combined with two specimens from Alaağaç, one from Gavurtepe, one from Yortan, and one from Papazköy, the number of figurines approaches twenty in this region. However, the radius covering between 150 and 200 km yielded only two specimens, which were excavated at Aphrodisias in the southeast Anatolia. The radius covering between 200 and 250 km includes the Troadic sites such as Hanaytepe. Beşik-Yassıtepe, and Kilia in the northwest. The sites of southeast Anatolia such as Karain Cave and Kozağacı are located in an area that exceeds 400 km and three examples were found there so far.

The recovery of most of these marble artifacts at sites located strategically important points on the natural land-based trade routes along the major western Anatolian rivers indicates that (Fig. 9) inter-personal

or inter-societal exchanges were taking place during this period. Small portable items like Kilia figurines could have moved along the already established trade networks. For example, the figurine from Gavur Tepe appears to have moved through a natural trade route following the Gediz River. Those figurines found at Aphrodisias probably arrived through this route, because the end of this route reached to the Büyük Menderes (*Maender*) River basin to the south. Those three specimens from Kozağacı and Karain Cave in the Antalya region in southwest Anatolia might have also been acquired through this route. The spread of Kilia figurines into the Troadic sites was due to the use of a natural trade route that passed through the Balıkesir region. The presence of Kilia figurines at sites such as Alaağaç, Yortan, and Papazköy on this land-based trade route probably explain the arrival of similar figurines at Beşik-Yassıtepe, Hanay Tepe, and Kilia in Troad. Because Kulaksızlar products usually made their way into an exchange system that extended over a 400km radius, implying that a long-distance indirect trade was in existence in this period. The presence of Kilia figurines in some Early Bronze Age sites must have been due to the fact that such valuable artifacts were often passed down for generation as heirlooms.

The distribution of the marble figurines over great distances clearly shows that these artifacts were highly valued in most parts of western Anatolia, suggesting a shared belief system and a common consumption pattern. The intended function of the figurines probably affected the mechanism of production and exchange. The overall uniformity of the form of Kilia figurines must be significant. If a cultural patterning is selected by the decision maker(s) (craftsmen or consumer), then, we may assume that certain social, economic, or symbolic meanings had an impact on the formation of figurines with bent-arms and pointed vessels. The decision making in the forms of artifacts is done this way because consumers demand it for religious or symbolic associations of the artifacts. For instance, the symbolic meaning associated with bending the arm at the elbow in Kilia figurines was one reason why the craftsmen selected this gesture. It may have represented a particular deity that was appropriate for the circumstances in which it was used. This type of gesture appears to be a common phenomenon of Chalcolithic figures found in most parts of western and central Anatolia, eastern Aegean islands, and Balkans (Seeher 1992: 169). A small shell pendant in the form of the middle-portion of a Kilia of figurine was found at Can Hasan in south central Anatolia dating 4600-4000 BC date. Two wooden figurines found at Tigani in levels II and IV2 have a similar type that recalls the middle portion of a Kilia figurine (Felsch 1988:pl.85). Figurines with this motif are also very common at the Chalcolithic Varna cemetery in Bulgaria. The reliance on specialist-produced figurines made from aesthetically pleasing marble can be related to increasing role of goods in the communication system. What I mean by communication systems is that the Kilia figurines were perceived as prestige items that helped to transmit messages to segments of the society and the ownership of these artifacts helped to differentiate their owners from the rest of the society on the basis of social roles. The cost of production and transportation involved in the acquisition of marble artifacts probably made them accessible to wealthy individuals or those who played important roles in the household or communal rituals.

Marble artifacts used symbolically important contexts, brought from distant regions, or manufactured out of valuable raw materials can be classified as valuable or prestige items. It is primarily the rarity and the specialized knowledge required in the manufacturing that differentiate prestige items from those of utilitarian character. Ownership of these valuables or prestige items causes differentiation within the households communities based on the visual display (e.g. status display based on wealth or specific role in rituals in households or

communities). The minimal number of archaeological evidence from the Chalcolithic sites of western Anatolia and adjacent eastern Aegean islands unfortunately prevented me from going far in explaining the interrelationship between production, exchange and consumption systems. Thus, I view Kulaksızlar marble working as an example of regional facility, that is production of prestige artifacts for exchange and symbolic uses. It is may belief that Kulaksızlar marble products must be viewed as valuables or prestige artifacts because of the symbolism attached them and the specialized attention placed on their manufacture.

Conclusions

The Kulaksızlar data contributes to our knowledge of production, exchange, and consumption systems of Chalcolithic western Anatolia. Both economic and non-economic factors seems to have played an important role for the development and maintenance of Kulaksızlar marble working. Productive utilization of local environment and socio-economic and symbolic constraints provided incentives for specialized craft production to emerge and developed in this part of western Anatolia. Marble working seems to have formed a major part of the village economy and that agriculture was only supplemental. The exchange of marble artifacts for subsistence needs could have formed the majority of the village economy or provided other requirements of the village population. This means that pre-urban villages can adopt non-agricultural production strategies even in environments that are highly suitable for basic subsistence activities. It is also likely that exchange of symbolic marble artifacts helped to maintain social relationships between the Kulaksızlar people and their neighbors. Increased desire for specialist-produced artifacts during this period was probably due to increasing role of artifacts in communication systems. Craft specialization in this sense helped to create interpersonal and inter-communal ties among the villages of this period. Because marble artifacts appear to have conveyed a symbolic meaning to their consumers, technological behavior was also shaped by non-economic processes. This non-economic motivation might have been the main reason behind pursuing laborious, time consuming, and risky marble working instead of adopting a less complex production strategy such as agriculture. This is one of the most important contributions of the analysis of Kulaksızlar archaeological evidence to the study of Chalcolithic Anatolian culture and society.

ACKNOWLEDGEMENTS

I am deeply grateful to my advisors in the Archaeology department of Boston University, Curtis RUNNELS, Julie HANSEN, and Paul ZIMANSKY for jointly supervising my dissertation, of which this paper represents a small part. I am also thankful to Mehmet SÖYLEMEZ from the General Directorate of Ancient Monuments and Museums of Turkey for accompanying me during the 1999 survey at the site and to Rafet DİNÇ for making the material from the 1994 and 1995 Kulaksızlar surveys available to me and encouraging me to carry out further research on the remains of this distinctive site. I am responsible for all shorthcomings and errors that may be found in this paper.

