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İçindekiler / Contents

Göbekli Tepe and the Rock Art of the Near East

Göbekli Tepe ve Ön Asya Kaya Resim Sanatı

Klaus SCHMIDT*

Keywords: Prehistoric rock art, Har Karkom, Jawa, Jubba, Kilwa, Tirişin, Latmos, Shamanism,"Ziegendämon"
Anahtar sözcükler: Tarihöncesi kaya sanatı, Har Karkom, Jawa, Jubba, Kilwa, Tirişin, Latmos, şamanizm, "keçi demonu"

İlk Neolitik evreye ait Göbekli Tepe'nin yontuları ve kabartmalarının ikonografileri Yakın Doğu kaya resim sanatı ile karşılaştırma olasılığını vermektedir. Bugüne kadar sadece birkaç kaya resim sanatı bulunduran yerleşme ciddi olarak tarihlenebilmiş, ya da arkeolojik kültürlerle bağlantıları kurulabilmiştir. Bu yazıda, Çanak Çömleksiz Neolitik B'ye ait Dhuweila yontularına dayanılarak, olasılıkla Çanak Çömleksiz Neolitik B'ye ait Kilwa-Negev-I tarzı ve Akeramik Neolitik evresi gösteren Göbekli Tepe ile başka bölgelerdeki, Jawa ve Jubba gibi, kaya resim sanatı kısaca incelenmiştir. Çanak Çömleksiz Neolitik B'ye ait ikonografi birçok nedenlerle ispatlanmıştır. Bu sanatın en olası açıklaması , gerisinde bir şaman stilinin bulunmasıdır. Latmos bölgesinde yenilerde bulunan resimler, İran ve Mezopotamya'daki Obeyd mühür sanatından bilinen "keçi-demon'unu da" kapsamaktadır. Bu varlık gene şaman tarzı bir davranış göstergesidir ve ,dağ keçisi tanrısı' olarak değil ama Franko-Kantabrik bölgedeki Paleolitik Devir kaya resim sanatına kadar izleri geriye gitmektedir. Yüksek kaliteli bu kaya resim sanatının ortadan kalkması şamanların ilk şehir devletlerindeki tapınaklarda iş gören rahiplerle yer değiştirdikleri şeklinde açıklanabilir.

The rock art of **Northern Africa** is famous since the 19th century. After the pioneering works of e.g. Gerhard Rholfs or Heinrich Barth[1] in the first half of the 20th century e.g. Leo Frobenius, Abbe Breuil and Henri Lhote developed a chronological sequence of several styles, starting with the Bubaline and round head period, the bovidian, the horse and the camel periods. The total number of known examples of Saharan rock art has increased drastically in recent decades. Recent studies, done e.g. by Alfred Muzzolini, caused some important change in the sequence. According to Muz-

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zolini, the Bubalus style is contemporary with the bovine phase[3]. He also rejected the early datings e.g. of Fabrizio Mori, who placed the earliest paintings before the end of the pleistocene[3]. Today a wide number of scholars is involved in the exploration of North African rock art and the colourful szenario of saharanien rock pictures is divided into a number of different styles or schools, but should not be dated before the early holocene.

In the **Middle East** amongst several early travellers Sir Aurel Stein drew attention to the significance of the rock art of the Upper Indus valley. It includes more than 30000 prehistoric and historic engravings. Recent research is done by the Joint Pakistan-German Rock Art Project[4].

Near Eastern Rock art never found such an interest in the archaeological science. It was always in the shadow of the "*arte mobilier*" of Mesopotamian cultures. Research rarely was concentrated on rock art sites itself, and the site of Kilwa e.g. was explored by the German African Rock Art Expedition by the way.

Anati's chronological system of the rock art of **Sinai** and the **Negev** is still the base of any reseach in Near Eastern rock art[5]. With **Har Karkom** an important site was found at the border between Negev and Sinai[6], which seems to be in the centre of the rock art distribution of this area.

From **Syria** and **Iran** there is no published evidence of rock art until now. From **Iraq** again very few is known, but some engravings are published from **Qasr Muheiwir** near Rutba near the Jordanian border[7].

Arabia, especially **Saudi Arabia**, is rich in rock art sites. After the pioneer work of H.Rhotert[8] in Kilwa (a site first noticed by G.Horsfield[9]) and E.Anati in central Arabia[10], a number of new provinces had been located and published by the Survey of Saudi Arabia. But Kilwa remained the main site for Anatis Negev-I-Style, which is poorly represented in the Negev itself. As the "*Rückenindustrie*" of Kilwa today can be understood as an PPNB flint mining area, and as the site Kilwa 19, which is close to the engravings, can be understood as an PPNB-settlement mound, the dating of Kilwa and the Negev-I-style most probably fals into the PPNB-period. The engravings depict mainly caprovines, but also an erotic scene and an tapered bovide with humans.

The engravings from **Dhuweila** and other sites in vicinity are recently published monographicaly by A.Betts[11]. The engravings, mainly gazelle like animals, include also a scene of several persons, probably dancing hunters. Highly important is the stratification of some of the engravings, giving an archaeological connection of the Dhuweila art with the PPNB. As the Dhuweila carvings are closely comparable with Kilwa and the Negev-I-style, the question of dating Anati's Early Hunters style again is focused into the PPNB period.

In contrast to the southern Levant our knowledge about rock art sites in the **Aegean** even is completely lacking. D. Theocharis published some engravings on stone slabs from **Sarakinos-cave** near Makrinitza in Pelion in Thessaly, which had been found 1964 during enlarging the entrance of the cave[12]. The engravings included a hunter with bow and an ibex and dancing scenes. In front of the cave of **Palaiokastro** between Hagios Vlachos and Ano Tsechania a stone artefact with an engraved horse was found. But G.Freund was able to proof, that the engravings had been of modern date and not pleistocene or early holocene, as Theocharis supposed[13]. Prehistoric rock art was not found in Thessaly or any other region of Greece.

Some fresh evidence is reported from the republic of Macedonia. D.Aleksovski of the Rock Art Association of **Macedonia** was able to find engraved rocks in 1992[14]. He attributed these figures to four different phases. The first three are ascribed to pre- and protohistoric ages, the last has been

attributed to the historic and Christian Periods. These engravings would be the first ones of the complete Balkan region, but it seems evident, that this area needs much more research.

In **Turkey** Rock art is an important part of the cultural heritage of the Hittite, Urartian, Assyrian and other historical periods, but these monuments, mainly imperial reliefs, are not included in this survey[15]. Prehistoric rock art also was known from Turkey for a long time[16], but after the summary of E.Anati, including the engravings of **Palanlı** and **Beldibi**[17] and the work of M.Uyanık in **Hakkari** and **Tirişin**[18] Turkish rock art research nearly stopped[19]. For a long time a few new sites could be added, and Uyanık's important publication about "The Petroglyphs of South Eastern Anatolia" remained unknown even to most rock art researchers (fig. 1).

Some new evidence only came from the eastern part of Turkey. O.Belli reported painted rock art from **Put köyü** and the **Baset dağ** near Van[20]. Alok added some further sites, including examples of Medieval Age or later graffiti on buildings, but also some examples of doubtfull value (e.g. Cudi dağı) 21. In the NEWS 95 World Rock Art Congress in Turin and Pinerolo Anatolian Rock Art was included in the chapter "Arabian Peninsula, Levant and Anatolia"[22]. The short, half page news regarding Anatolia had been restricted to Çatal Höyük, where there is no true Rock Art, but wall paintings, the Van caves and, as the only real news, to the recently discovered Latmos paintings.

Anneliese Peschlow-Bindokat's research in the region of ancient Herakleia brought knowledge of an unexpected and spectacular province of rock art in Western Turkey[23]. All the pictures in abris found around **Tekerlek Dağ**, the ancient Latmos mountain, are painted and not engraved. They depict humans, some animals as snakes or other reptils, and geometric signs, but no hunting scenes. Many of the anthropomorphic figures have T-shaped or M-shaped heads. Up to now there is no archaeological culture in the region of Tekerlek Dağ, which could be connected with the paintings, but Peschlow-Bindokat - based on the representations of female persons - is inclined to see iconographical and chronological links with the Hacılar culture of the Lake District in Anatolia. Such a dating could be in fact a serious base, but further analysis is needed.

The situation of Rock Art research in Anatolia is far away from beeing satisying. So the excavations at **Göbekli Tepe** in Southeastern Turkey (fig. 1, 7) - which encovered not rock art, but large scale sculptures and reliefs - offer, like Çatal Höyük, the possibility of a new approach in the study of Near Eastern Rock Art.

The site of Göbekli Tepe is known since 1963, but its monumental neolithic architecture was not understood by the early surveyers. Time was not ready to connect a scatter of flint tools with large worked limestone slaps, which can be seen all over the site. With the fresh knowledge of the Çayönü and Nevali Çori excavation results the real importance of this site was understood easily during a short visit in 1994.

In 1995, directed by the Museum of Şanlıurfa and the German Archaeological Institute excavations could be started at Göbekli Tepe[24]. After five seasons of work (1995-99) we know still few about the layout of the monumental architecture (fig. 2), but we can understand, that Göbekli Tepe is a site mainly of megalithic ritual buildings of unexpected dimensions.

Today from Göbekli Tepe we have a large serie of monumental reliefs on pillars or on different groups of artifacts, which are dated to the PPN-Period. Partially they can be linked with Near Eastern rock art. On the other hand there are also a few examples of true rock art at Göbekli Tepe. On bedrock of the southeastern plateau there are three more than life-size phalloi in relief (C15)[25]. From a little cave at the western slope of the natural rigde of Göbekli Tepe there is the re-

usually are of less quality. Simple stick-figures without specific stylistic dominate. Isn't it, that the trained artists had been disappeared? This lack of good quality rock art in later periods seems to be connected with the dissappearance of the shaman, who was transformed in Bronze Age societies to the "priest", now acting in the temples and not in the canyons or abris of the mountains. Some rock engravings had still been made at the old holy places, but made by the untrained visitors. This model also explains, why "good" rock art is existing in some regions in quite late periods. Here the Shamans had been survived, in some regions, like Sibiria or Southern Afrika, nearly till today.

Göbekli Tepe clearly is not the key site to understand Near Eatern Rock art. But it can help to push forward a branch of archaeological research, which is - in contrary to Northern Africa - not very popular between Near Eastern Archaeologists. In the next future, the main focus of interest of Near Eastern Rock art will be the Latmos area. There we have to proof, if the shamanistic Model is suffient to explain the paintings within a landscape, which later became the place of a god like "Zeus Akraios".

But how Göbekli Tepe fits in this model? It seems very probable, that the shamans of Göbekli Tepe had been "at the edge". The edge to cross the border from the animistic shaman to the established priest. Some motives of the reliefs and of the sculptures are still the old ones, but they seem to be mixed with the dawn of representations of a new world, a world of temples with powerful rulers, a world of a classified society. Following this way, the end of Göbekli Tepe within the PPNB could be understood as some defense reaction of the society to newly established classes - as "Neolithic Revolution", a revolution not fully in the sense of Gordon Childe's ones. With the newly developed equipment of agriculture people had not to follow the rules of the old shamans of the age of the hunters.

NOTES

1. Comp. Rhotert 1978
2. Muzzolini 1996
3. Mori 1978
4. Bandini-König, et.al. 1997
5. Anati 1955; 1981
6. Anati 1986; 1996; Anati, Cottinelli, Mailland 1996
7. Tyrácek, Amin 1981
8. Rhotert 1938
9. Horsfield 1933; Horsfield, Glueck 1933
10. Anati 1968b-c; 1972b; see also Howe 1950
11. Betts 1998
12. Theocharis 1966, 76; 1967
13. Freund 1968, 418; Freund 1971 doesn't mention the „art mobiliére" of Thessaly any more
14. Aleksovski 1993
15. Comp. Bittel 1953
16. E.g. Pittard 1939
17. Anati 1968a; 1972a
18. Uyanık 1968 a-b; 1970; 1974; Freh, Uyanık 1954-59; 1957; Haas, Grüninger 1972
19. Comp. Özdoğan 1999, 234
20. Belli 1975; 1978; 1979
21. Alok 1988
22. Khan 1996
23. Peschlow- Bindokat 1995; 1996a; 1996b; 1998; 1999a; 1999b; Otto 1999
24. Beile-Bohn et.al. 1998; Schmidt 1995; 1997; 1998
25. A preliminary catalogue of the iconographic finds from Göbekli tepe is published in Schmidt 1999; these catalogue numbers are used without further comment for a short reference of the pieces, which mostly had been published in several periodicals
26. Hauptmann 1993; 1999a-b
27. Comp. Özdoğan,M.-A. Özdoğan 1998
28. Helms 1981; Hunt 1976
29. Zarins 1982
30. E.g. Howe 1950
31. Choppy J.- B. Choppy 1996
32. Von der Osten-Sacken 1992
33. Vivelio 1981
34. Herzfeld 1932, 101 fig. 25, TG 2373; pl. 2; a very similar scene is show on the relief bowl from Nevali Çori-except the missing goat-heads of the anthropomorphs which seem to have more skulls than heads
35. Bleek,Lloyd 1911; Lewis-Williams 1981; 1990; 1991
36. Clottes, Lewis-Williams 1996, 1997
37. Wehrberger 1994
38. Hahn 1994
39. Two possible exceptions from the Early Neolithic of Upper Mesopotamia (Hauptmann 1999b fig. 12A-B and a hitherto unpublished sculpture from the region of Adıyaman) need further analysis of their iconographical meaning.

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1968c *Rock-Art in Central Arabia.* 2.1. Fat-Tailed Sheep in Arabia. 2.2. The Realistic-Dynamic Style of Rock-Art in the Jebel Qara .Leuven, Institut Orientaliste
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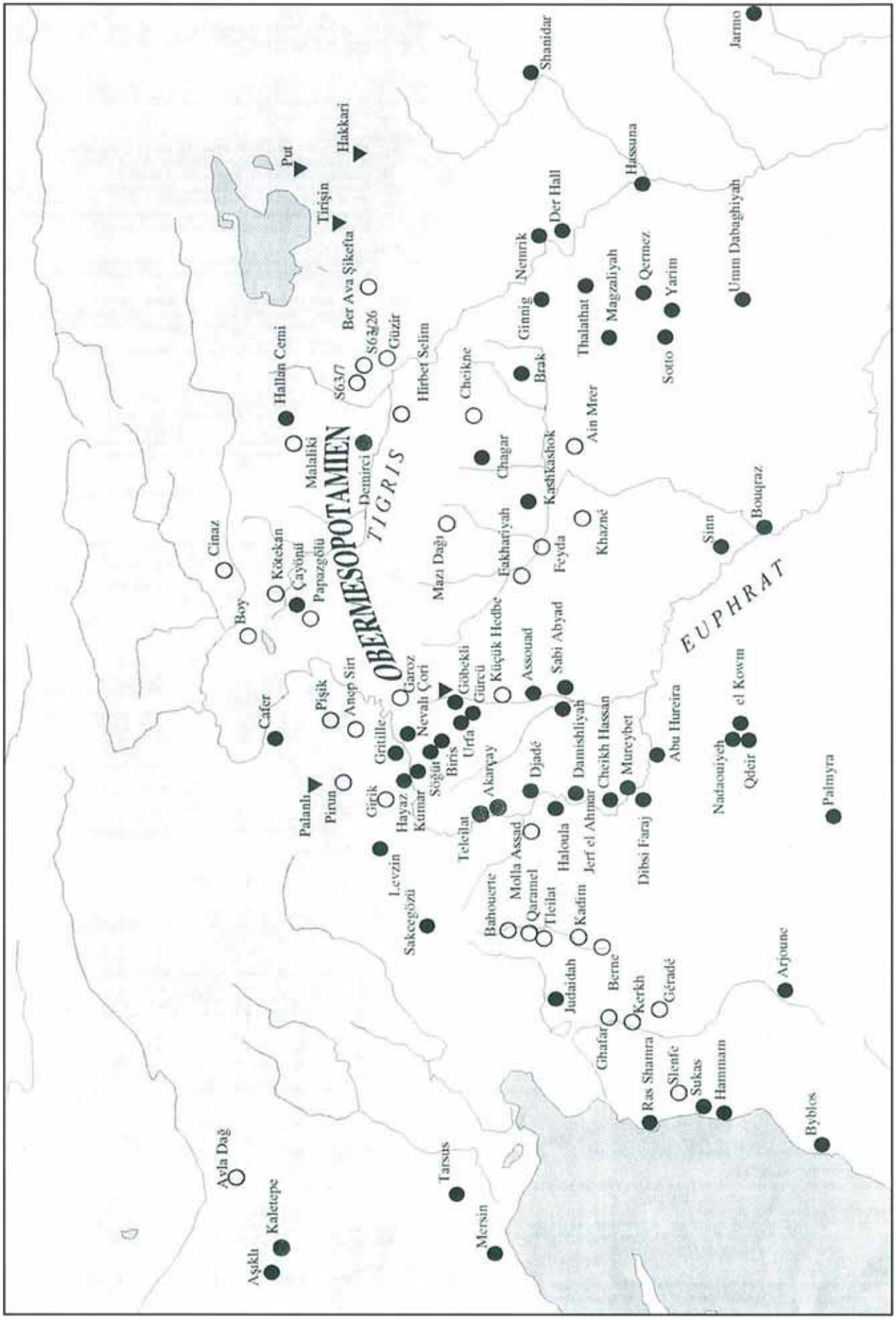

Figure 1: Epipalaeolithic and early neolithic sites in Upper Mesopotamia; dots: excavation; circles: survey; triangles: rock art

Figure 2: Göbekli Tepe, "*Schlangenpfeilergebäude*"