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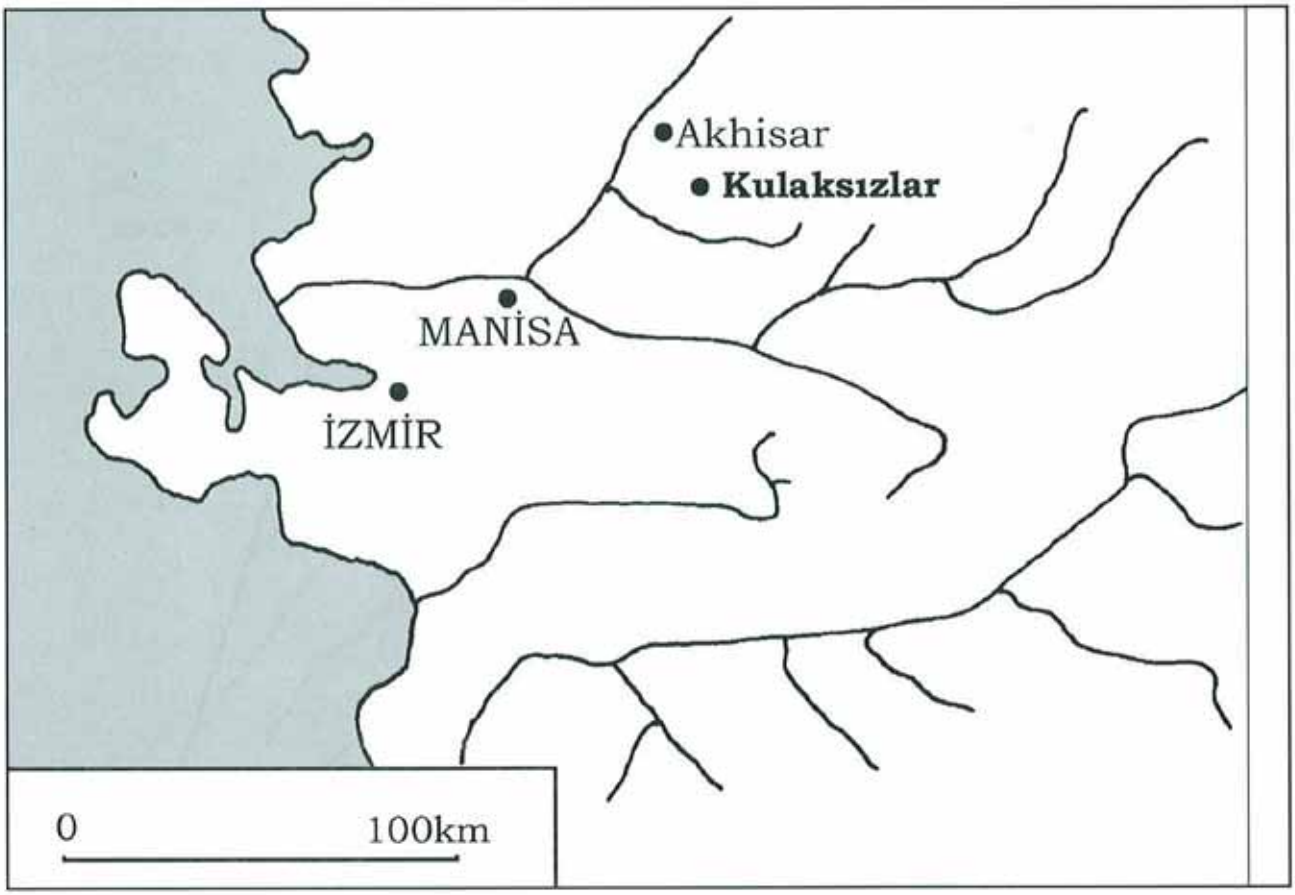


Figure 1 Map locating the site of Kulaksızlar in western Anatolia

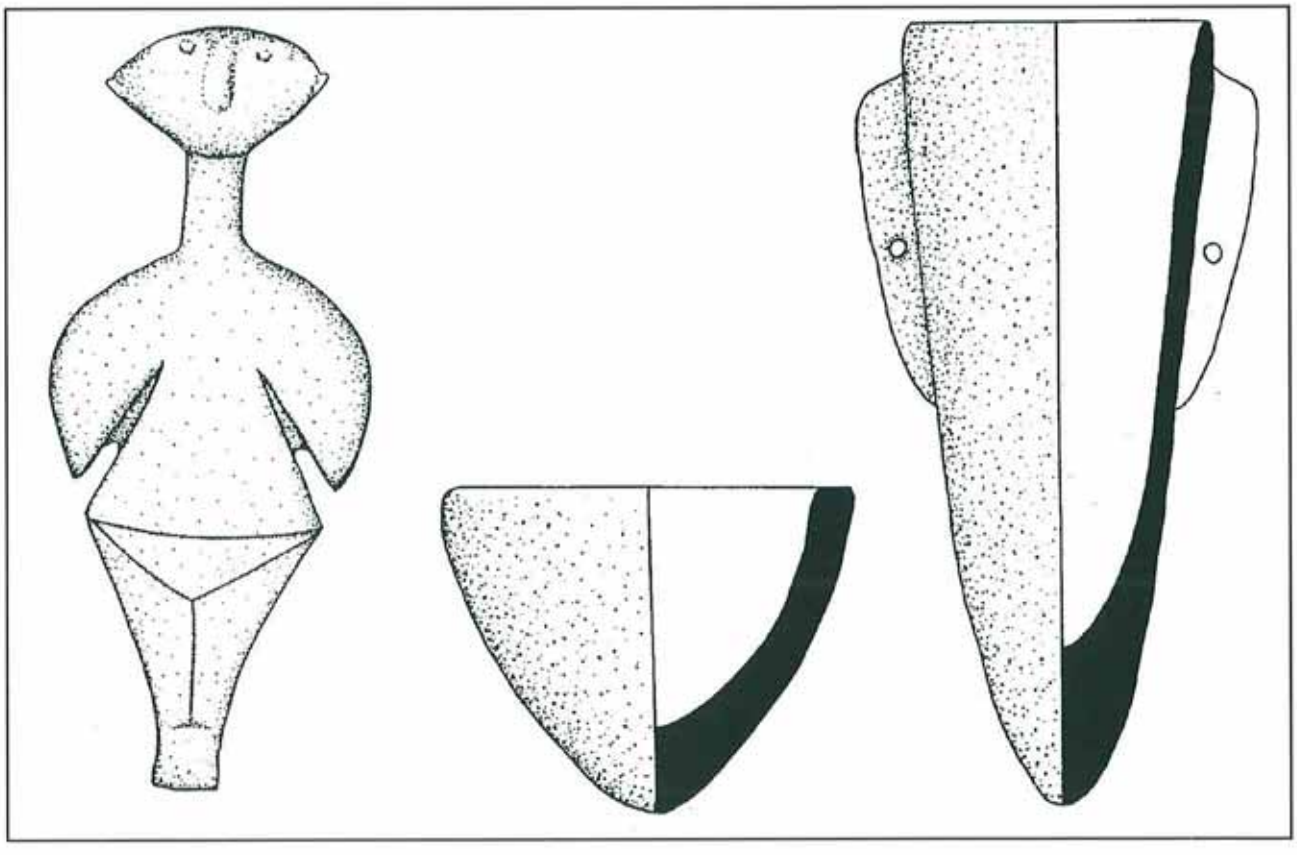


Figure 2 Main marble products of the Kulaksızlar workshop

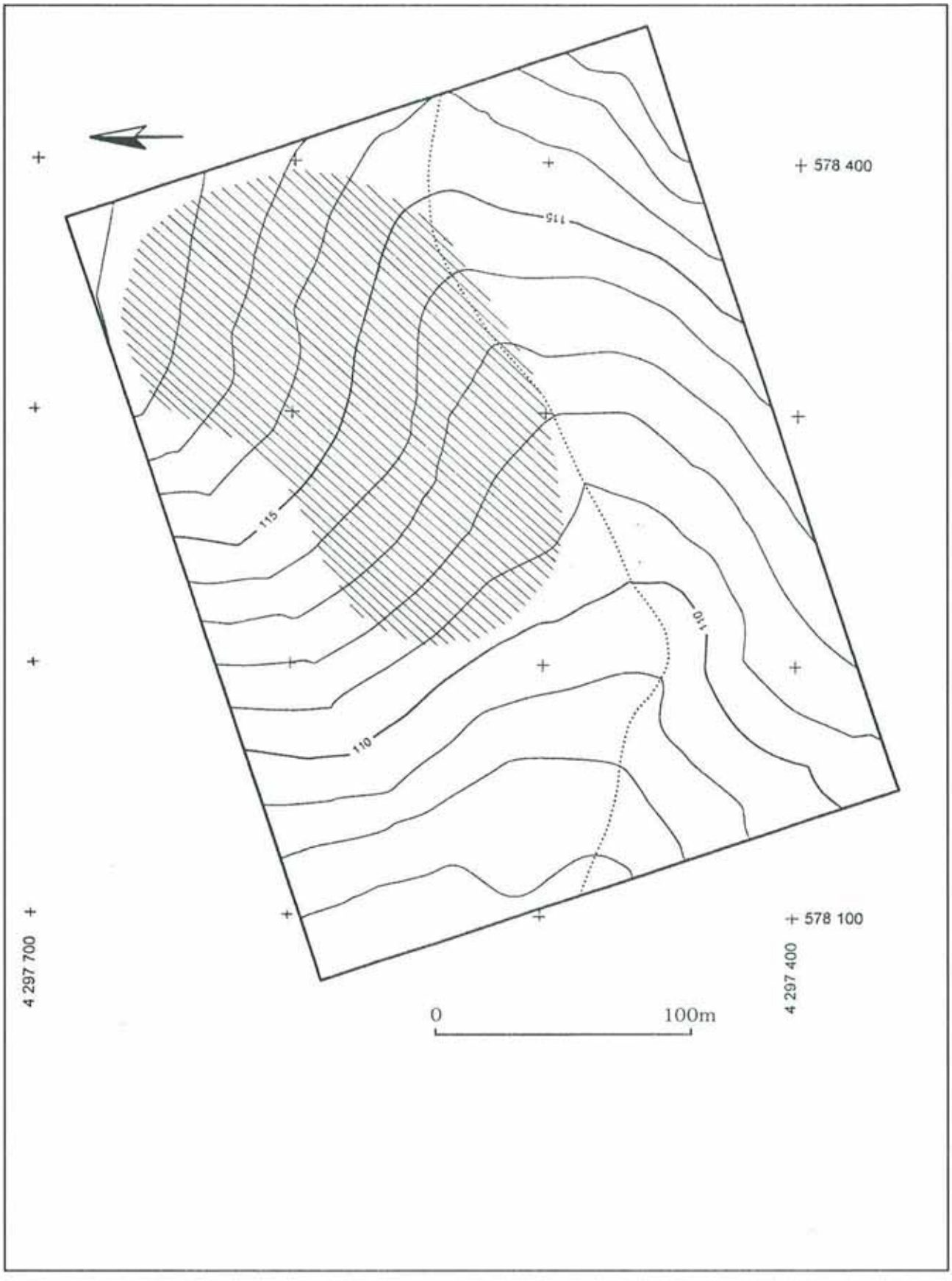
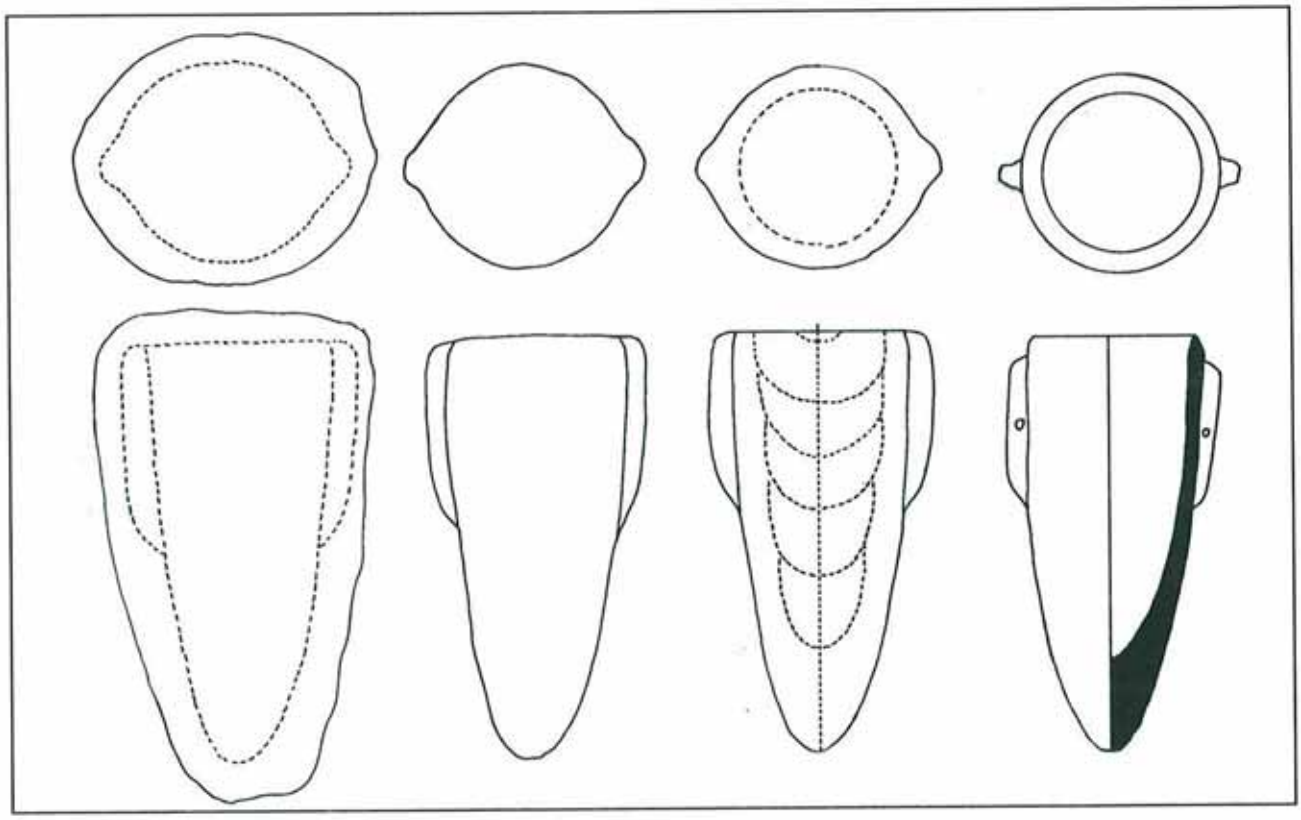


Figure 3 Map showing the spatial extent of the marble finds over the surface of the site