Figure 3: Göbekli Tepe, pillar 6

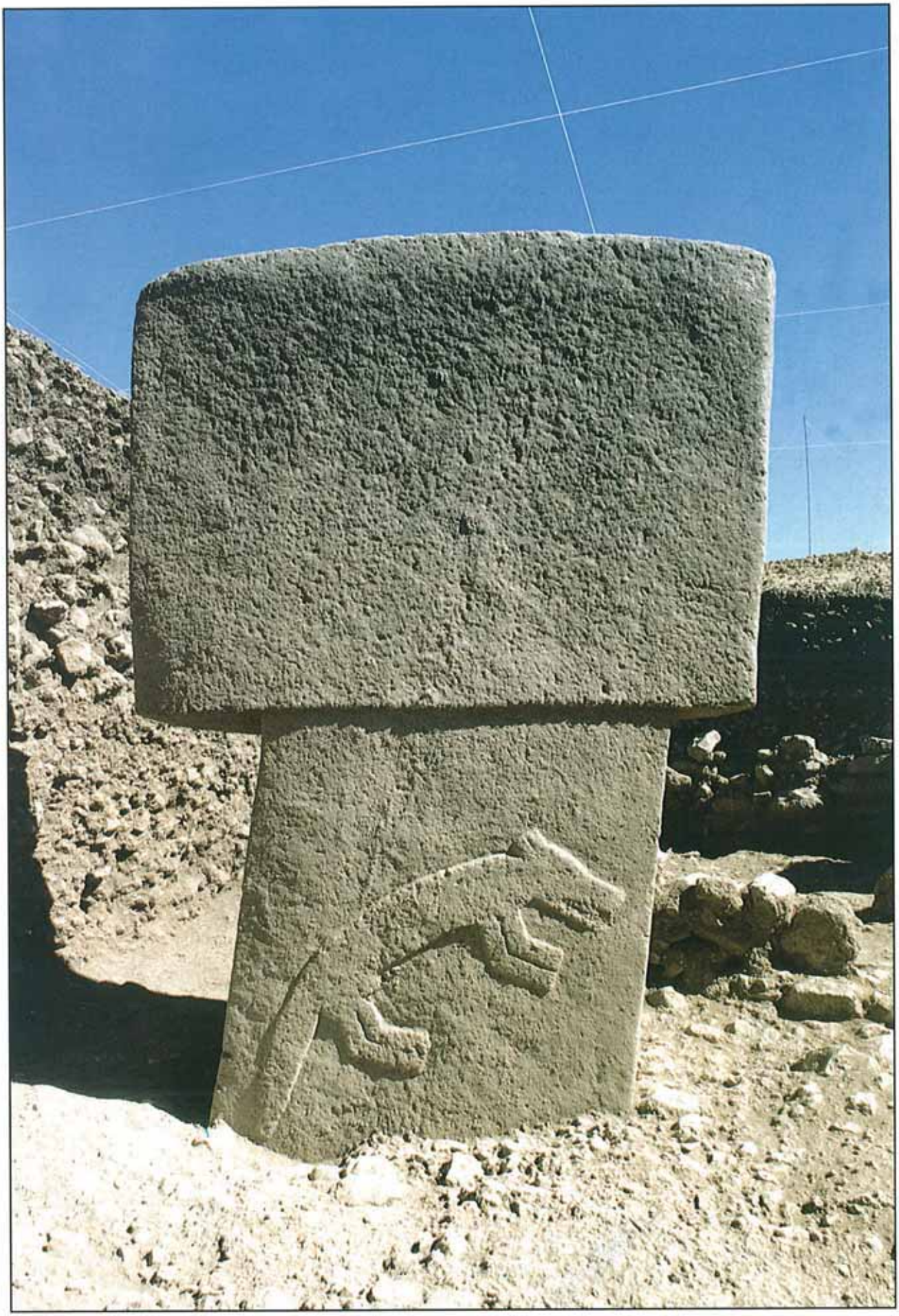

Figure 4: Göbekli Tepe, pillar 9

Figure 7: The mound of Göbekli Tepe from North

Figure 8: Göbekli Tepe, sculpture of a boar (L= 48,5 cm)

Hattuşa/Boğazköy'ün Yerleşim Tarihine Yeni Katkılar: Büyükkaya Kazılarına Toplu Bir Bakış

Neue Aspekte der Besiedlungsgeschichte von Hattušá/Boğazköy: Die Grabung auf Büyükkaya

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Schlüsselwörter: Boğazköy, Hattuša, Chalkolithikum, Bronzezeit, Hethiter, getreidesilo, Eisenzeit, radiokarbondaten
Anahtar Sözcükler: Boğazköy, Hattuşa, Kalkolitik, Tunç Çağı, Hitit, tahıl silosu, Demir Çağı, radiokarbon tarih

In den Jahren 1993-1998 sind in Hattuša/Boğazköy Ausgrabungen auf dem Bergrücken von Büyükkaya durchgeführt worden. Die Ergebnisse sind umfangreich und aussagekräftig: Entdeckt wurden unter anderem eine frühe chalkolithische Ansiedlung, große unterirdische Getreidesilos aus der hethitischen Großreichszeit und eine ausgedehnte eisenzeitliche Siedlung, die im "Dunklen Zeitalter" kurz nach dem Weggang der Hethiter begann und bis in die Mittlere Eisenzeit im 8. Jahrhundert v. Chr. andauerte. Der vorliegende Artikel bildet eine Zusammenfassung der Ergebnisse.

Topografya ve Kazı Tarihçesi

Hattuşa şehir alanının kuzeydoğusunda bulunan yaklaşık 500 m uzunluğundaki sırt Büyükkaya olarak anılır (Plan 1). Büyükkaya Deresi boğazıyla geri kalan yerleşme alanından ayrılmıştır. Adını güneybatı tarafında bulunan yaklaşık 100m yüksekliğindeki sarp kaya kütlesinden alır. Bu kütle kuzey doğuya doğru yaklaşık 300 m uzunluğunda ve 100 - 150 m genişliğinde bir sırtla birleşir (Resim 1). Büyükkaya'nın önemli bir kısmı yapaydır; kökende Büyükkaya bir dizi kaya tümseği ve sivriltilerinden oluşmaktaydı. Bu kaya sivriltilerinin arasında ve çevresinde yer yer 10 - 15 m kalınlığa ulaşan, bir kaç aşamada tamamlanan toprak doldurma işlemine olasılıkla Eski Hitit Devri'nde, ya da en geç İmparatorluk Devri'nin erken dönemlerinde başlanmıştır ve İmparatorluk Devri'nin sonuna dek devam edilmiştir.

Günümüzde tepede üç ayrı plato tanımlanmaktadır (Plan 2). Üst Plato tepenin en yüksek yerinde Aşağı Şehir'e hakim sarp kayalığın hemen üzerinde yaklaşık 50 x 40 m'lik bir alanı kapsar. Orta Plato yaklaşık 5

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m daha alçaktadır, 100 x 60 m'lik bir alana yayılmıştır. Kuzey kenarında Alt Plato olarak adlandırılan ve yaklaşık 140 x 80 m'lik bir alanı kapsayan, kuzey-kuzeybatıya yönelen yamaca bağlanılır.

Büyükkaya'da yapılan ilk kazılar 1952 - 1954 yıllarında gerçekleştirilmiştir (Bittel 1953; 1955). Bu kazılarda güneydoğu kenarında iki potern üzerinden geçen bir Hitit suru saptanmıştır. Orta Plato'da iki deneme açması açılarak Hitit dönemine ait geniş taş döşemeler gün ışığına çıkarılmıştır. Tabakaya ait olmaksızın dağınık olarak bulunan Kalkolitik çanak çömlek parçalarının yanısıra (Hachmann 1957; Parzinger 1993) bulunan boyalı Demir Çağı keramiğinin analizleri, hafiri burada Büyükkale'nin en eski "Frig" tabakasından da (Büyükkale II) eski bir yerleşmenin kalıntıları olabileceği sonucuna ulaştırmıştır.

Doğal olarak söz konusu erken araştırmalar yalnızca sondajlardan ibarettir; bundan sonra 1993 yılında P.Neve Büyükkaya'da kazıları sürdürme kararı almıştır (Neve 1994). Sur duvarının büyük kısmıyla üçüncü bir poternin girişini gün ışığına çıkartmıştır; ayrıca iç kısımda bir kaç deneme sondajı açmıştır. 1994 -1998 yıllarında bu makalenin yazarının başkanlığında adı geçen üç platoda da geniş kapsamlı kazılar yapılmıştır. Sonuçlar özel topografik durumu nedeniyle yanlızca Hitit devrinde değil, hem önceleri, hem de sonraları kullanılmış olan bu sırtın yerleşim tarihçesini yorumlamayı mümkün kılar.

Kalkolitik Çağ ve İlk Tunç Çağ

Büyükkaya'da ve böylece Hattuşa'nın tüm yerleşme alanında en erken yerleşme M.Ö. 6.binde, Kalkolitik Çağ'da gerçekleşmiştir. Üst Plato'nun güney bitiminde Kalkolitik Çağ'da oluşan küçük bir yerleşmenin günümüze ulaşan 30 - 40 cm kalınlığındaki tabakaları İlk Tunç Çağı yapı faaliyetleri tarafından tahrip edilmiştir. Sıvalı tabanları, düz döşeme taşları üzerine yapılmış ocaklar, çeşitli taş yığıntıları ve çukurlar saptanmıştır. Çukurlardan birinde yan yatırılmış bir çocuk iskeleti bulunmuştur. Buluntuları Orta Anadolu Kalkolitik Çağı konulu doktora çalışması kapsamında ele alan U.Schoop'a göre burada ele geçen tek renkli, gri kahve açkılı çanak çömlek hala Geç Neolitik geleneklidir. Söz konusu dönem, Konya Ovasından (olasılıkla Can Hasan I çevresi) ithal edilmiş boya bezemeli keramik ve diğer ögelerle birlikte Erken Kalkolitik Çağ'a tarihlendirilebilir. Bu buluntu grubu yukarıda kısaca değinilen, Büyükkaya'nın eski deneme sondajlarından da tanınan tabaka dışı Kalkolitik Çağ malzemesinden daha eski olmakla birlikte, bu malzeme ile yakın ilişki içindedir. Biraz daha geçe tarihlenen tabaka dışı Kalkolitik Çağ keramik parçalarından, yeni dönem kazılarında da, özellikle Orta ve Alt Plato'da çok sayıda bulunmuştur. Olasılıkla Hitit Devri'nde Büyükkaya'ya taşınan dolgu toprağıyla birlikte buraya ulaşmışlardır; yakındaki başka bir yerleşmenin malzemesi oldukları varsayılmaktadır. Son yıllarda Hattuşa çevresinde yürütülen yüzey araştırmalarından anlaşıldığına göre (Czichon 1998), söz konusu Kalkolitik Çağ buluntu yerleri birbirinden uzak, tercihen dağ yamaçlarında ya da tepe başlarında kurulan küçük yerleşmelerdir. Bu türde küçük bir buluntu yeri Hattuşa'nın 2 km kuzey doğusunda Yarıkkaya'da da saptanmıştır (Hauptmann 1969).

Uzun bir aradan sonra M.Ö. 3. binin, yani İlk Tunç Çağ'ının sonlarında, Büyükkaya'da iki evreli bir yerleşme kurulmuştur. Bu dönemde de yerleşme Üst Plato'nun sınırları içindedir. Tabaka kalıntıları tüm platoya yayılmıştır, ancak yalnızca güney kısımda ayrıntıyla araştırılmışlardır. Serbest nizamdaki taş temelli uzun kerpiç yapılar, bir sur duvarı ile korunan platonun güneydoğu kenarına araziye uydurularak yerleştirilmişlerdir. Buluntular Aşağı Şehir'de Kuzeybatı Yamaç 9 - 8 c-d tabakalarıyla çağdaştır (Orthmann 1963, 13 ff.). Aynı dönemde boğazın karşı yakasında yine yüksek bir düzlük olan Büyükkale de iskan edilmiştir. Anlaşıldığına göre her iki yükselti de çukurda yer alan yerleşmeyi kontrol açısından uygun konumdaydı. Sonraki

dönem olan M.Ö.2. bin Asur Koloni Çağı'nın mimari kalıntıları Büyükkaya'da saptanmamıştır. Ancak Üst Plato'da tabaka dışı ele geçen damga mühür ve çok kaliteli çanak çömlek parçaları yerleşmenin sürdüğü yolunda ip uçları vermektedir; gözlemlendiği kadarıyla bu döneme ait yapı kalıntıları Hitit Devri'nde tümüyle ortadan kaldırılmıştır.

Hitit Devri

Eski Hitit Devri yerleşme kalıntıları geç dönem tabakaları tarafından yoğun biçimde tahrip edilmiş olmalarına rağmen Büyükkaya'nın üç platosunda da saptanmıştır. Kalıntılar bu dönemdeki yerleşmenin niteliği hakkında kesin bilgi verecek türden değildir.

Doğu suru adı verilen ilk sur duvarı Büyükkaya'nın yalnızca güneydoğu kısmına oturtulmuştur. Yapı tarzı olarak Aşağı Şehir'deki Poternli Sur ile karşılaştırılabilir ve aynı türden yer altı geçitlerine sahiptir (Plan 2: Pot.1-Pot.3). P. Neve'ye göre birbirlerinden 65 m uzaklıkta olan Potern 1 ve Potern 3 ilk yapı evresine aittir, ancak ikisinin arasında yer alan Potern 2 daha sonradan ilave edilmiştir (Neve 1996, 99). Söz konusu tünellerin işlevi konusunda yeni bilgiler edinilememiştir: Poternlerin savaşçılara düşmanı arkadan vurma olanağı tanıyacak bir arka kapı (latinca: posterula) olabilecekleri düşünülürdü. Ancak burada da Potern 3'ün girişi böyle bir işlevi çağrıştırmaktan uzak bir anıtsallığa sahiptir (Resim 2).

Kuzey kısımda doğu suru Büyükkaya'nın ucunu aşarak Kuzey Şehir Suru'yla birleşerek devam etmekteydi (Plan 2: A). Kuzey Şehir Suru geniş bir yay çizerek batıya, Dış Aşağı Şehir'e dönerek Büyük Tapınağın batısından geçip Poternli Sur'a ulaşmaktaydı. Büyükkaya'nın güney yüzünde doğu suru, dik kaya yamacını aşıp boğaza inerek Minarekaya/Ambarlıkaya'ya ulaşır ve burada Büyükkale'nin kuzey köşesine bağlandığı düşünülen bir surla buluşurdu.

P.Neve Büyükkaya'nın doğu suruyla Poternli Sur'un yeniden yapılışını M.Ö.15.yüzyıldan 14.yüzyıla geçiş devrine tarihlendirmektedir (Neve 1996, 101). Önceleri eski şehrin Büyükkaya Deresi boğazının batı kısmındaki alanla sınırlı olduğu varsayılırken (ör.: Neve 1982, ek 4.5), şimdilerde şehrin oldukça erken bir dönemde de geniş bir alana yayıldığı gözlenmektedir. Özellikle Büyükkaya sırtlarının iskana dahil edilmesiyle, düşmanın böylesine şehre hakim bir yerde yerleşerek bu noktadan şehirde sürdürülen tüm etkinlikleri izleyebilmesinin engellenmiş olması mantıklı görünmektedir. Bu anlamda Büyükkaya'daki doğu surunun ya da öncü bir başka surun daha eski olma olasılığı ve buradaki Eski Hitit yerleşmesinin korunaklı şehir alanına dahil edilmiş olması olasılık dahilindedir. Aşağı Şehir'in güney batı tarafındaki Poternli Sur da kökende bir Eski Hitit mimari etkinliğidir (Neve 1982, 35 v.d.).

Büyükkaya'daki sur duvarının yapımı büyük toprak taşıma işlemleri gerektirmiştir. Doğu tarafında, sırtın yanındaki çukurluk bu ve bundan sonraki dönemde doldurma işlemi için çekilen toprak sonucu oluşmuş olmalıdır. Söz konusu çukurluk Yerkapı'nın önündeki, setin yapılması sırasında meydana gelmiş çukurlukla karşılaştırılabilir. Büyük Hitit İmparatorluk Devri'nde, Üst Plato'nun güney ucunda olasılıkla resmi bir amaca hizmet eden ve tüm şehri kusursuz bir biçimde gözlemleyecek türde büyük bir yapı kompleksi kurulmuştur (Plan 2: B; Resim 3). Alt Plato'nun batı tarafındaki masif dörtgen yapı da Büyük Hitit İmparatorluk Devri'ne tarihlenir (Plan 2: C); burada da yapının biçimi ve büyüklüğü, mesken olmasını olasılık dışı bırakmaktadır. Ayrıca, Alt Plato'da Hitit Büyük İmparatorluk devrine tarihlenen, teraslama tarzından yararlanılarak yamaca paralel yapılmış çeşitli mimari kalıntılar saptanmıştır.

Büyükkaya Büyük Hitit İmparatorluk Devri'nin geç dönemlerinde yepyeni bir yapılanmaya sahne olmuştur. Doğu tarafındaki eski sur yeni bir duvarla yükseltilmiştir. Ayrıca, Büyükkaya'yı kuzeyden sınırlayan yeni bir duvar inşa edilmiştir (Plan 2: D). Bu duvar batıda Deliklikaya'ya uzanırken doğu-

da yeni doğu suruyla keskin bir açı ile birleşmektedir. Neve söz konusu kuzey surun yapı düzenini Aşağı Şehir'deki "Abschnittsmauer" olarak tanımlanan surun yapı düzeni ile karşılaştırmakta ve her ikisini de III.Hattuşili devrine ya da biraz daha geçe tarihlendirmektedir (Neve 1996, 101). Yapılanma sırasında yeniden büyük miktarda toprak dolguya gereksinim duyulmuş ve böylece Büyükkaya her yönden tahkim edilmiş bir kaleye dönüşmüştür. Kuzey Şehir Suru Büyükkaya'nın kuzey eteğinde benzer bir yenilenme geçirmediğinden, söz konusu duvarın o dönemde hala savunma işleviyle var olup olmadığı sorusu akla gelmektedir.

Alan bakımından şehirdeki en büyük kapı Büyükkaya surlarının doğu tarafında yer almaktaydı. Kuzey suruna ikinci bir kapı açılmıştır; buradan Kuzey Şehir'e yılankavi bir yolla inilirdi. Ayrıca Büyükkaya'ya Aşağı Şehir'den güneybatı yönünde dik bir yolla da ulaşılırdı(Plan 2: E). Yokuşun en dik kesiminin dibinde, kaya üzerinde Batı Kapısı adıyla anılan ve Kuzey Şehir'e ikinci bağlantıyı oluşturan kapı bulunurdu.

Surun yeniden inşası sırasında Büyükkaya'nın yeni işlevi için gerekli geniş hacimli toprak yığıntılarına ihtiyaç duyulmuştur. Bu dönemden başlayarak söz konusu yere dikdörtgen biçimli, topraktan büyük tahıl siloları kurulmuştur. 6 x 6 m ve 12 x 18 m boyutları arasında değişen onbir adet çukur saptanmıştır (Resim 5); ancak arazi yapısına bakılırsa rahatlıkla onbeş , hatta daha fazla silonun varlığı düşünülebilir. Çukurlar en az 2 m derinliğinde, olasılıkla da bundan daha derindiler. Demir Çağı tahribatı nedeniyle Çukurların üst kenarının bulunamamasından dolayı derinlikleri ancak minimum değer olarak verilebilir. Çukurların tabanları kireç taşından kaba bir döşeme ile kaplanmıştır. Hem döşemenin üzerinde hem de çukurların toprak duvarlarında tabaka halinde organik malzeme saptanmıştır (Resim 6). Saptanan organik malzeme, çukurları yalıtmak amacıyla kullanılan kalın saman tabakasıdır. Söz konusu tabakalardan silolarda saklanan tahıl türünü gösteren büyük miktarda arpa poleni elde edilmiştir.

Tahılların toprak altı silolarda saklanması tüm dünyada yaygın bir uygulamadır (Sigaut 1980) ve aşağıda açıklanacak olan ilkeye dayanır: Tahılla doldurulan çukur mümkün olan en etkin hava yalıtımını sağlamak için kalın bir tabaka toprakla kapatılır. Bu ortamda tahıl, tanelerin arasında kalan oksijeni solur ve karbondiyoksit üretir. Zehirli olan söz konusu ortamda fare, tahıl böcekleri ve küf mantarları barınamaz. Tahıl nem ve oksijen alışverişinden korunduğu sürece, yarım yüzyılı aşan zaman dilimleri boyu bozulmadan saklanabilir hale gelir. Ancak zamanla tahılın çimlenme yetisi oldukça azalır. Anlaşılacağı üzere, yöntem bir tür konservasyondur: Havadan tümüyle yalıtma zorunlu olduğundan bu tür silolar gereksinim oldukça açılıp kapanamaz, bir kez açıldıklarında tümüyle boşaltılmaları gerekir.

Geniş kapsamlı çalışmasında H. Hoffner Hititler'de tarım ve beslenme konusu çerçevesinde tahıl ambarlarını çivi yazılı metinlerden yola çıkarak betimlemiştir. ÉSAG (eskisi ARAH) sümerogramı ile tanımlanan mimari birimler yapı değildir. Bu birimler "derin" ve "toprağa kazılmış" olarak tanımlanır; "aşağıya doğru" bir şey konulur ve "aşağıdan dışarıya" bir şey çıkarılır (H. Hoffner 1974, 34 vdd.). Kuşkusuz bu şekilde Büyükkaya'daki örnekler türünde silolar anlatılmak istenmiştir.

Yenilemeler, dolgular ve kesişmeler, hepsi aynı dönemde olmasa da, siloların uzun süreli kullanıldıklarını göstermektedir. En büyük silo çukuru olan silo 8'in (Resim 4) 2 m'lik dolgu yüksekliğinde 432 m^3'lük bir depolama kapasitesi olduğu düşünüldüğünde, Büyükkaya'da ne büyük miktarlarda tahıl depolanabileceği görülür. Bu miktar 1400'den fazla kişinin bir yıllık gereksinimini karşılayabilecek olan 260 ton arpaya eşittir. Bu silolarda günlük kullanım için değil, darlık zamanında kullanmak üzere uzun süreli rezerv olarak büyük hacimde tahıl depolanmıştır. Resim 7 bu siloların kullanım şekilleri için bir öneridir.

Büyükkaya'da surun yeni yapı evresi için önerilen tarihin doğruluğu benimsenirse,

silo kompleksi M. Ö 13.yüzyılın ortalarına tarihlendirilebilir. Aşağı Şehir'in 30/34 plan karesinde, Poternli Sur'un arkasında son yıllarda saptanan bir silo kompleksi yaklaşık aynı dönemde kullanım dışı bırakılmıştır (Seeher, 1999, 2000). Burada 32 gözlü, 115 m uzunluğunda ve 7- 9000 m³ lük saklama kapasitesinde bir yeraltı silo yapısı bulunmaktadır. Büyükkaya'daki silolar söz geçen miktarda saklama kapasitesinden yoksun olmakla birlikte bu işlevin en azından bir kısmını üstlendikleri akla yakın görünmektedir.

Hitit Imparatorluk Devri'nin sonlarına doğru Büyükkaya'da Kuzey Kapı örülerek kapatılmış, kuzey sur duvarının önüne ek bir ön duvar yerleştirilmiştir (Plan 2: F). Bu önlem en geç bu devirde, daha aşağıda yer alan Kuzey Şehir Suru'nun işlev dışı bırakıldığına işaret eder. Büyükkaya'nın doğu tarafına da bir ön duvar örülmüştür (Plan 2: G), bazı belirtiler doğu kapısının da kullanıma kapandığını düşündürmektedir. Söz konusu varsayımın doğru olduğu düşünülürse, Büyükkaya'ya yalnızca kuzey surun arkasından, yokuşun korunaklı halinden yararlanılarak Aşağı Şehir üzerinden erişilmekteydi. Yolun Alt Plato'ya ulaştığı yerde geçiş bir duvar tarafından kesilerek korunmaktaydı (Plan 2: H). Tahıl ambarlarının bu şekilde korunmalarına sebep İmparatorluk Devri'nin sonlarında giderek artan şehrin içine düştüğü güvenlik sıkıntısı olmalıdır. Büyük ambarların bazılarının doldurulup işlev dışı kaldığı bu zaman diliminde kuzey kapısında çömlek fırını kalıntıları dikkati çeker. Büyükkaya'da Hitit iskanının sonu yangınlara ya da başka türden yıkımlara bağlı değildir. Bu yolda veriler de beklenmemektedir, zira bu bölüm şehrin diğer bölgelerinin hemen tümünde olduğu üzere, yaklaşık M. Ö 1200'lerde yavaş yavaş terkedilmiştir (Seeher, baskıda): Büyük miktarda tahılı uzun süreli saklamayı gerektiren bir durum kalmamıştır.

Demir Çağı

Büyükkaya sırtları uzun süre terkedilmiş bir durumda kalmamıştır. Şehrin terk edilmesinden kısa bir süre sonra M. Ö. 12.yüzyılda Karanlık Çağ başlarında, Erken Demir Çağ sakinleri buraya yerleşmişlerdir. Bu yerleşme iki evrelidir ve üst evre iki gelişim süreci gösterir. Orta Plato'da bu döneme ait tabakalar 1,5 m kalınlığına ulaşmaktadır. Alt Plato'da bulunmuş bir dizi çukur bu dönemde Büyükkaya'nın bu bölgesinde de yerleşim aktivitelerinin bulunduğunu gösterir. Mimari kalıntılar hem taş temel üzerine kerpiç yapı şeklinin hem de kazıklı yapı tekniğinin (Resim 9) bir arada kullanıldığını göstermektedir. Ayrıca içlerinde kısmen ahşap kalıntılarının bulunduğu, boyutları 6 - 8 m arasında değişen büyük çukurlar da gün ışığına çıkartılmıştır (Resim 8). Bulunan hayvan kemiklerini inceleyen A. von den Driesch söz konusu çukurlarda domuz barındırıldığı konusunda bazı ip uçlarından bahsetmektedir. Karanlık Çağ'a ait tabakalardan alışılmışın dışı bir yoğunlukta hayvan kemiği elde edilmiştir. Bu malzemenin dönemin iklim ve ekonomisini yeniden modellendirme konusunda büyük kolaylık sağlayacağı düşünülmektedir.

Orta Plato'da bu devre tarihlenen ve maden işleme zanaatiyle yakından ilgili bol miktarda buluntu ele geçmiştir. Madencilik kapsamında ateş yerlerinin yanı sıra demir, tunç, kurşun buluntularla pota ve üfleç parçalarından söz edilebir. Söz konusu buluntuların dışında demircinin alet yapımında kullanmak üzere ürettiği geyik boynuzundan saplar ve çok sayıda bunların yapımından kalan, tamamlanmamış örnekler ve üretim artığı boynuz parçaları da gün ışığına çıkarılmıştır. Karanlık Çağ'a tarihlenen maddi kültür kalıntıları Hitit İmparatorluk Devri kalıntılarından tümüyle farklı bir görünüm sunmaktadır. Bu durum küçük buluntu kompozisyonunda, özellikle de hemen tümüyle el yapımı olup farklı bir form yelpazesi gösteren keramik buluntularda kendini belli etmektedir. H.Genz bu yayındaki diğer bir makalede söz konusu keramiğin özelliklerini ele almaktadır.

Karanlık Çağı izleyen ve "Büyükkaya Evresi" adıyla da anılan Orta Demir Çağ'da, aynı yerde tüm tepe sırtını kaplayan geniş alanlı bir yerleşme kurulmuştur. Mimarisi oldukça

Sur'un arkasında yer alan, devlet hazinesinin bir kısmını ve kralın gücünün temelini oluşturan büyük kompleksin devamı niteliğindedir. Aynı şekilde Büyükkaya'daki toprak silolar da, küçük çapta da olsa, bu işlevi yerine getirmekteydi.

Büyükkaya kazıları Hattuşa ve çevresi için Erken Demir Çağı'nda Karanlık Çağa ait bir yerleşmenin ilk kanıtlarını oluşturmaktadırlar. Hititler'in sahneden çekilmesinden kısa süre sonra burada hemen hemen kesintisiz biçimde M.Ö 12.yüzyıldan 8.yüzyıla kadar süren bir yerleşme oluşmuştur. Buluntuların değerlendirilmesi sonucunda Karanlık Çağ'da burada yaşayan insan topluluklarının, kökü İlk ve Orta Tunç Çağları'na dayanan eski bir Anadolu kültürünü yaşattıkları anlaşılmaktadır. Demir Çağı yerleşmesi, Boğazköy'den ve çevre yerleşmelerden bilinen, eskiden Erken Frig kültür kompleksi olarak adlandırılan dönemle sürmektedir. Büyükkale kültür silsilesinin yardımıyla devrin maddi kültürünün büyük bir kısmının Karanlık Çağ'dan geliştiğini gözlemlemek mümkündür. Bu nedenle Kızılırmak kavisi içinde kalan ve güneye doğru yaygın bir dağılım alanı bulunan söz konusu kültür "Frig" kavramıyla adlandırmak artık pek uygun görünmemektedir. Genel anlamda kullanılan tarafsız terim "Demir Çağı"nın, doğru olmayan etnik kökenli bir kavramın yerine kullanılması daha uygundur.

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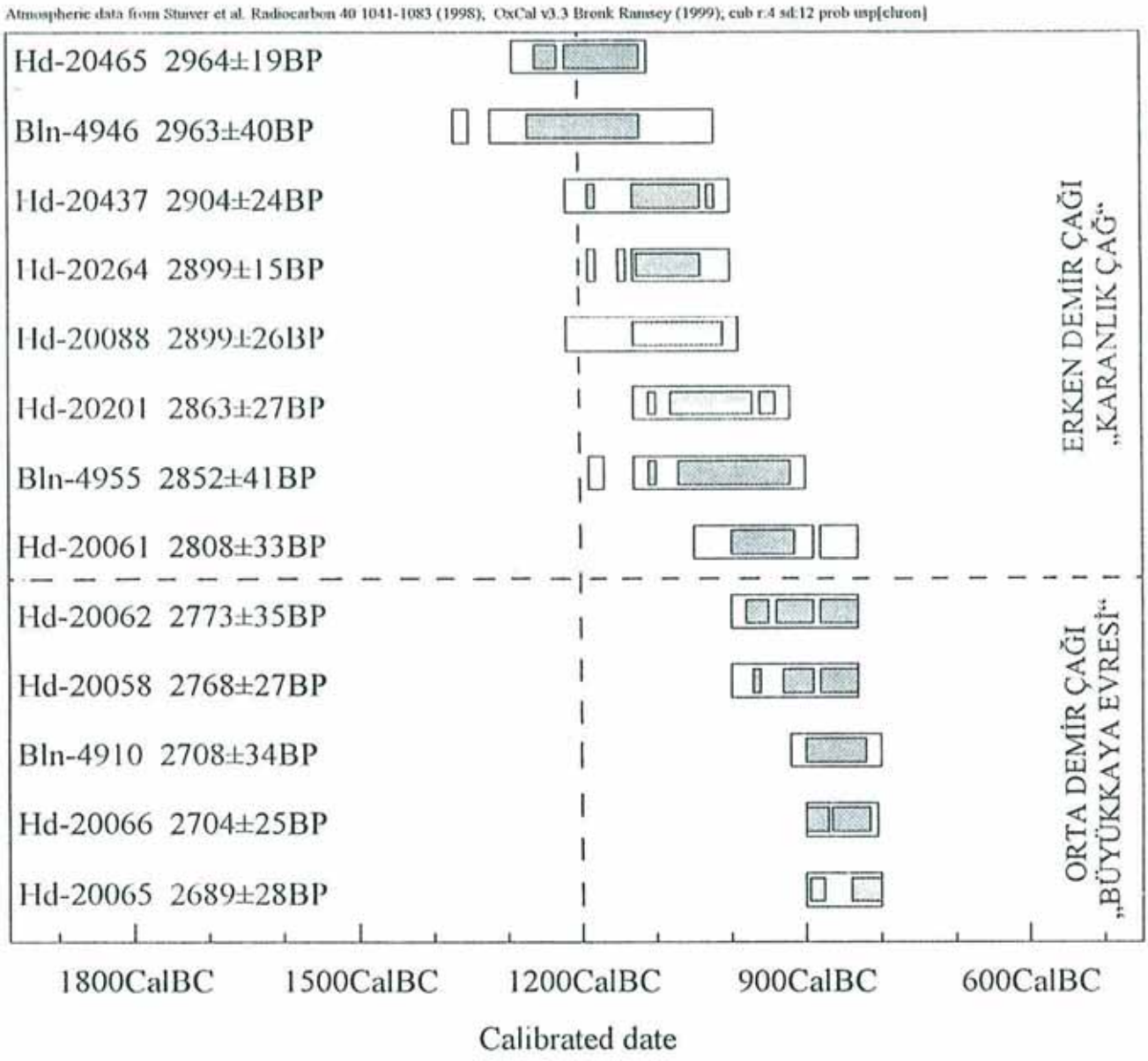
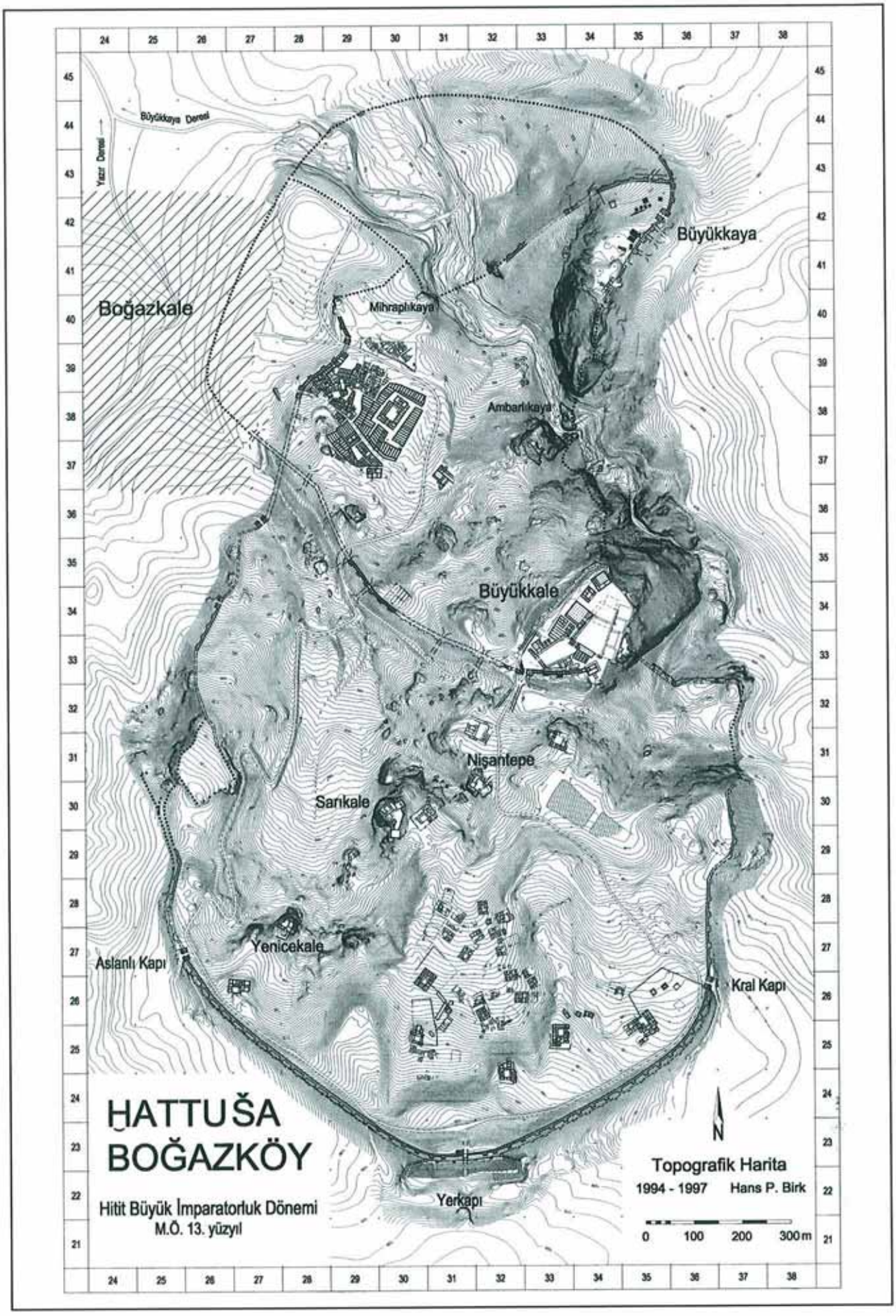