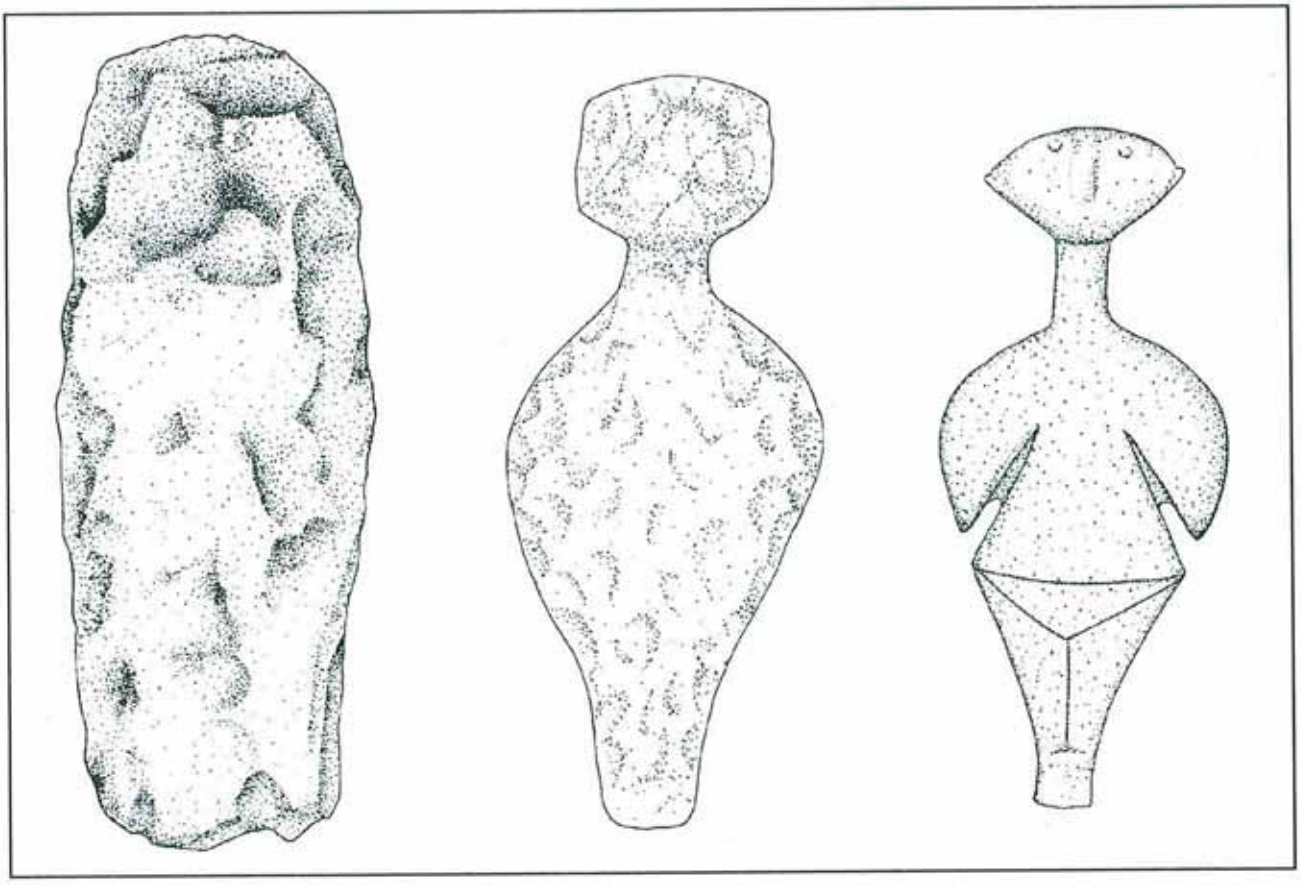


Figure 4 Suggested main stages of pointed beaker and Kilia figurine manufacture

Sample	Li	Sc	Ni	Cu	Rb	Nb	Pb	U	Mg	Zn	Sr	Ba	Rb/Sr	U/Pb	% dol.
	113	96	1328	455	108	3	179	65	251301	12396	38979	959	0,003	0,367	0,191
	2341	187	6672	1469	1089	97	533	52	1021746	4547	45870	8670	0,024	0,097	0,775
	3145	133	2413	801	422	24	378	38	741216	4282	40140	3602	0,011	0,101	0,562
	4397	253	10068	1900	1452	135	385	62	1093797	6924	40720	10145	0,036	0,161	0,830
	568	109	1731	529	163	6	101	64	1308501	12902	57016	2479	0,003	0,633	0,993
	614	96	1305	533	48	4	102	31	257749	7327	30532	1473	0,002	0,302	0,196
	75	90	1388	643	19	3	369	46	348349	7649	38081	2648	0,000	0,124	0,264
	819	95	1180	620	161	5	148	61	372629	18602	41976	1558	0,004	0,414	0,283
Source K	106	110	2569	763	285	13	531	48	642552	20716	39086	40008	0,007	0,090	0,488

Figure 5 Results of the trace element analysis of eight marble samples from archaeological materials and one geological sample taken from the vicinity of the site

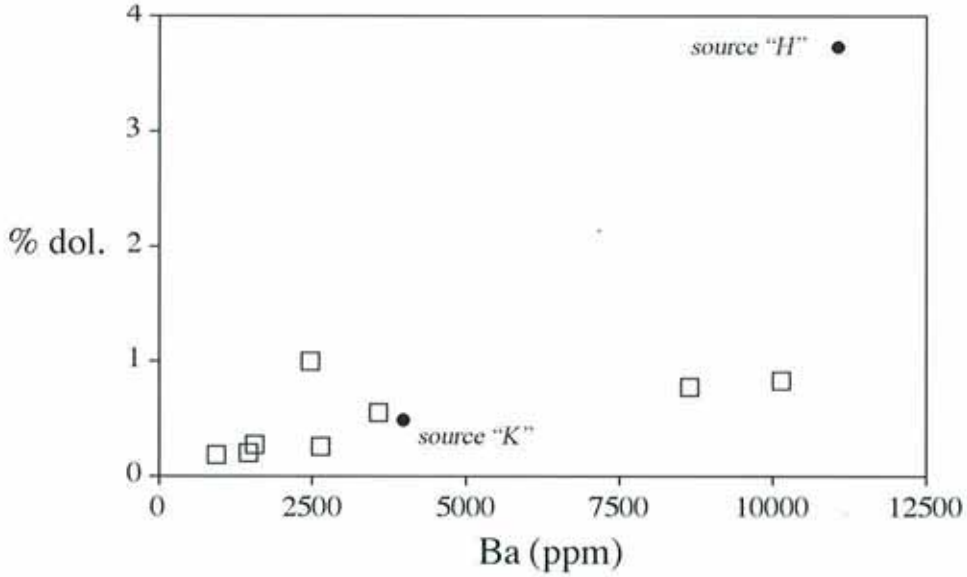


Figure 6 Diagram showing the relationship in the chemical properties of marble from the geological source K and eight samples taken from archaeological materials

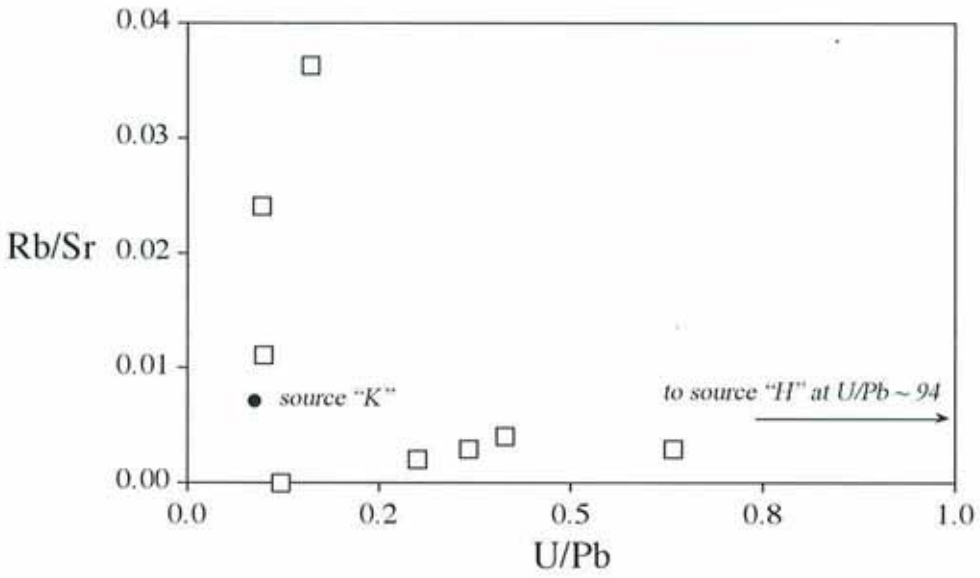


Figure 7 Diagram showing the relationship in the chemical properties of marble from the geological source K and eight samples taken from archaeological materials