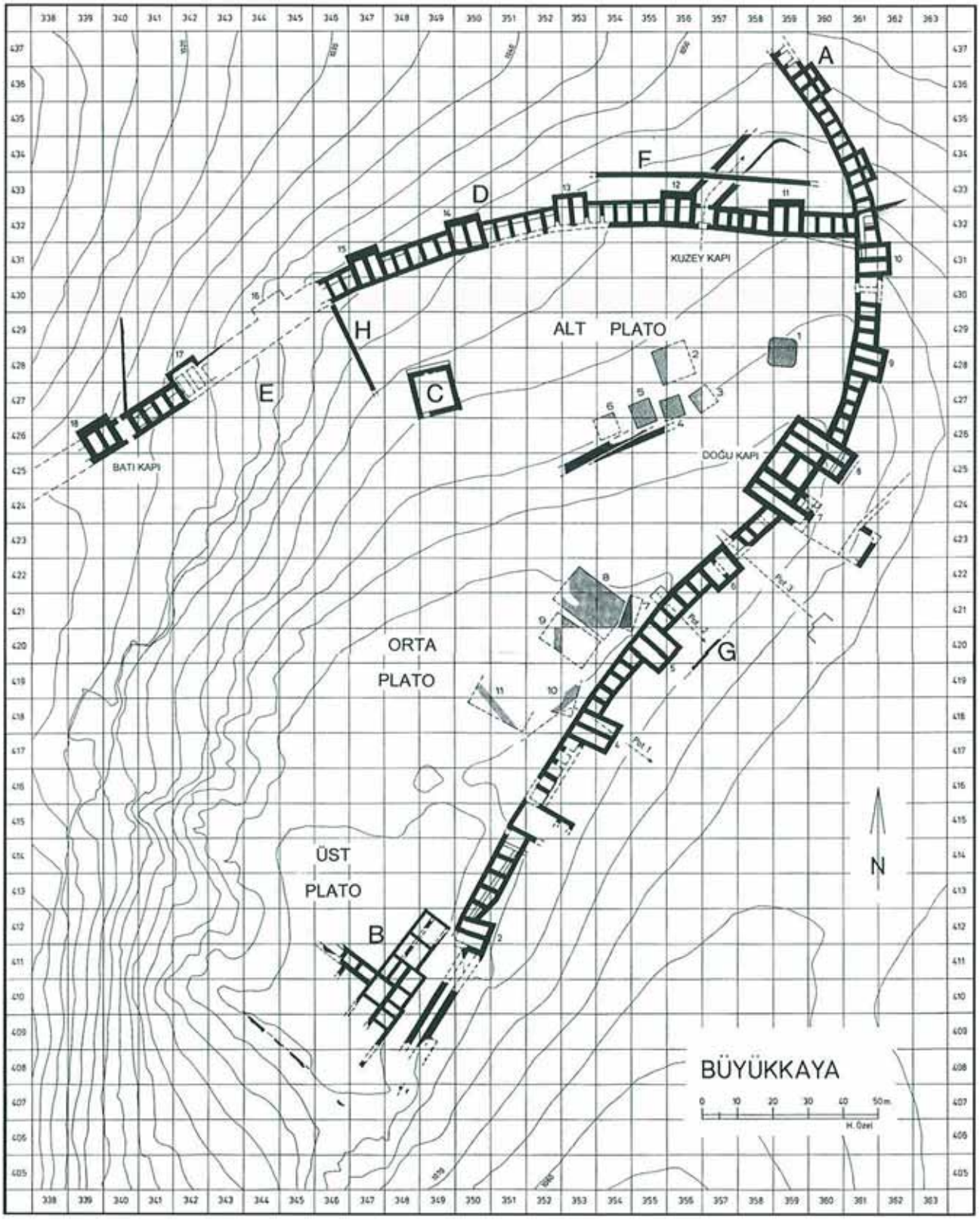
Çizelge 1: Büyükkaya Erken ve Orta Demir Çağ radyokarbon tarihleri

	BÜYÜKKAYA		BÜYÜKKALE
TARİHLEME	DÖNEM	VERİLER	
	BİZANS		Tabakasız buluntular
	ROMA	Tabakasız buluntular, mezarlar	Sur, Evler
M.Ö.3. , 1. yy.	GALAT-HELENİSTİK	Tabakasız buluntular	Tabakasız buluntular
	GEÇ DEMİR ÇAĞ ("GEÇ FRİG")	Tabakasız buluntular?	I a
	GEÇ DEMİR ÇAĞ ("GEÇ FRİG")	Tabakasız buluntular	I b
M.Ö.700/650'den evvel	ORTA DEMİR ÇAĞ ("ERKEN FRİG")	Tabakasız buluntular	II a
	ORTA DEMİR ÇAĞ ("ERKEN FRİG")	Üst Plato'da sur ve yerleşme; Doğu Kapı'da bir sıra yapı	II b
M.Ö.9.yy.	ORTA DEMİR ÇAĞ (BÜYÜKKAYA EVRESİ)	Her üç platoda geniş yerleşim aktiviteleri	?
	ERKEN DEMİR ÇAĞ (KARANLIK ÇAĞ 2)	Orta Plato'da yerleşme, Alt Plato'da çukurlar; tabakasız buluntular (kırmızı boyalı çanak ç.)	Tabakasız buluntular
M.Ö.1200/1180'den sonra	ERKEN DEMİR ÇAĞ (KARANLIK ÇAĞ 1)	Orta Plato'da yerleşme	
M.Ö.1200	BÜYÜK İMPARATORLUK ÇAĞI - SON DÖNEM	Tahıl siloları; kuzeyde ön sur, Kuzey Kapı'da çömlekçilik atölyesi; çeşitli yerleşim kalıntıları	(IIIa)
	BÜYÜK İMPARATORLUK ÇAĞI - GEÇ DÖNEM	Doğu Surun yeniden inşası, Kuzey Sur, tahıl siloları; Aşağı Plato'da çeşitli yapılar	III
	BÜYÜK İMPARATORLUK ÇAĞI - ERKEN DÖNEM	Doğu Sur ve poternler; Üst Plato'da büyük bir yapı; diğer iki platoda yerleşim kalıntıları	IV a-b
M.Ö.1650/1600'den sonra	ESKİ HİTİT KRALLIĞI	İlk Doğu Sur ?; her üç platoda yerleşim kalıntıları	IV c
M.Ö.1700'den evvel	KARUM DÖNEMİ	Tabakasız buluntular; belki Üst Plato'da yerleşim kalıntıları	IV d
M.Ö.2000'den evvel	İLK TUNÇ ÇAĞ 3	Üst plato'da yerleşme	V
	ERKEN KALKOLİTİK ÇAĞ 2	Çok sayıda tabakasız buluntuları özellikle Orta ve Alt Plato'da	
M.Ö.6. binyıl	ERKEN KALKOLİTİK ÇAĞ 1	Üst Plato'da yerleşme	

Çizelge 2: Büyükkaya Kronoloji tablosu



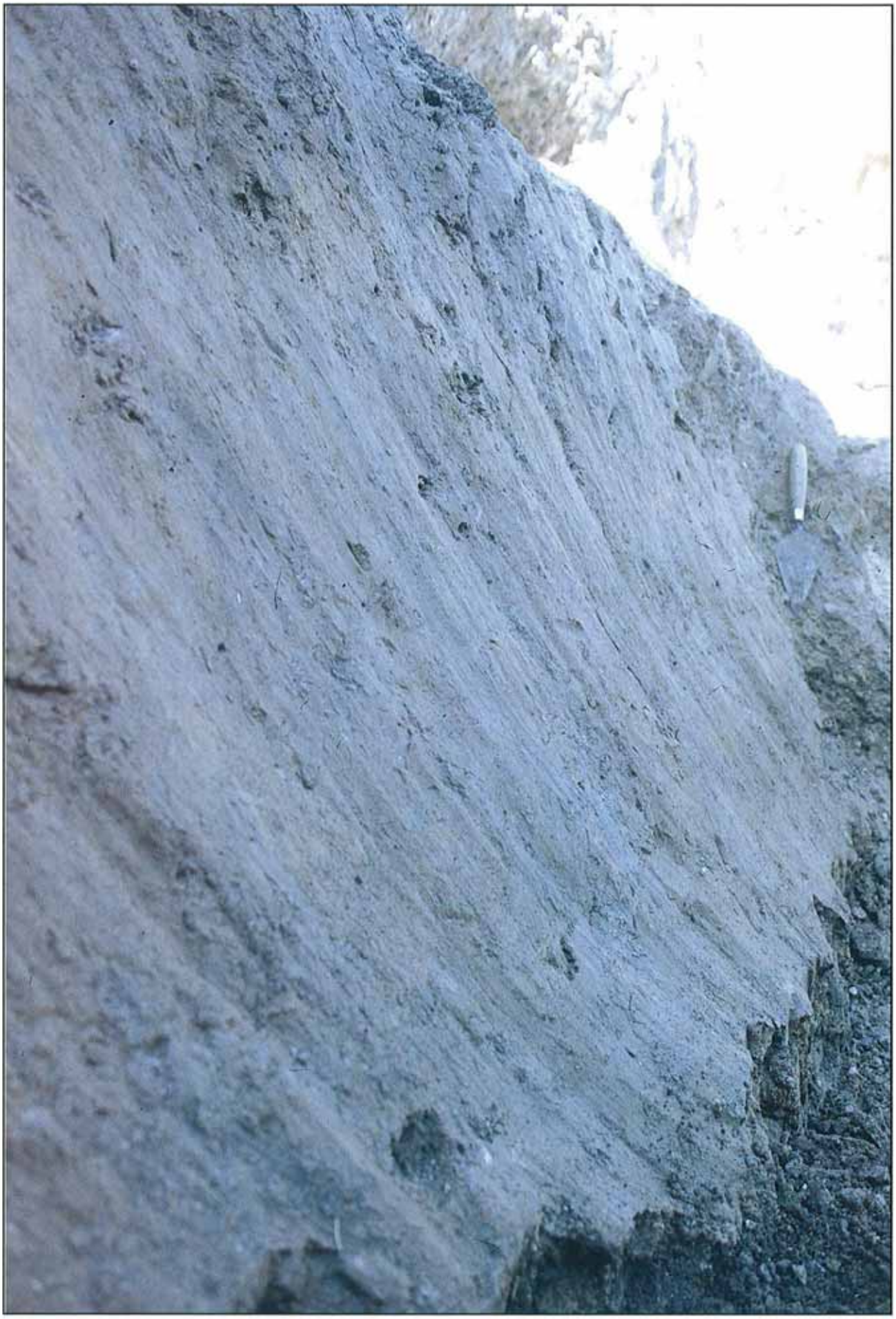
Plan 1: Hattuşa/Boğazköy Genel Planı



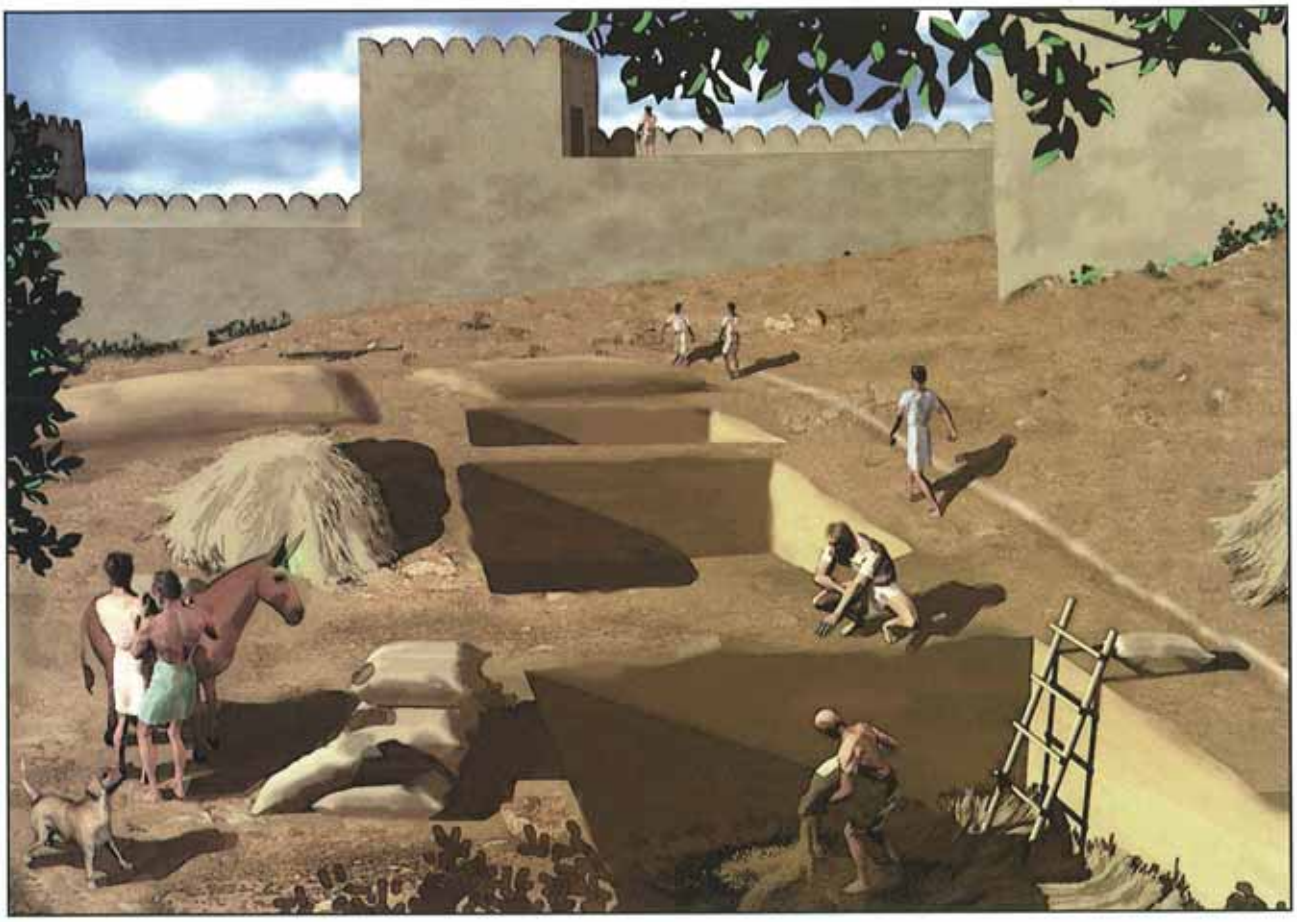
Plan 2: Hitit Büyük İmparatorluk Çağı'nda Büyükkaya

Resim 1: Büyükkaya - Kuzeyden bakış

Resim 2: Büyükkaya - Potern 3'ün girişi

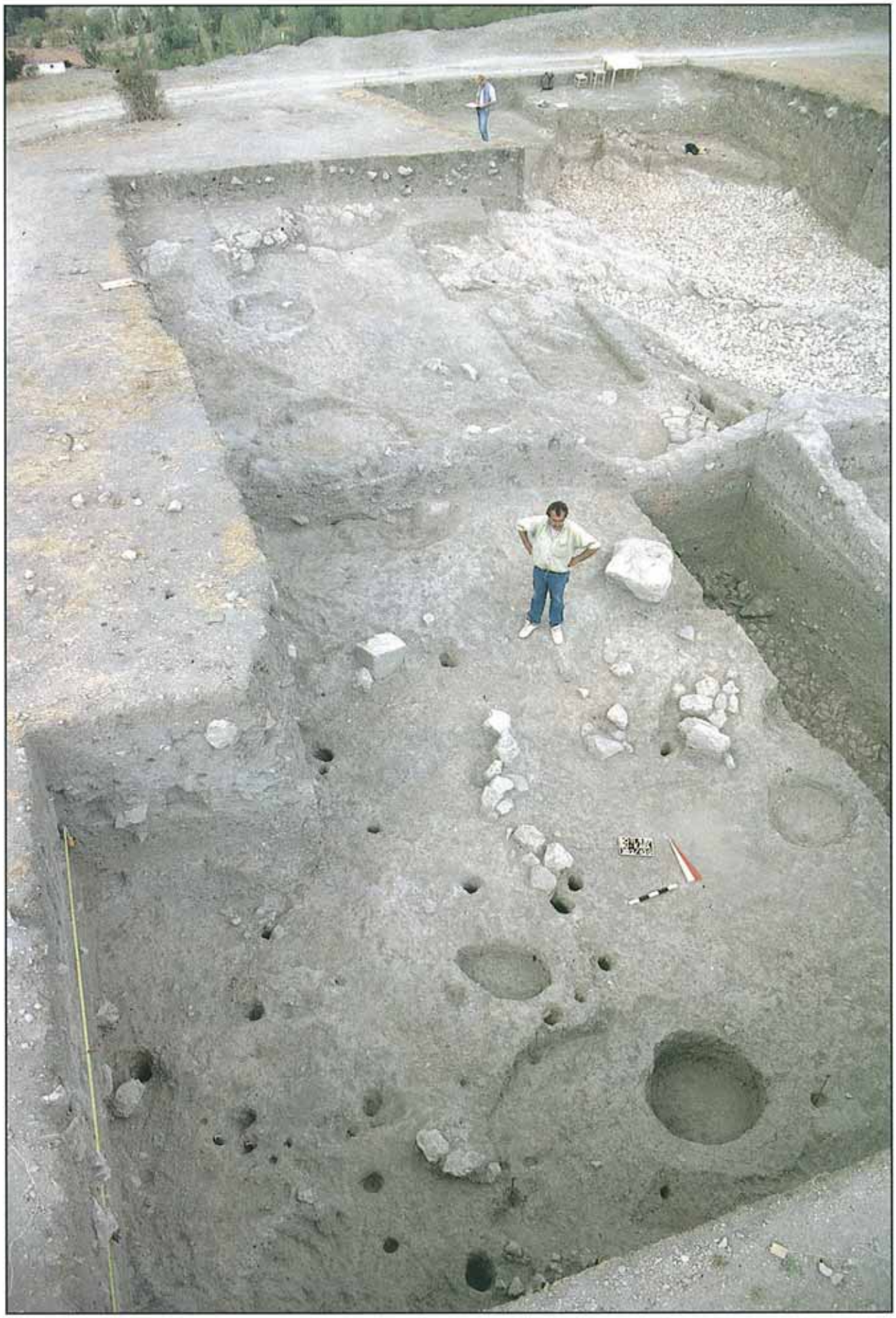


Resim 6: Büyükkaya - Tahıl silolarının yan duvarlarına yalıtım için konmuş saman tabakasının izleri



Resim 7: Büyükkaya - Tahıl silolarının kullanımını gösteren canlandırma (Uğurhan Betin)

Resim 8: Büyükkaya - Orta Plato. Karanlık Çağ, ahşap döşeli büyük çukur



Resim 9: Büyükkaya - Orta Plato. Karanlık Çağ, kazıklı yapı tekniğine örnek

Resim 10: Büyükkaya - Alt Plato. Orta Demir Çağ, Büyükkaya evresine ait bir mekan

Resim 11: Büyükkaya - Üst Plato. Orta Demir Çağın, Büyükkale IIb ile çağdaş evresine ait sur duvarı

Resim 12: Büyükkaya - Üst Plato. Orta Demir Çağ Kutsal mekan

Die Eisenzeit in Zentralanatolien im Lichte der keramischen Funde vom Büyükkaya in Boğazköy/Hattuša

Boğazköy/Hattuša Büyükkaya Keramik Buluntuları Işığında Orta Anadolu'da Demir Çağı

Hermann GENZ*

Schlüsselwörter: Boğazköy, Hattuša, Dunkles Zeitalter, Eisenzeit, Phryger, Keramik, Zentralanatolien
Anahtar Sözcükler: Boğazköy, Hattuša, Karanlık Çağ, Demir Çağı, Frig, çanak çömlek, Orta Anadolu

Boğazköy/Hattuša'da Büyükkaya sırtı üzerinde yapılan kazılarda geniş alana yayılmış bir Demir Çağı yerleşmesi bulunmuştur. Boğazköy'deki eski kazılardan bilinen "Frig" tabakalarıyla çağdaş olanların (burada Orta Demir Çağı) dışında daha eski, Erken Demir Çağ'a ait tabakalar dikkati çeker. Erken Demir Çağ'a ait buluntular, Hitit İmparatorluk Çağı'nı takip eden "Karanlık Çağ" olarak adlandırılan döneme ışık tutar. Orta Anadolu bölgesinin Erken Demir Çağ'da hemen hemen boş ve ancak göçebe toplulukların gelip geçtiği bir bölge olduğu sanılmaktaydı. Büyükkaya, Gordion, Kaman-Kalehöyük gibi yerleşmelerden elde edilen sonuçlar bu bölge için düşünülen modelin yeniden elden geçirilmesi gerektiğini göstermektedir. Bu yazıda Büyükkaya Demir Çağı keramiğinin bazı ögeleri üzerinde durulacak ve Orta Anadolu tarihi içindeki yeri analiz edilecektir.

Einleitung

Bei den von 1993 bis 1998 erfolgten Ausgrabungen auf dem Büyükkaya in Boğazköy/Hattuša wurde eine umfangreiche eisenzeitliche Besiedlung festgestellt (Neve 1994; Seeher 1995, 1996, 1997, 1998, 1999, 2000). Neben den bereits aus Boğazköy bekannten sogenannten phrygischen Schichten[2] - hier als mittlere Eisenzeit bezeichnet - ist vor allem die Entdeckung von früheisenzeitlichen Schichten bedeutsam (Abb. 1). Diese früheisenzeitlichen Befunde werfen neues Licht auf das sogenannte „Dunkle Zeitalter", d. h. die Zeit unmittelbar nach dem Ende des hethitischen Großreiches. Galt Zentralanatolien bislang in der frühen Eisenzeit als weitgehend siedlungsleeres, allenfalls von Nomaden durchzogenes Gebiet (Akurgal 1955, 112; Joukowski 1996, 297), so zeigen nun die neuen Ergebnisse vom Büyükkaya, zusammen mit ähnlichen Befunden aus Gordion, Kaman-Kalehöyük und anderen Orten, daß dieses Bild einer Revision bedarf (Abb. 2). In diesem Artikel sollen einige Aspekte der eisenzeitlichen

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Keramik des Büyükkaya vorgestellt und ihr historischer Kontext in Zentralanatolien analysiert werden.

Die früheisenzeitliche Keramik

Auf dem mittleren Plateau wurden in einer durch die spätgroßreichszeitlichen Silogruben 8 und 9 gebildeten Vertiefung drei aufeinanderfolgende Schichten der frühen Eisenzeit, des sogenannten "Dunklen Zeitalters" entdeckt (Seeher 1997, 327ff., 1998, 235ff.). Diese stratigraphische Abfolge bildet die Grundlage für die Einteilung der frühen Eisenzeit in eine frühe, mittlere und späte Phase, wobei sowohl stratigraphisch als auch von der Keramikentwicklung her die mittlere und die späte Phase nicht deutlich voneinander getrennt werden können. Unter den früheisenzeitlichen Schichten liegt eine Silogrube der späten Großreichszeit (spätes 13. Jh. v. Chr.), nach oben werden die früheisenzeitlichen Schichten durch mitteleisenzeitliche ("phrygische") Bebauung versiegelt. Insgesamt ist früheisenzeitliche Keramik auf allen Plateaus des Büyükkaya in beträchtlicher Anzahl anzutreffen, ausserhalb des mittleren Plateaus aber kaum aus stratigraphisch gesicherten Fundzusammenhängen.

Die Keramik der frühen Phase der Früheisenzeit weist meist einfache Formen wie Schalen, halslose Töpfe, Töpfe mit ausbiegendem Rand und Krüge auf (Abb. 3:1-7). Verzierungen sind nicht belegt, meist ist die Oberfläche geglättet, teilweise sehr gut, häufig sind aber auch nur einzelne Glättstreifen sichtbar. Zwei Waren lassen sich unterscheiden. Eine feinere ist beigefarben bis hellbraun, meist klingend hart gebrannt und weist als Magerungspartikel Kalk und scharfkantige Gesteinssplitter von bis zu 2mm Größe auf. Die zweite, gröbere Ware ist dunkelbraun bis schwarz, weniger gut gebrannt, und enthält als Magerung meist Steinchen von bis zu 3mm Größe. Ein Großteil der Gefäße ist handgemacht, doch sind noch ca. 25% der Keramik scheibengedreht.

Die Verwendung der Drehscheibe sowie Formen von Schalen mit ausbiegendem Rand (Abb. 3:3), halslosen Töpfen mit aussen verdicktem Rand (Abb. 3:4-5) und Krügen mit Kehle an der Innenseite des Randes (Abb. 3:7) weisen auf hethitische Traditionen hin. Entsprechende scheibengedrehte Gefäße sind im Repertoire der hethitischen Großreichszeit gut belegt (Müller-Karpe 1988; Parzinger/Sanz 1992). Trotz dieser Ähnlichkeiten bestehen aber doch deutliche Unterschiede zwischen der spätgroßreichszeitlichen Keramik und der frühesten Phase der Früheisenzeit. Während bei der groben tongrundigen Ware der späten Großreichszeit - der sogenannten Töpferofenware (Müller-Karpe 1988) - die Oberfläche meist unbehandelt blieb, weisen fast alle früheisenzeitlichen Gefäße eine mehr oder weniger sorgfältig ausgeführte Glättung der Oberfläche auf.

Die Keramik der mittleren und späten Phase der Früheisenzeit unterscheidet sich kaum voneinander[3]. Sie stellt aber auf jeden Fall eine organische Weiterentwicklung der Keramik der frühen Phase dar, auch wenn die hethitischen Traditionen verlorengehen. Scheibengedrehte Keramik taucht nur noch selten auf, auch besteht bei diesen Stücken der Verdacht, daß es sich größtenteils um verworfenes Material aus der frühen Phase handelt.

Die feinere beige sowie die gröbere reduzierend gebrannte Keramik setzen sich auf jeden Fall aus der frühen Phase fort, ebenso wie ein Großteil der einfachen Gefäßformen. Daneben treten jedoch auch neuere Typen auf. Schalen weisen nun häufig eine Kehle außen unterhalb des Randes auf (Abb. 3:8-9), ebenfalls typisch ist das Auftreten von facettierten Rändern an Schalen und Töpfen (Abb. 3:10-12). Diese facettierten Ränder finden sich häufig zusammen mit roter Bemalung bei der feinen beigefarbenen Ware (Abb. 5:4-6). Die Motive der Bemalung beschränken sich auf rein geometrische Motive wie Strichgruppen, Zickzacklinien und - besonders charakteristisch - punktgefüllte Dreiecke (Abb. 5:4-9; 9; 10).

Ritz- und Einstichverzierung ist bei der groben reduziert gebrannten Ware belegt, tritt aber insgesamt sehr selten auf (Abb. 4: 6+8). Häufiger finden sich an Töpfen der Grobware Hufeisenhenkel (Abb. 4:3; 11) sowie runde oder dreieckige Knubben (Abb. 4:4-5; 11). Eine häufig anzutreffende Gefäßform, die sich aber bisher einer überzeugenden funktionalen Deutung entzieht, ist der Siebtrichter (Abb. 5:2-3; 12). Diese Siebtrichter weisen an einem Ende eine breite, an dem anderen eine schmale Öffnung auf, die Wandung ist mit vor dem Brand eingestochenen Löchern versehen. Die Gefäße sind schlecht gebrannt, unsorgfältig bis kaum geglättet und weisen fast immer sekundäre Brandspuren auf.

Keramik der mittleren Eisenzeit

Der Beginn der mittleren Eisenzeit ist durch spürbare Veränderungen im Keramikrepertoire markiert. Die rote Bemalung verschwindet ganz, statt dessen taucht eine matte dunkle Bemalung auf, meist in braun, schwarzbraun oder violettbraun gehalten, nur selten ist sie tiefschwarz. Auch im Formenspektrum sind deutliche Veränderungen zu erkennen. Die für die späteren Phasen der frühen Eisenzeit typischen facettierten Ränder und Henkel verschwinden fast ganz. Dennoch setzen sich einige auffällige Elemente von der frühen in die mittlere Eisenzeit fort. Dazu gehören z. B. die Hufeisenhenkel (Abb. 6:9), sowie bei der Bemalung die Verzierung von Schalenrändern mit Strichgruppen (Abb. 6:1).

Die Büyükkaya-Stufe:

Bereits in den 50er Jahren bemerkte K. Bittel (1953, 50; 1955, 24), daß die auf Büyükkaya zutage kommende eisenzeitliche Keramik wohl früher als Büyükkale II anzusetzen wäre. Auch wenn diese Büyükkaya-Stufe niemals genauer definiert wurde, bestätigen die neueren Grabungen doch Bittels Vermutung. Auf dem unteren und mittleren Plateau des Büyükkaya wurde eine substantiellere Besiedlung freigelegt, die sich der Büyükkaya-Stufe zuweisen läßt.

Neben reduzierend gebrannter Küchenware dominiert vor allem die feinere beigefarbene bis hellbraune Keramik. Die Keramik ist durchgehend handgemacht. Ein überraschend großer Prozentsatz dieser feineren Keramik weist die dunkle, matte Bemalung auf. Bei Schalen beschränkt sich die Dekoration auf den Rand, bei geschlossenen Gefäßen auf Rand, Hals und Schulter. Typische Motive sind Linien und Linienbündel, Girlanden und kreuzschraffierte Dreiecke (Abb. 6:1-8; 7:1+3; 13).

Schalen weisen in der Regel zwei typische Formen auf: der Rand ist entweder innen verdickt (Abb. 6:2-3), oder schwingt weit nach außen aus (Abb. 6:4-5). Bei geschlossenen Formen überwiegen Töpfe und Krüge, diese haben immer einen Flachboden und meist einfach ausbiegende, seltener verdickte Ränder. Kochtöpfe weisen häufig Knubben auf der Schulter auf (Abb. 6:10).

Die Büyükkale-II-Stufe:

Zusätzlich zu dem frühen Material wurde aber auch Keramik angetroffen, die eindeutig der Büyükkale-II-Stufe zuzuweisen ist. Diese Keramik konzentriert sich auf dem oberen Plateau, findet sich aber auch in oberflächennahen Schichten auf dem mittleren und unteren Plateau. Die Büyükkale-II-Siedlung auf dem oberen Plateau weist einen Brandhorizont auf, der mit reichem *in situ* gefundenen Keramikinventar einen günstigen Ausgangspunkt für die Charakterisierung der Büyükkale-II-Keramik bietet (Seeher 1999, 326).

Die Keramik ist meistens noch handgemacht, daneben treten aber schon vereinzelt scheibengedrehte Stücke auf. Auffallend ist, daß ein Großteil der Form- und Dekorationselemente der Büyükkaya-Stufe weiterhin gut vertreten sind. Zu dieser traditionellen „Grundausstattung" kommen aber zahlreiche neue Elemente hinzu. Dies betrifft vor allem die Dekoration: bei der monochromen matten Bemalung treten neue Motive auf, so Kreisaugen, Radmotive und Tiere, vor allem Wildziegen und Hirsche, seltener Vögel,

auch Fische sind belegt (Abb. 7:4-7; 14). Vor allem die Keramik mit Tierdarstellungen ist mehrfach behandelt worden[4], und dementsprechend leider auch unter verschiedenen Namen bekannt (Alişar IV-Stil, Tierstil, Silhouettenstil, frühphrygischer Stil). Neben den üblichen, sehr elegant wirkenden Darstellungen des eigentlichen Tierstils sind vom Büyükkaya auch mehrere sehr ungelenk wirkende Tierdarstellungen bekannt (Abb. 14: oben rechts; 15). Derzeit ist noch unklar, ob es sich dabei um Vorläufer des eigentlichen Tierstils, regionale Besonderheiten oder einfach nur die Werke weniger begabter Maler handelt. Neu tritt auch mehrfarbige Bemalung auf: zu dem dunklen Farbton gesellt sich nun häufiger rote Bemalung (Abb. 8:7-10; 16).

Auch neue Formtypen treten auf, so große Kratere mit Deckelauflage am Rand (Abb. 8:4-6). Schließlich wird das Spektrum der Büyükkale-II-Keramik durch neue Waren bereichert. Graue Ware tritt nur in wenigen Beispielen, meist kleinen Gefäßen wie Schalen oder kleinen Töpfen auf (Abb. 8:11). Ebenfalls selten ist eine sehr feine, weißtonige Keramik, auch diese nur in wenigen Beispielen belegt. Die geringe Zahl der Funde dieser Waren legt den Gedanken an Importe nahe, dies ließe sich am sichersten durch petrographische Analysen nachweisen.[5]

Zur Datierung der eisenzeitlichen Besiedlung des Büyükkaya

Die Keramikchronologie für die Eisenzeit Zentralanatoliens steht derzeit noch auf sehr unsicheren Füßen. Da die Grabungen auf dem Büyükkaya für die Eisenzeit keinerlei Importfunde erbrachten, sind demnach kaum neuere Ergebnisse zur absoluten Datierung zu erwarten. Lediglich einige Überlegungen zur Dauer der eisenzeitlichen Besiedlung des Büyükkaya sollen hier angestellt werden (Abb. 1).