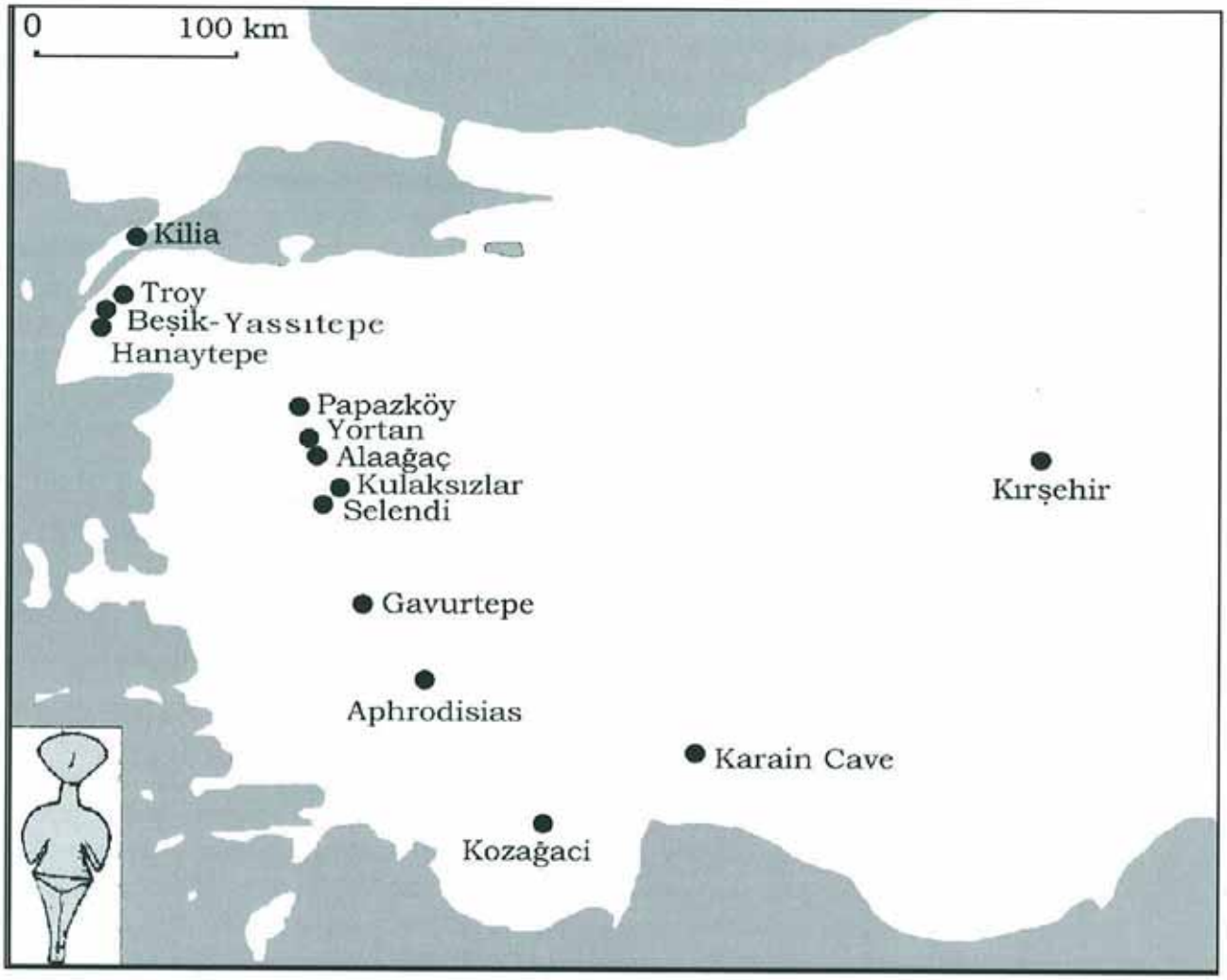


Figure 8 Sites with Kilia figurines in western Anatolia

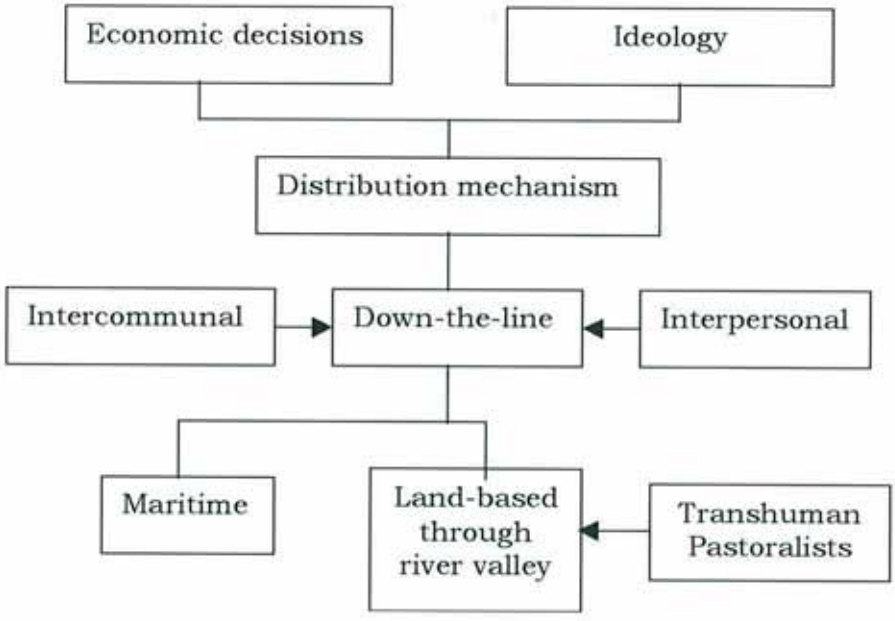


Figure 9 Tentative flow chart showing the distribution of marble artifacts

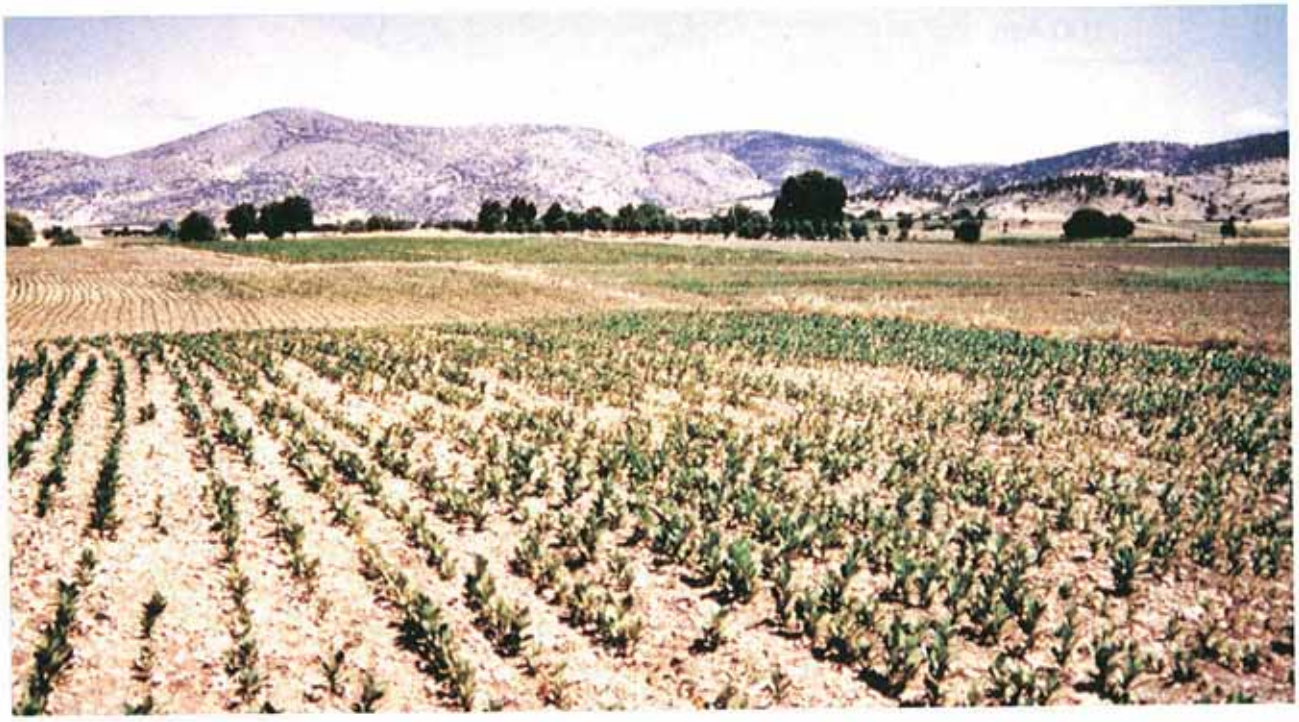


Figure 10 General view of the site from the southwest

Figure 11 Unfinished marble pointed beaker fragments broken during the drilling process