Die deutlich erkennbaren hethitischen Traditionen in der frühesten Phase der Früheisenzeit zeigen, daß nach dem Ende des hethitischen Großreiches nicht mit einer längeren Unterbrechung der Besiedlung zu rechnen ist. Als Datum für das Ende des hethitischen Großreiches wird heute allgemein der Zeitraum um oder kurz nach 1200 v. Chr. angenommen (Hoffner 1992, 49; Sürenhagen 1996, 289). Während sich somit der Beginn der früheisenzeitlichen Besiedlung einigermaßen sicher angeben läßt, besteht für deren Ende noch keine endgültige Klarheit. Allenfalls über die Datierung der mittleren Eisenzeit läßt sich das Ende der frühen Eisenzeit ungefähr bestimmen. Traditionell wird der Beginn der mattbemalten Keramik, durch welche die mittlere Eisenzeit charakterisiert wird, in das 8. Jh. v. Chr. datiert (Akurgal 1955, 24). Allerdings setzte Akurgal die Keramik der Büyükkale-II-Stufe an den Anfang seiner stilistischen Entwicklung. Bittel (1955, 24) vermutete somit zu Recht, daß die zeitlich frühere mattbemalte Keramik des Büyükkaya in das 9. Jh. v. Chr. gesetzt werden könnte. Nach dem derzeitigen Kenntnisstand kann für die Büyükkale-II-Stufe ein Beginn im 8. Jh. v. Chr. als gesichert angesehen werden. So datierte Bossert (1963, 69) aufgrund von griechischen Importen den Übergang von Büyükkale II zu I in die erste Hälfte des 7. Jhs. v. Chr.. Für die mehreren Bauphasen von Büyükkale II (Neve 1982, 146) kann man sicherlich einen Zeitraum von mindestens einem Jahrhundert veranschlagen. Büyükkale II fällt somit größtenteils ins 8. Jh. v. Chr. Auch in Gordion lassen sich Funde des Tierstils in das 8. Jh. v. Chr. datieren (Sams 1994, 163). Daraus folgt, daß die Büyükkaya-Stufe, für die man sicher keinen allzu kurzen Zeitraum veranschlagen darf[6], in das 9. Jh. v. Chr. gesetzt werden muß. Der Übergang von der frühen zur mittleren Eisenzeit muß demnach im frühen 9. oder sogar an der Wende vom 10. zum 9. Jh. v. Chr. angesetzt werden. Noch ist nicht geklärt, ob zwischen der frühen und der mittleren Eisenzeit ein Hiatus anzunehmen ist. Falls dies zutreffen sollte, dürfte dieser nach Ausweis der im Keramikmaterial beobachteten Kontinuitäten von nicht allzu langer Dauer gewesen sein. Die bisher vorliegenden drei C-14-Daten[7] bestätigen die hier vorgeschlagenen Datierungen in groben Zügen.

Die Büyükkale-II-Siedlung auf dem oberen Plateau des Büyükkaya scheint aber nicht die gesamte Büyükkale-II-Stufe zu umfassen. Schon ab der Mitte der Büyükkale-II-Stufe tauchen Dekorationen wie Tiere mit dunklen Konturen und heller Innenbemalung auf (Opificius 1965, 81ff.), die auf dem Büyükkaya nicht belegt sind. Die Besiedlung des Büyükkaya endet demnach spätestens in der Mitte der Büyükkale-II-Stufe.

Vergleichsfunde

Für die Keramik der ältesten früheisenzeitlichen Phase sind bislang keine Vergleichsfunde bekannt. Das Fortlaufen hethitischer Keramiktraditionen in nachhethitischer Zeit ist zwar auch aus der Schicht 1b von Kuşaklı bekannt (Müller-Karpe 1996, 79), doch sind hier die hethitischen Traditionen wesentlich stärker als auf dem Büyükkaya, auch fehlt handgemachte Keramik vollkommen.

Dagegen ist Keramik der mittleren und späten Phase der frühen Eisenzeit nicht nur aus Boğazköy selbst, sondern auch von anderen Fundorten bekannt. Handgemachte Keramik, teilweise mit roter Bemalung und facettierten Rändern wurde in Tempel 7 im Bereich der Oberstadt gefunden (Parzinger/Sanz 1992, 33ff.; Parzinger 1995). Wurde diese Keramik zunächst mangels datierbarer Parallelen in die Spätbronzezeit gesetzt, so zeigen die neuen Ergebnisse vom Büyükkaya mit aller Deutlichkeit, daß diese Keramik der frühen Eisenzeit zuzurechnen ist. Früheisenzeitliche Scherben sind auch als Streufunde auf Büyükkale und in der Unterstadt am Nordwesthang belegt. Rotbemalte Keramik fand sich weiterhin in Alaca-Höyük (Koşay 1944, Taf. V:5-6, VI:3, 7; Koşay/Akok 1973, Pl. XCIV), in Eskiyapar (Bayburtluoğlu 1979, Res. 1-7) und Çadır-Höyük (Gorny et al. 1999, 164). Weitere Fundorte wie Gordion (Sams 1994; Henrickson 1993, 1994), Kaman-Kalehöyük (Omura 1991) und Porsuk (Dupré 1983) haben ebenfalls früheisenzeitliche Keramik erbracht, doch ist das Material kaum oder gar nicht mit der früheisenzeitlichen Keramik des Büyükkaya zu vergleichen. Wie vom Büyükkaya ist auch aus Gordion dunkelpolierte, handgemachte Keramik bekannt, doch sind die Ähnlichkeiten in Form und Herstellungstechnik nur sehr allgemeiner Natur. Zudem weisen die meisten Stücke in Gordion Ritz- oder Einstichverzierung auf. Diese Verzierungsart ist in der Früheisenzeit auf dem Büyükkaya sehr selten, bei den wenigen vorhandenen Stücken (Abb. 4:6+8) wäre daher zu überlegen, ob es sich um Importe aus dem Westen, d. h. der Region um Gordion, handeln könnte. Die früheisenzeitliche Keramik aus Kaman-Kalehöyük und Porsuk ist dagegen fast ausschließlich scheibengedreht und weist häufig zweifarbige Bemalung auf, schließt sich somit an kilikische Traditionen an.

Keramik der mitteleisenzeitlichen Büyükkaya-Stufe ist außerhalb des Büyükkaya bislang noch von keinem anderen Fundort vorgelegt worden. Dagegen hat die Keramik der Büyükkale-II-Stufe mit dem Tierstil als charakteristischstem Merkmal eine weite Verbreitung, die auf jeden Fall den gesamten Bereich des Halysbogens umfaßt, und im Osten bis Malatya am Euphrat reicht. Die Keramik von Alişar, Schicht IVc und Kaman-Kalehöyük IIc ist weitestgehend identisch mit der aus Büyükkale II. Im Westen findet sich Keramik mit Tierstilverzierung auch in Gordion, wird dort allerdings klar als Import bezeichnet (Sams 1994, 163). Die graue Ware ist auf jeden Fall westlich des Halys beheimatet und breitet sich erst ab dem 8. Jh. v. Chr. weiter nach Osten aus (Summers 1994).

Wie schon oben dargelegt, finden sich hethitische Traditionen nur in der frühen Phase der Früheisenzeit, danach löst sich die eisenzeitliche Keramik in Form, Dekoration und Herstellungstechnik gänzlich von hethitischen Vorbildern. Schnabel- und Kleeblattkannen, die für die eisenzeitliche Keramik Zentralanatoliens typisch sind, finden sich fast gar nicht in der hethitischen Keramik der späten Großreichszeit (Müller-Karpe 1988, 24ff.; Parzinger/Sanz 1992, 59). Auch Bemalung ist in der Groß-

reichszeit nicht vorhanden, ebenso andere für die Eisenzeit typische Elemente wie Hufeisenhenkel, Knubbenverzierung und dunkel polierte Oberflächen. Wo also ist der Ursprung der neuen, in der Eisenzeit auftauchenden Traditionen zu suchen? Meist wurde an balkanische Vorbilder gedacht, die im Zuge der von Herodot (I.14 und I.35) erwähnten phrygischen Wanderung vom Balkan nach Anatolien gelangt seien. Dies wurde für die handgemachte, dunkelpolierte Keramik der Früheisenzeit ebenso angenommen (Sams 1992, 58ff.; 1994, 26) wie für die mattbemalte Keramik der mittleren Eisenzeit (Akurgal 1955, 27). Schon Bittel (1942, 113; 1950, 83) wandte aber mehrfach mit Recht ein, daß diese Parallelen nicht besonders überzeugend seien. Statt dessen beobachtete er (Bittel 1942, 111), daß die spätfrühbronzezeitliche Alişar-III-Ware leicht mit mitteleisenzeitlicher mattbemalter Keramik zu verwechseln sei. Früh- oder mittelbronzezeitliche Vorbilder wurden auch für die eisenzeitliche Keramik des Büyükkaya festgestellt (Seeher 1998, 236ff.). Dies gilt für Gefäßformen ebenso wie für einzelne Elemente und Dekorationsmotive. Wo sich diese alten Keramiktraditionen halten konnten, ob in ausserhethitischen Gebieten - zu denken wäre dann an die kaskäischen Siedlungsgebiete im pontischen Bereich - oder in ländlichen Bereichen des hethitischen Herrschaftsgebietes, bedarf noch weiterer Forschungen.

Interessant ist auch die Beobachtung, daß es sich der frühen Eisenzeit zu einer starken Regionalisierung der Keramikstile kommt. Während die hethitische Keramik der späten Großreichszeit von Gordion im Westen bis Malatya im Osten nahezu identisch ist, bilden sich in der frühen Eisenzeit kleinräumigere Keramikzonen. So ist die rotbemalte Keramik bislang nur im zentralen Bereich des Halysbogens vertreten. Zwischen der früheisenzeitlichen Keramik des Büyükkaya und der von Kaman-Kalehöyük gibt es keine Ähnlichkeiten, obwohl beide Fundplätze lediglich 110 km in Luftlinie voneinander entfernt liegen. Erst in der mittleren Eisenzeit nehmen die Keramikregionen wieder an Größe zu. So ist die mattbemalte Keramik im gesamten Bereich des Halysbogens vertreten, und erreicht im Westen Gordion, im Osten sogar den oberen Euphrat.

Ergebnisse

Wurde früher davon ausgegangen, daß Zentralanatolien während des „Dunklen Zeitalters" nach dem Zusammenbruch des Hethiterreiches weitgehend siedlungsleer war, so zeigen neue Befunde aus Boğazköy und von anderen Fundorten, daß in diesem Zeitraum durchaus mit festen Siedlungen zu rechnen ist (Abb. 2). Nach dem derzeitigen Kenntnisstand handelt es sich dabei - zumindest im Bereich des Halysbogens - nur um kleine dörfliche Siedlungen mit kleineren Gebäuden, häufig in Holz-Flechtwerkkonstruktion. Wie die Befunde aus Tempel 7 in der Oberstadt von Boğazköy zeigen, wurden aber auch hethitische Ruinen wiederbenutzt.

Das kurzzeitige Weiterleben von hethitischen Traditionen in der Keramik zeigt, daß ein hethitisches Bevölkerungselement zumindest vertreten war. Insgesamt zeigen die auf die Früh- und Mittelbronzezeit zurückgehenden Keramiktraditionen an, daß es sich um alteingesessene anatolische Bevölkerungselemente gehandelt haben muß. Hinweise auf eine Einwanderung aus dem Balkan finden sich im Bereich des Halysbogens nicht. Auch weiter im Westen sind balkanische Einflüsse in der Früheisenzeit archäologisch[8] kaum zu fassen - mit Ausnahme der Buckelkeramik in Troia VIIB. Über die ethnische Zusammensetzung der früheisenzeitlichen Bevölkerung innerhalb des Halysbogens während der Eisenzeit kann man derzeit nur spekulieren, doch wird man wohl mit einer hethitischen Restbevölkerung rechnen können, zu der neue Elemente wie z. B. Kaskäer dazukamen.

Die mitteleisenzeitliche Kultur im Bereich des Halysbogens wird meist als „phrygisch" bezeichnet (Akurgal 1955), auch wenn an dieser ethnischen Bezeich-

nung immer wieder Kritik geübt wurde[9]. Wie aber die Keramik zeigt, ist diese mitteleisenzeitliche Kultur aus früheisenzeitlichen Traditionen entstanden. Damit stellt sich die Frage, ob die Bezeichnung „phrygisch" für die mittlere Eisenzeit von Boğazköy gerechtfertigt ist. Die Unterschiede zwischen der weitgehend von grauen Waren geprägten Keramik im eigentlichen Phrygien und der mattbemalten Keramik im Bereich des Halysbogens wurden schon früh erkannt (Bittel 1942, 115; Mellink 1965, 324). Die mattbemalte Keramik ist darüber hinaus auch in den späthethitisch geprägten Bereichen südlich und südöstlich des Halys in größerer Menge vertreten, kann schon allein deswegen nicht als unzweifelhaft phrygisch bezeichnet werden.

Klare phrygische Einflüsse lassen sich in Boğazköy erst im späten 8. Jh. v. Chr. mit dem Auftreten von phrygischen Inschriften fassen (Mellink 1965, 320; 1993). Möglicherweise kann man auch die um diese Zeit auftauchende graue Keramik wachsendem phrygischem Einfluß im Bereich des Halysbogens zuschreiben (Summers 1994). Daß das Gebiet innerhalb des Halysbogens gegen Ende des 8. Jhs. v. Chr. unter phrygischer Herrschaft stand, ist sehr wahrscheinlich. Dies sagt allerdings noch nichts über die ethnische Zugehörigkeit der eigentlichen Bevölkerung aus. In Anbetracht der bestehenden Unsicherheiten sollte man daher auf ethnische Bezeichnungen verzichten und eine möglichst neutrale Terminologie verwenden. Aus diesem Grund wurde hier der Begriff „mittlere Eisenzeit" gewählt.

Es muß aber betont werden, daß Keramik allein nicht ausreicht, um die historisch-politischen Ereignisse der frühen und mittleren Eisenzeit Zentralanatoliens nachzuvollziehen. Hier müssen weitere Quellen herangezogen werden, auch ist das archäologische Bild für die frühe Eisenzeit noch zu lückenhaft, um endgültigere Aussagen zu ermöglichen. Dennoch werfen die Ergebnisse der Ausgrabungen auf dem Büyükkaya in Boğazköy neues Licht auf eine bislang wenig bekannte Epoche der anatolischen Frühgeschichte und erlauben es dadurch, neue Theorien zur Genese der eisenzeitlichen Kulturen Zentralanatoliens zu formulieren.

Anhang: Keramikbeschreibungen zu Abbildungen 3-8:

3.1 352/420.483.3: Schale, beigefarbener Ton, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige.
3.2 352/420.468.2: Schale, beigefarbener Ton, feine mineralische Magerung, scheibengedreht, Oberfläche außen und innen geglättet, beige.
3.3 353/420.288.20: Schale, rötlich-brauner Ton, mittelfeine mineralische Magerung, scheibengedreht, Oberfläche außen und innen geglättet, rötlich-braun.
3.4 352/420.483.1: halsloser Topf, schwarzbrauner Ton, grobe mineralische Magerung, handgemacht, Oberfläche außen und innen unbehandelt, schwarz.
3.5 353/420.302.1: halsloser Topf, brauner Ton, grobe mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, braun.
3.6 352/420.514.2: Topf, brauner Ton, mittelfeine mineralische Magerung, scheibengedreht, Oberfläche außen geglättet, innen unbehandelt, braun.
3.7 352/420.375.9: Krug, brauner Ton, mittelfeine mineralische Magerung, scheibengedreht, Oberfläche außen und innen streifig geglättet, braun.
3.8 352/420.208.11: Schale, beigefarbener Ton, feine mineralische Magerung, handgemacht, Oberfläche außen und innen poliert, beige.
3.9 352/420.208.9: Schale, beigefarbener Ton, feine mineralische Magerung, handgemacht, Oberfläche außen poliert, graubraun, Oberfläche innen poliert, beige.
3.10 352/420.113.3: Schale, brauner Ton, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, braun.
3.11 352/420.414.1: Schale, beigefarbener Ton, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige.
3.12 352-3/420-1.272.62: halsloser Topf, brauner Ton mit schwarzem Kern, grobe mineralische Magerung, handgemacht, Oberfläche außen geglättet, schwarz, Oberfläche innen unbehandelt, braun.
4.1 352/420.325.25: halsloser Topf, rötlich-brauner Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen unbehandelt, graubraun, Oberfläche innen unbehandelt, rötlich-braun.
4.2 352/420.352.17: Topf, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige, Oberfläche innen unbehandelt, beige.
4.3 353/420.78.67: halsloser Topf, brauner Ton, grobe mineralische Magerung, handgemacht, Oberfläche außen geglättet, braun bis schwarz, Oberfläche innen geglättet, braun.
4.4 353/421.33.8: Topf, brauner Ton mit grauem Kern, grobe mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, braun.
4.5 352/420.246.85: Topf, beigefarbener Ton mit grauem Kern, grobe mineralische Magerung, handgemacht, Oberfläche außen und innen unbehandelt, beige.
4.6 352/420.411.12: Topf, brauner Ton mit schwarzem Kern, grobe mineralische Magerung, handgemacht, Oberfläche außen geglättet mit Einstichverzierung, schwarzbraun, Oberfläche innen geglättet, braun.
4.7 353/421.74.93: Krug, hellroter Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, rötlich-braun, Oberfläche innen unbehandelt, hellrot.
4.8 352/421.207.1: Krug, graubrauner Ton mit schwarzem Kern, grobe mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet mit Ritz- und Einstichverzierung, schwarzgrau.

5.1 353/420.256.5: Kanne, beigefarbener Ton, feine mineralische Magerung, scheibengedreht, Oberfläche außen geglättet, beige, Oberfläche innen unbehandelt, beige.
5.2 352/420.382.37: Siebtrichter, beigefarbener Ton mit schwarzem Kern, grobe mineralische Magerung, handgemacht, Oberfläche außen und innen unbehandelt, beige.
5.3 352/420.251.4: Siebtrichter, brauner Ton mit grauem Kern, grobe mineralische Magerung, handgemacht, Oberfläche außen und innen unbehandelt, braun.
5.4 352/420.330.57: Schale, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige, rote Bemalung.
5.5 353/420.113.97: Schale, brauner Ton, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige, rote Bemalung.
5.6 353/420.78.100: halsloser Topf, rötlich-brauner Ton, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige, rote Bemalung.
5.7 352/420.113.7: Topf, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit roter Bemalung, Oberfläche innen unbehandelt, beige.
5.8 352/420.328.1: Kanne, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit roter Bemalung, Oberfläche innen unbehandelt, beige.
5.9 352/420.221.80: Kanne, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit roter Bemalung, Oberfläche innen unbehandelt, beige.
6.1 356/431.51.1: Schale, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige, braune Bemalung.
6.2 350/427.54.2: Schale, rötlich-brauner Ton mit graubraunem Kern, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige, braune Bemalung.
6.3 352-3/420-1.40.23: Schale, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige, braune Bemalung.
6.4 354/430.34.15: Schale, rötlich-brauner Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige, Oberfläche innen geglättet, rötlich-braun mit schwarzer Bemalung.
6.5 354/430.133.1: Schale, rötlich-brauner Ton, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige, schwarze Bemalung.
6.6 354/430.54.12: Topf, rötlich-brauner Ton, feine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit brauner Bemalung, Oberfläche innen unbehandelt, beige.
6.7 353/420.78.216: Topf, beigefarbener Ton, feine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit schwarzer Bemalung, Oberfläche innen unbehandelt, beige.
6.8 355/430.176.4: Topf, beigefarbener Ton, feine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit brauner Bemalung, Oberfläche innen unbehandelt, beige.
6.9 353/420.106.1: Topf, brauner Ton mit schwarzem Kern, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, braun bis schwarz, Oberfläche innen unbehandelt, braun bis schwarz.
6.10 354/430.180.3: Topf, brauner Ton mit schwarzem Kern, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, braun bis schwarz, Oberfläche innen unbehandelt, schwarzbraun.
7.1 356/431.87.9: Topf, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige bis graubraun mit brauner Bemalung, Oberfläche innen unbehandelt, beige bis graubraun.
7.2 352/427-8.78.1: Krug, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige, Oberfläche innen unbehandelt, beige.
7.3 346-7/415.846.1: Kanne, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit brauner Bemalung, Oberfläche innen unbehandelt, beige.
7.4 347/414.399.5: Schale, beigefarbener Ton mit grauem Kern, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige, Oberfläche innen geglättet, beige, schwarzbraune Bemalung.
7.5 354/430.42.12: halsloser Topf, rötlich-brauner Ton, feine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit brauner Bemalung, Oberfläche innen unbehandelt, beige.
7.6 347/415.1016.2: Wandscherbe, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit brauner Bemalung, Oberfläche innen unbehandelt, beige.
7.7 346/413-4.495.11: Wandscherbe, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige mit brauner Bemalung, Oberfläche innen unbehandelt, beige.
7.8 353/421.12.1: Schale, rötlich-brauner Ton, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige, schwarzbraune Bemalung.
7.9 345/413.290.1: Schale, beigefarbener Ton, feine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige, Oberfläche innen geglättet, beige, schwarzbraune Bemalung.
8.1 347/414.665.1: Schale, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige, Oberfläche innen geglättet, beige, schwarzbraune Bemalung.
8.2 356.427.85.7: Krug, rötlich-brauner Ton, feine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige bis grau mit schwarzbrauner Bemalung, Oberfläche innen unbehandelt, braun bis schwarz.
8.3 358/426.26.2: Kanne, rötlich-brauner Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, rötlich-braun bis graubraun, Oberfläche innen unbehandelt, beige.
8.4 345/413-4.39.3: Krater, beigefarbener Ton mit graubraunem Kern, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige mit brauner Bemalung.
8.5 347/414.803.3: Krater, rötlich-brauner Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige mit schwarzbrauner Bemalung.
8.6 346/414.43.15: Krater, rötlich-brauner Ton mit grauem Kern, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, graubeige mit brauner Bemalung, Oberfläche innen geglättet, rötlich-braun.
8.7 350/426-7.61.1: Schale, rötlich-brauner Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, schwarzgrau, Oberfläche innen geglättet, rötlich-braun mit roter und brauner Bemalung.
8.8 355/430.43.4: Schale, beigefarbener Ton, mittelfeine mineralische Magerung, handgemacht, Oberfläche außen geglättet, beige, Oberfläche innen geglättet, beige mit roter und brauner Bemalung.
8.9 347/413.161.6: Krug, beigefarbener Ton mit graubraunem Kern, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige mit roter und brauner Bemalung.
8.10 351/427-8.14.6: Topf, beigefarbener Ton, feine mineralische Magerung, handgemacht, Oberfläche außen und innen geglättet, beige mit roter und brauner Bemalung.
8.11 345/413.109.4: Topf, grauer Ton, feine mineralische Magerung, scheibengedreht, Oberfläche außen poliert, schwarzgrau, Oberfläche innen unbehandelt, grau.

NOTLAR

1. Die Endpublikation der eisenzeitlichen Keramik vom Büyükkaya wird derzeit vom Autor mit einem vom Deutschen Archäologischen Institut gewährten Forschungsstipendium für die Reihe "Boğazköy - Hattuša. Ergebnisse der Ausgrabungen" vorbereitet. Danken möchte ich Herrn Dr. J. Seeher, der mir nicht nur das Material zur Bearbeitung anvertraute, sondern mich darüber hinaus in vielfacher Hinsicht unterstützte. Bei der Materialaufnahme in den Sommern 1998 und 1999 halfen M. Brückle, B. Fischer, G. Özel und B. Ulmer. Die türkische Zusammenfassung für diesen Artikel wird Frau Dr. A. Baykal-Seeher verdankt.
2. Zur sog. phrygischen Keramik aus Boğazköy siehe Bossert 1957; Opificius 1965, allgemein Akurgal 1955, Özkaya 1995.
3. Lediglich bei der quantitativen Analyse machen sich Unterschiede bemerkbar, so z. B. mit dem stärkeren Auftreten von rotbemalter Keramik in der späten Phase.
4. Akurgal 1955, Opificius 1965, Nizette-Godfroid 1978, Özkaya 1995.
5. Ein erster Satz von ca. 40 eisenzeitlichen Keramikproben aus Bogazköy wird im Rahmen des Gordion-Projektes durch L. Kealhofer und P. Grave analysiert.
6. Die Grabungen besonders auf dem unteren Plateau haben mehrfach stratigraphische Überschneidungen von Gebäuden, die der Büyükkaya-Stufe zuzuweisen sind, erbracht (Seeher 1995, 613).
7. Görsdorf in Seeher 1999; zu weiteren Daten siehe Seeher 2000 (in diesem Band).
8. Die Ergebnisse der Sprachforschung zeigen dagegen deutliche balkanische Einflüsse im Phrygischen und anderen westanatolischen Sprachen.
9. So versucht Mellink 1965, 320, die mattbemalte Keramik den Muški zuzuweisen. Damit ersetzt sie aber lediglich einen problematischen Begriff durch einen anderen.

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Periode	Boğazköy stratigraphische Bezeichnung	Datierung
Spätbronzezeit	ältere Großreichszeit (Büyükkale IV b-a)	14. Jh. v. Chr.
	jüngere Großreichszeit (BüyükkaleIII)	13. Jh. v. Chr. bis ca. 1180 v. Chr.
frühe Eisenzeit	frühe Phase	12. Jh. v. Chr.
	mittlere bis späte Phase	11.-10. Jh. v. Chr.
mittlere Eisenzeit	Büyükkaya-Stufe	9. Jh. v. Chr.
	Büyükkale IIb	8. Jh. v. Chr.
	Büyükkale IIa	bis ca. 650 v. Chr.

Abb 1: Chronologische Tabelle für Büyükkaya in der Eisenzeit

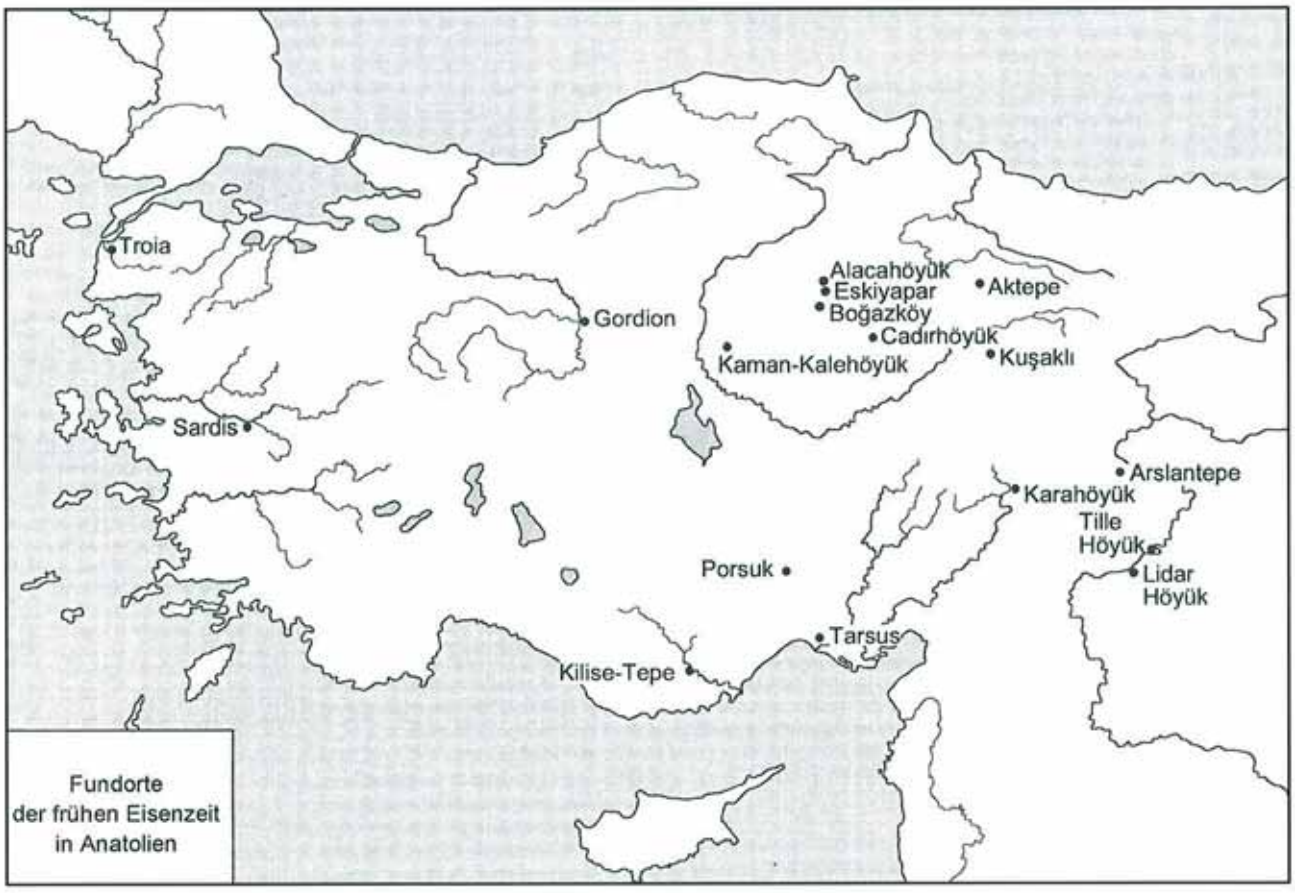

Abb 2: Karte mit früheisenzeitlichen Fundorten in Anatolien

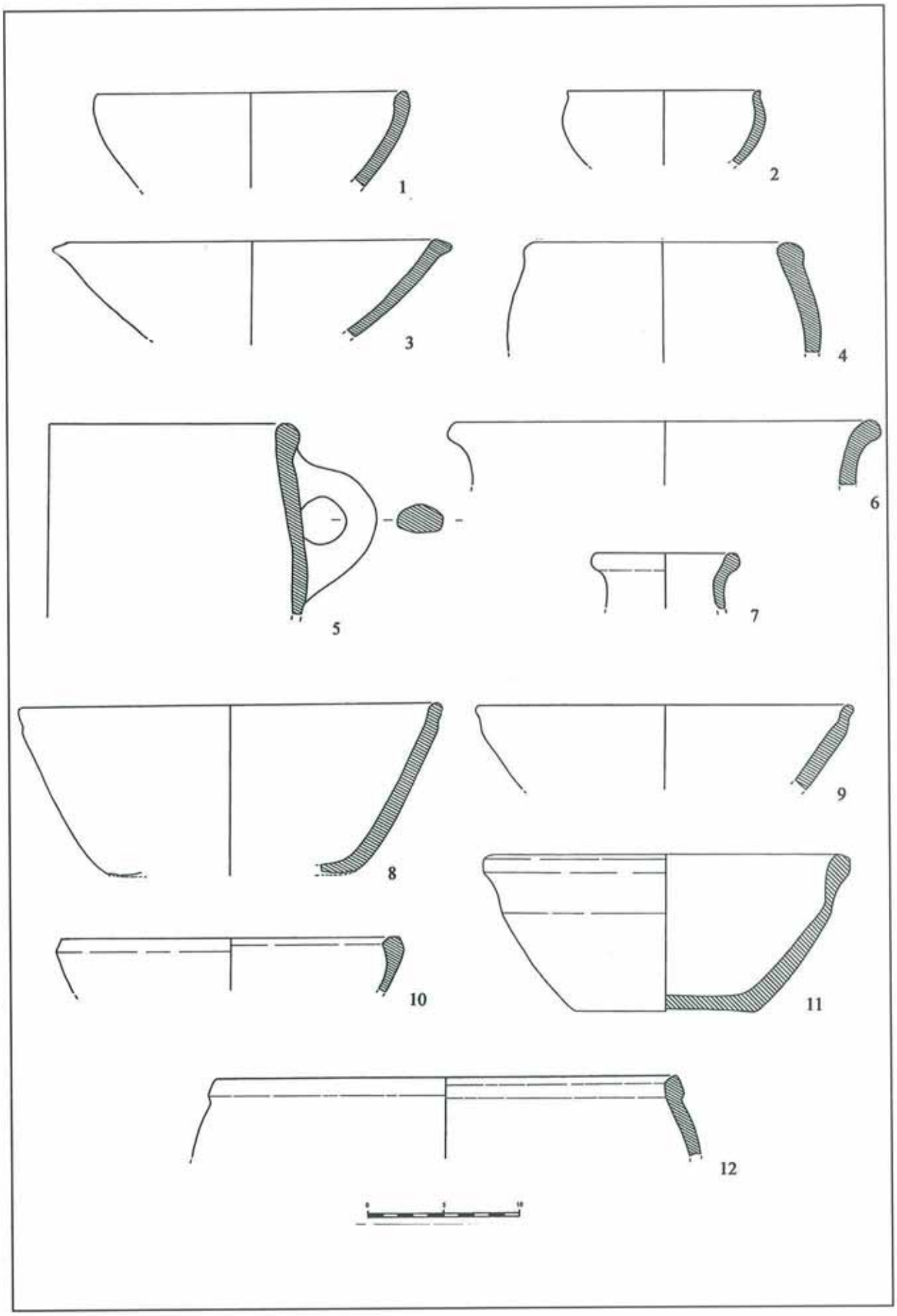

Abb 3: Keramik der frühen Eisenzeit: frühe Phase (1-7), mittlere bis späte Phase (8-12)