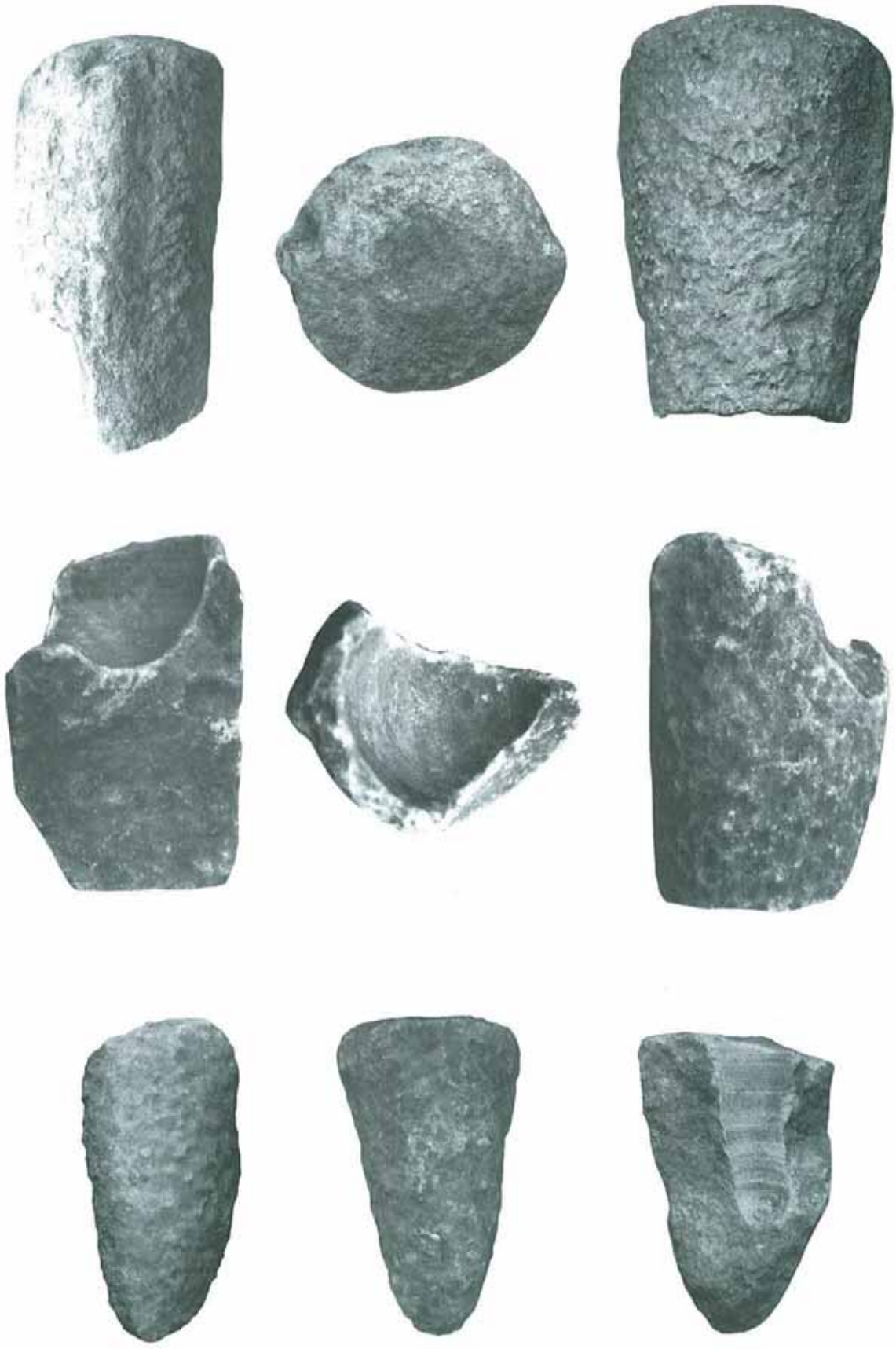


Figure 12 Roughed-out marble pointed beaker fragments

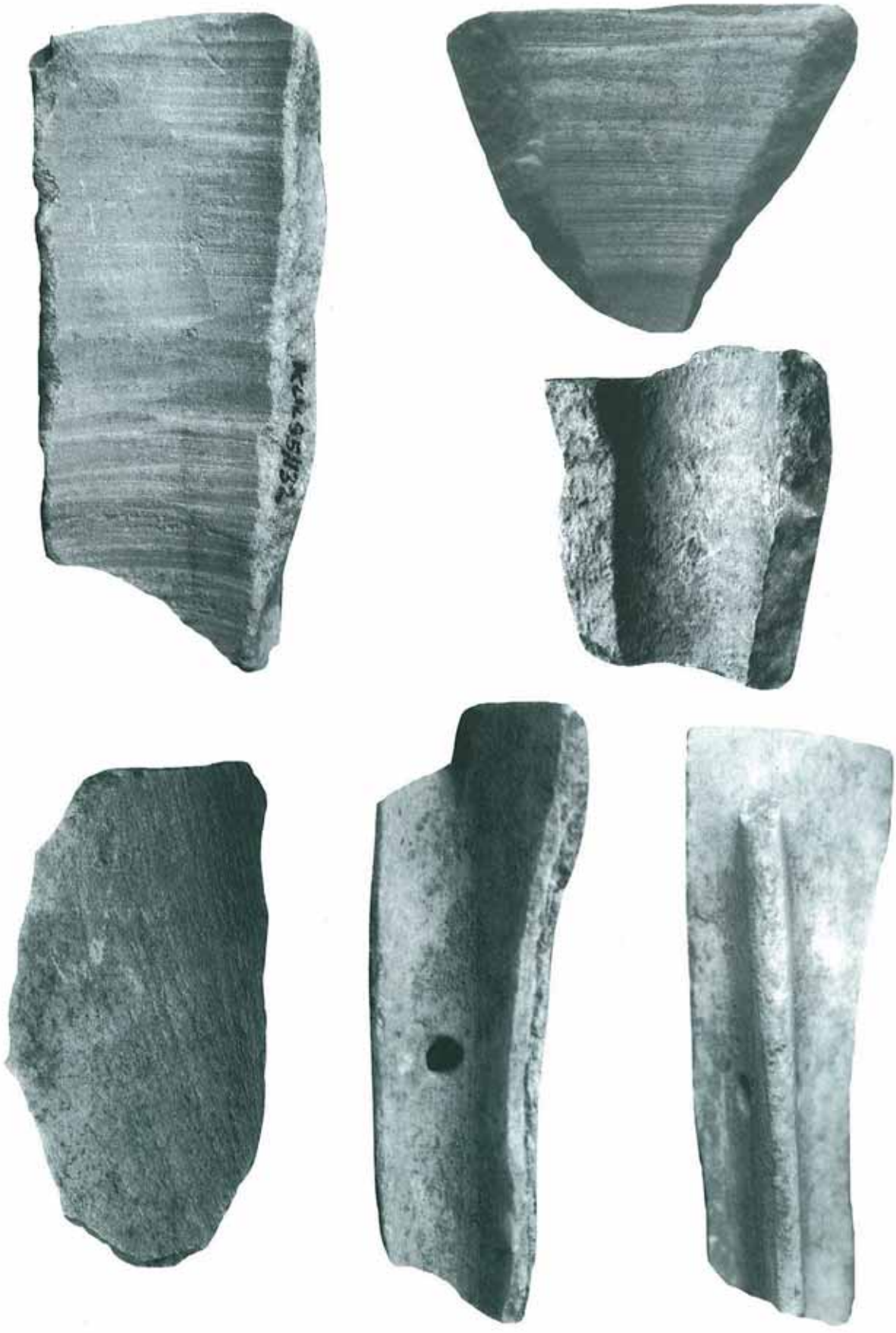


Figure 13 Rim and wall fragments of unfinished marble pointed beakers

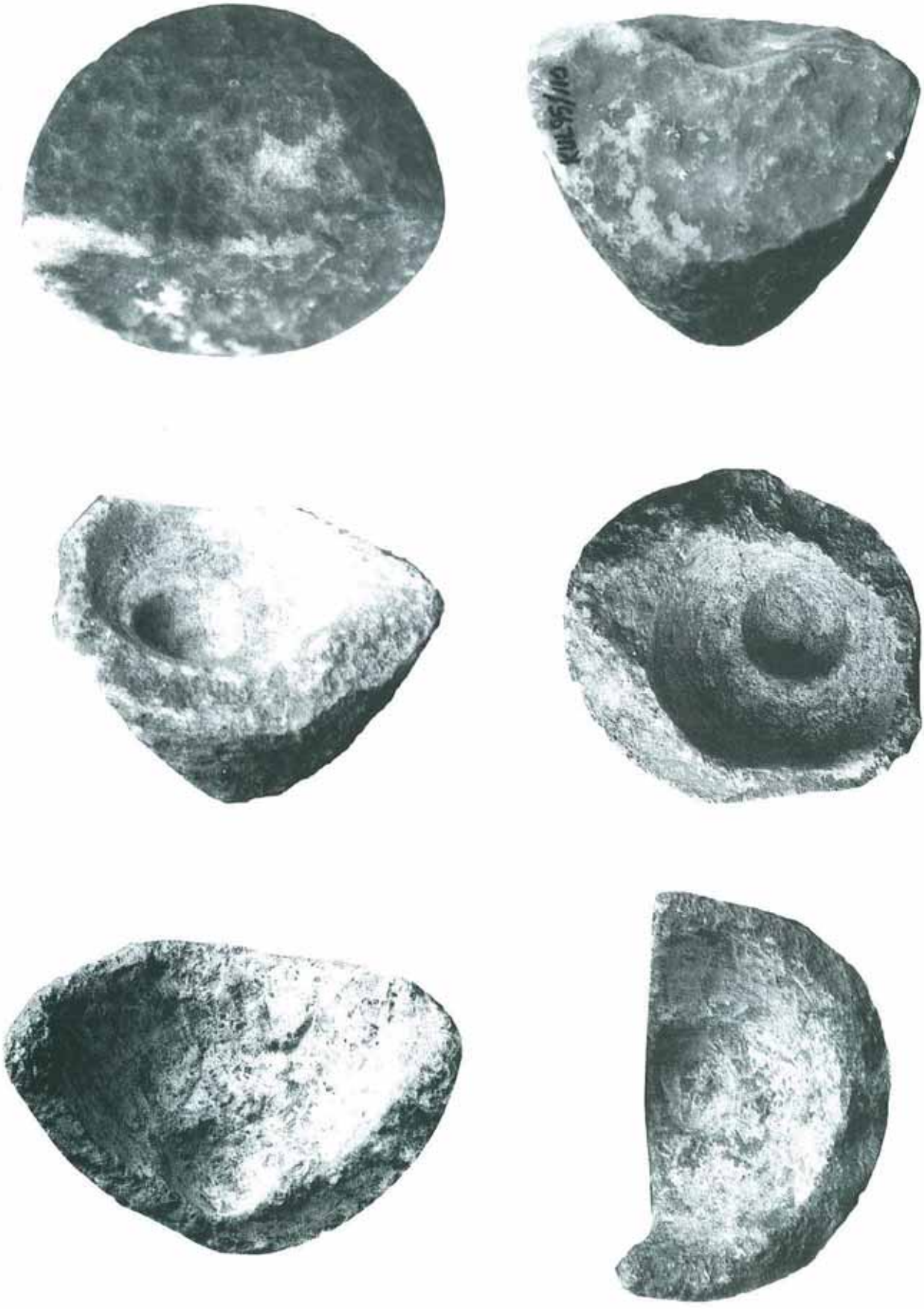


Figure 14 Roughed-out pointed bowls fragments showing the use of pointed hammerstones and Kilia figurine manufacture

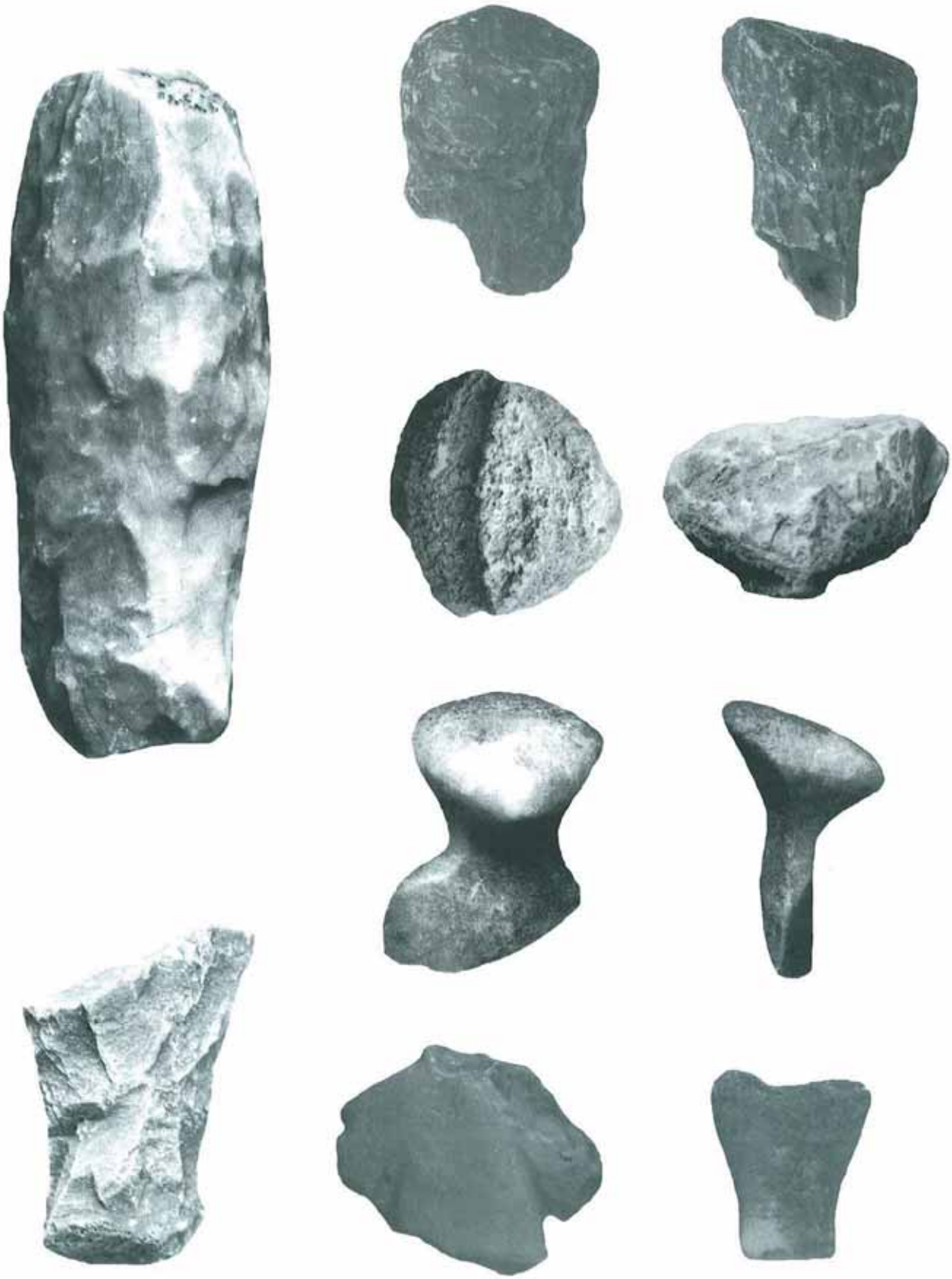


Figure 15 Fragments representing the multiple stages of marble Kilia figurine manufacture

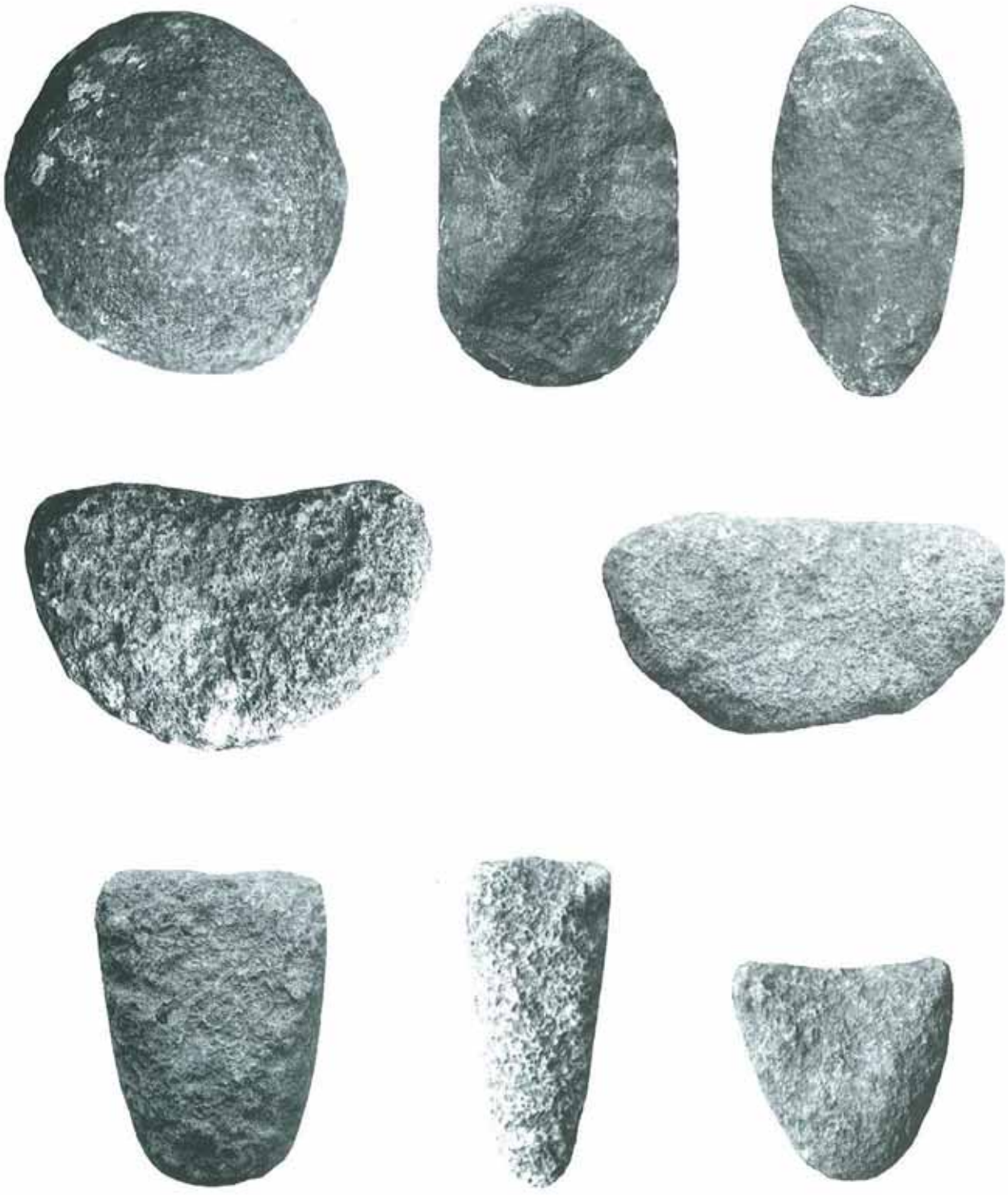


Figure 16 Stone tools used in marble working..a-c) gabbro hammerstones d-h) sandstone drill-bits