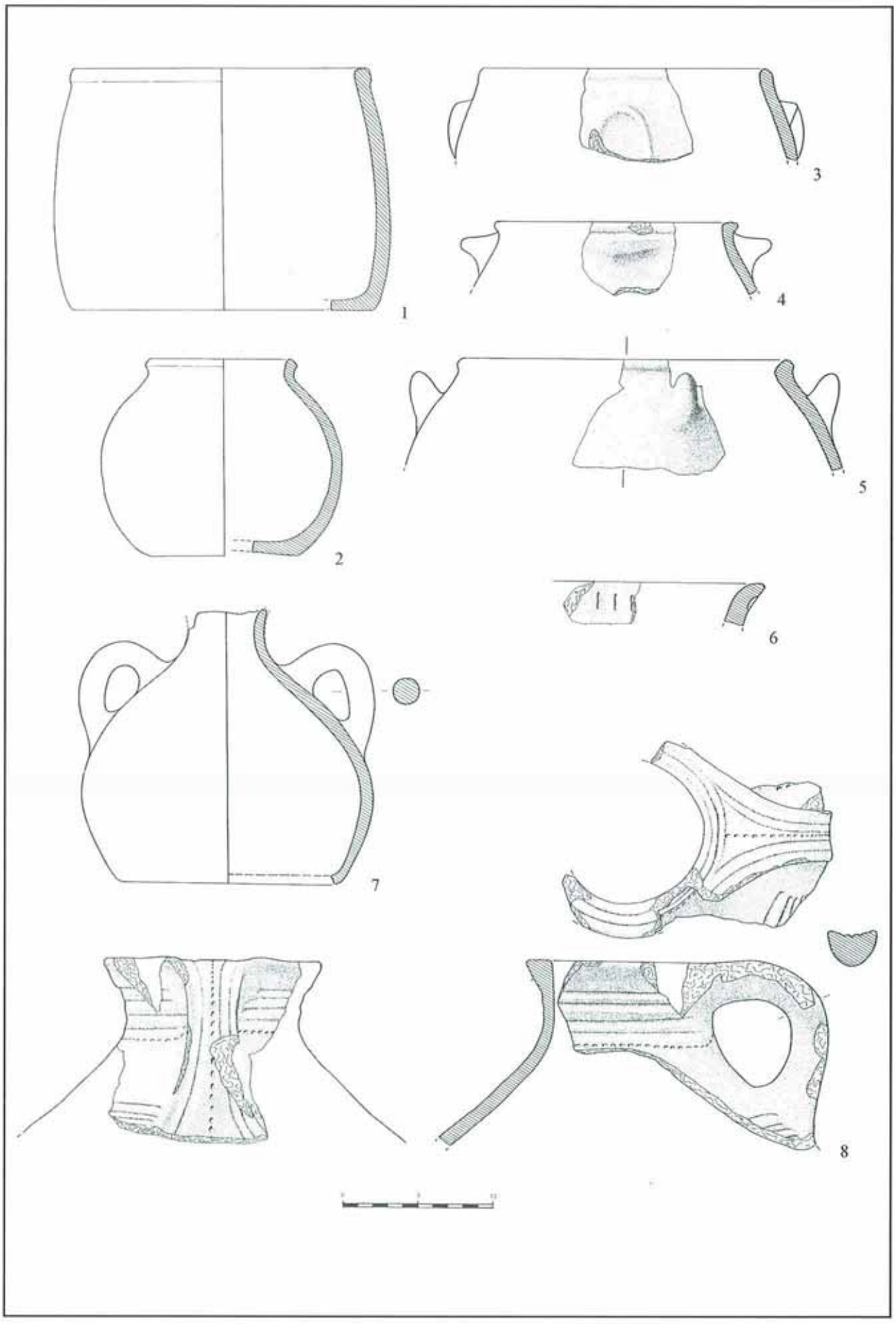

Abb 4: Keramik der frühen Eisenzeit: mittlere bis späte Phase

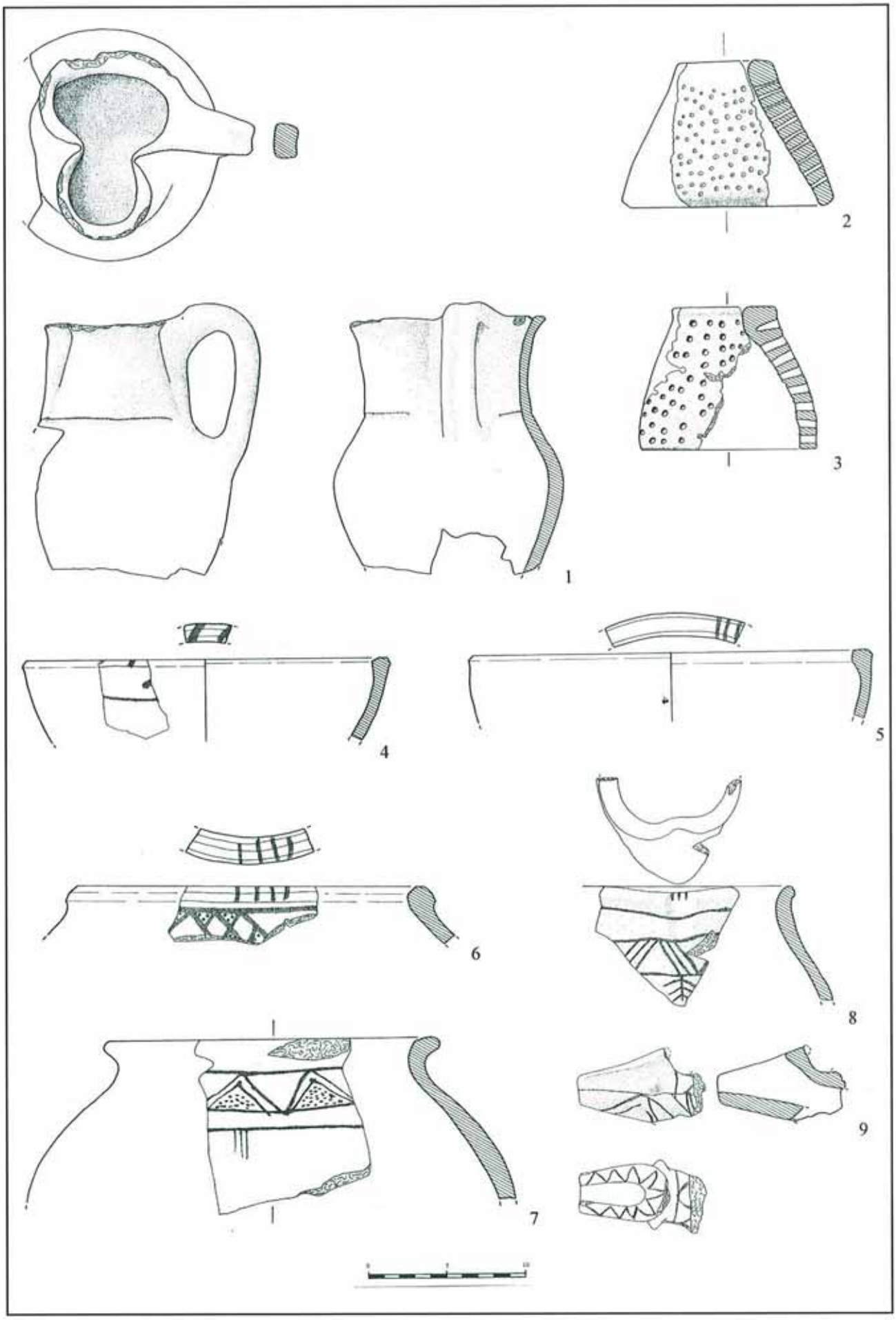

Abb 5: Keramik der frühen Eisenzeit: mittlere bis späte Phase

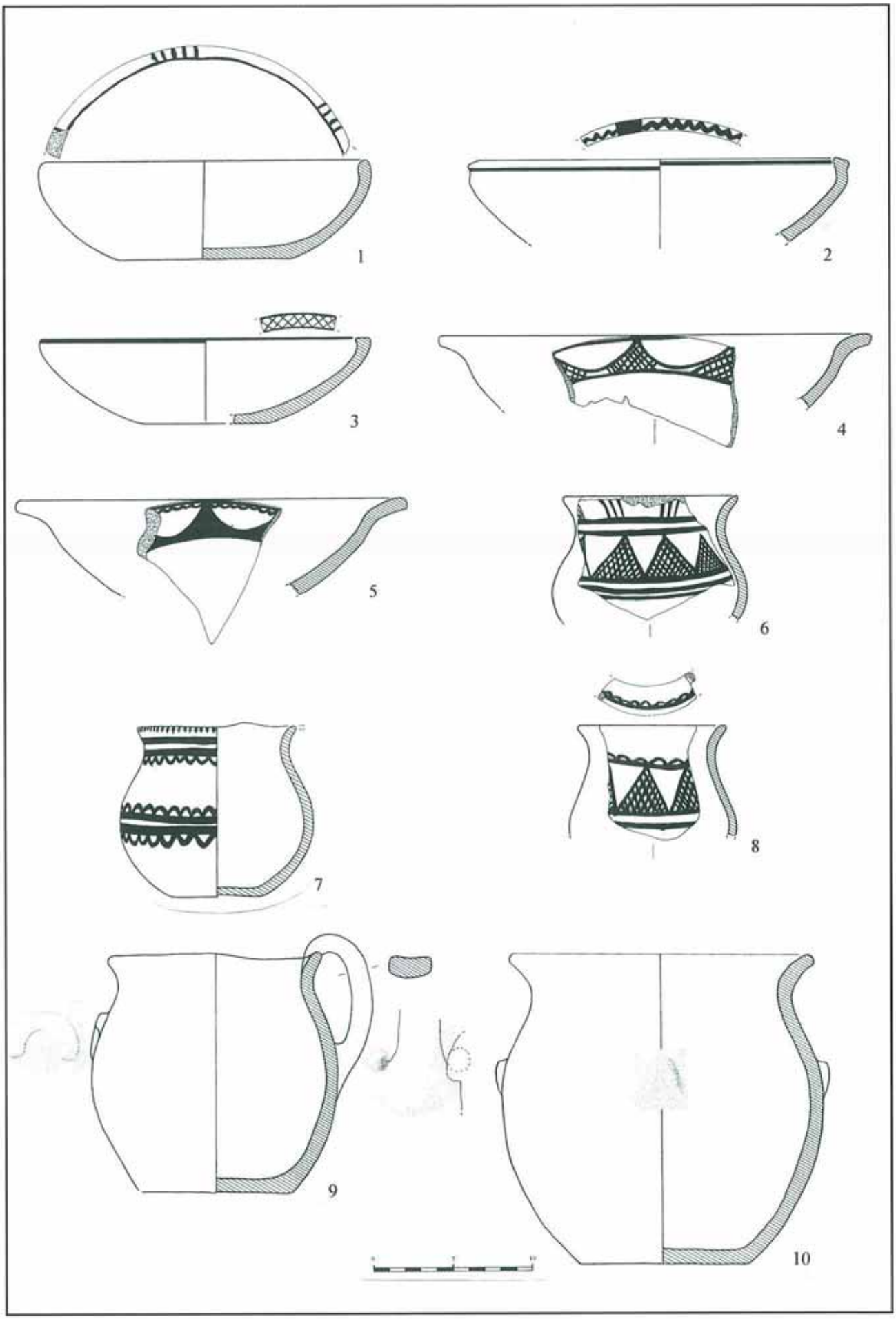

Abb 6: Keramik der mittleren Eisenzeit: Büyükkaya-Stufe

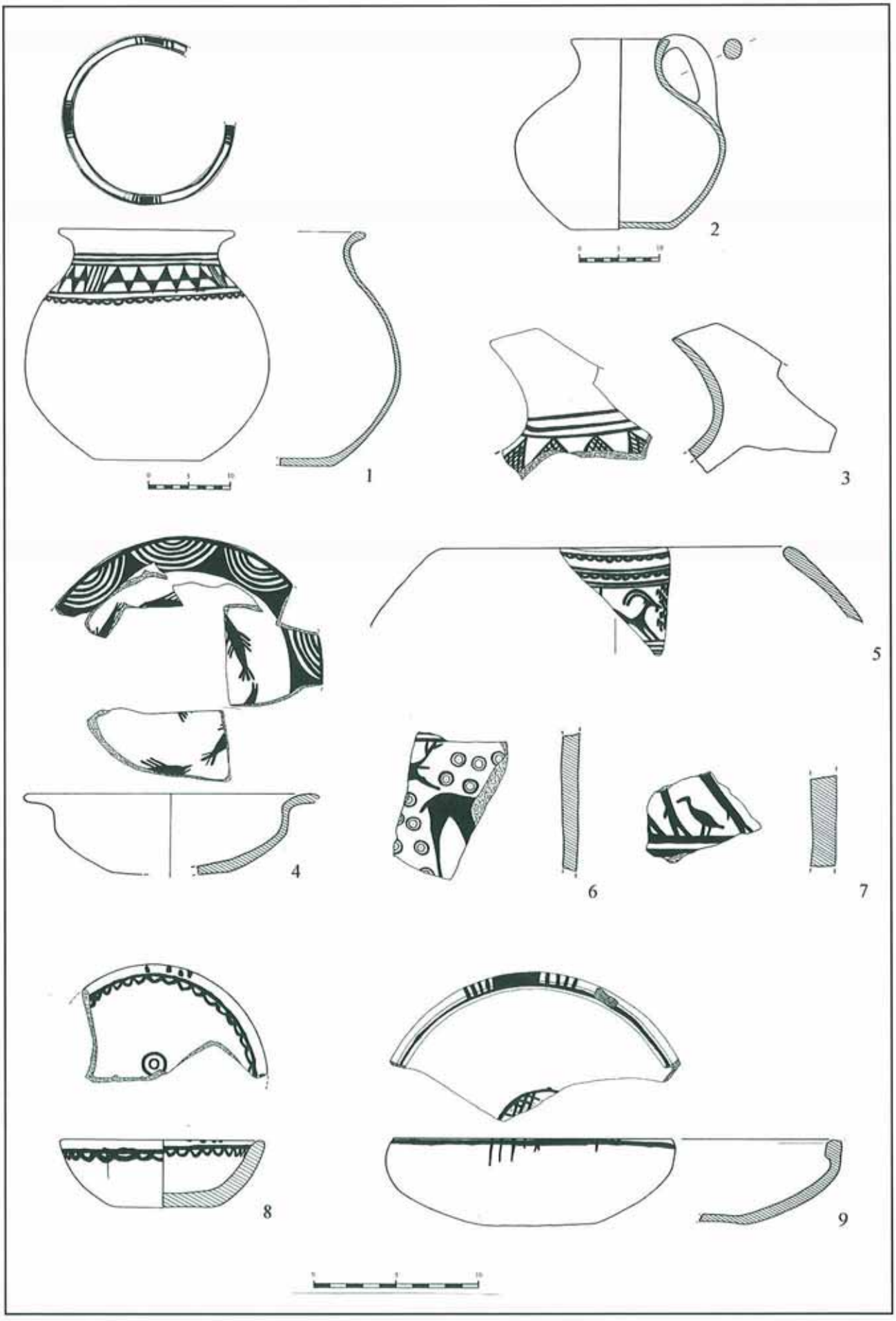

Abb 7: Keramik der mittleren Eisenzeit: Büyükkaya-Stufe (1-3), Büyükkale-II-Stufe (4-9)

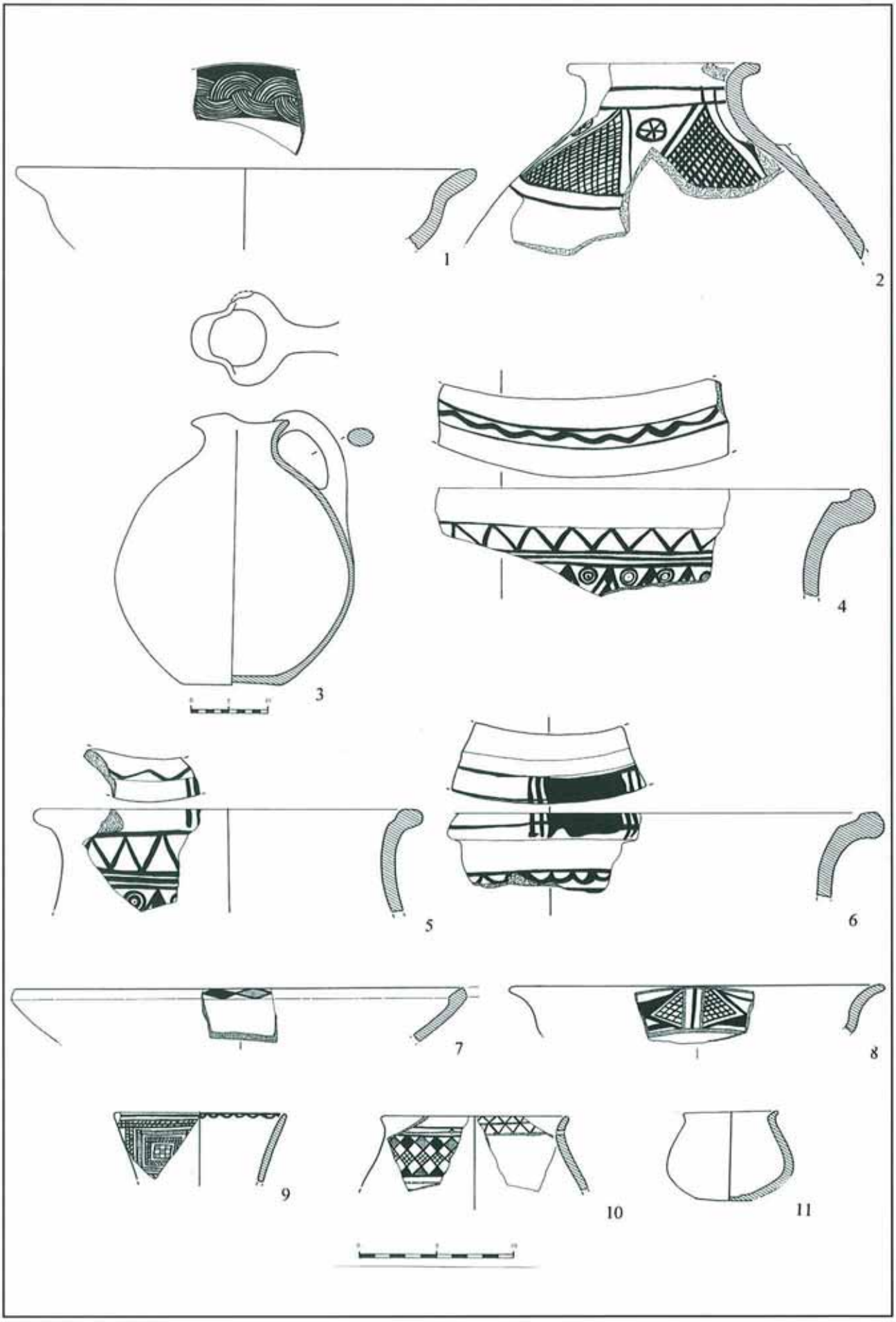

Abb 8: Keramik der mittleren Eisenzeit: Büyükkale-II-Stufe

Abb 9: Rotbemalte Keramik (Frühe Eisenzeit, mittlere bis späte Phase)

Abb 10: Rotbemalte Keramik (Frühe Eisenzeit, mittlere bis späte Phase)

Abb 11: Knubben und Hufeisenhenkel (Frühe Eisenzeit, mittlere bis späte Phase)

Abb 12: Siebtrichter (Frühe Eisenzeit, mittlere bis späte Phase)

Abb 13: Mattbemalte Keramik (Büyükkaya-Stufe)

Abb 14: Tierstil (Büyükkale-II-Stufe)

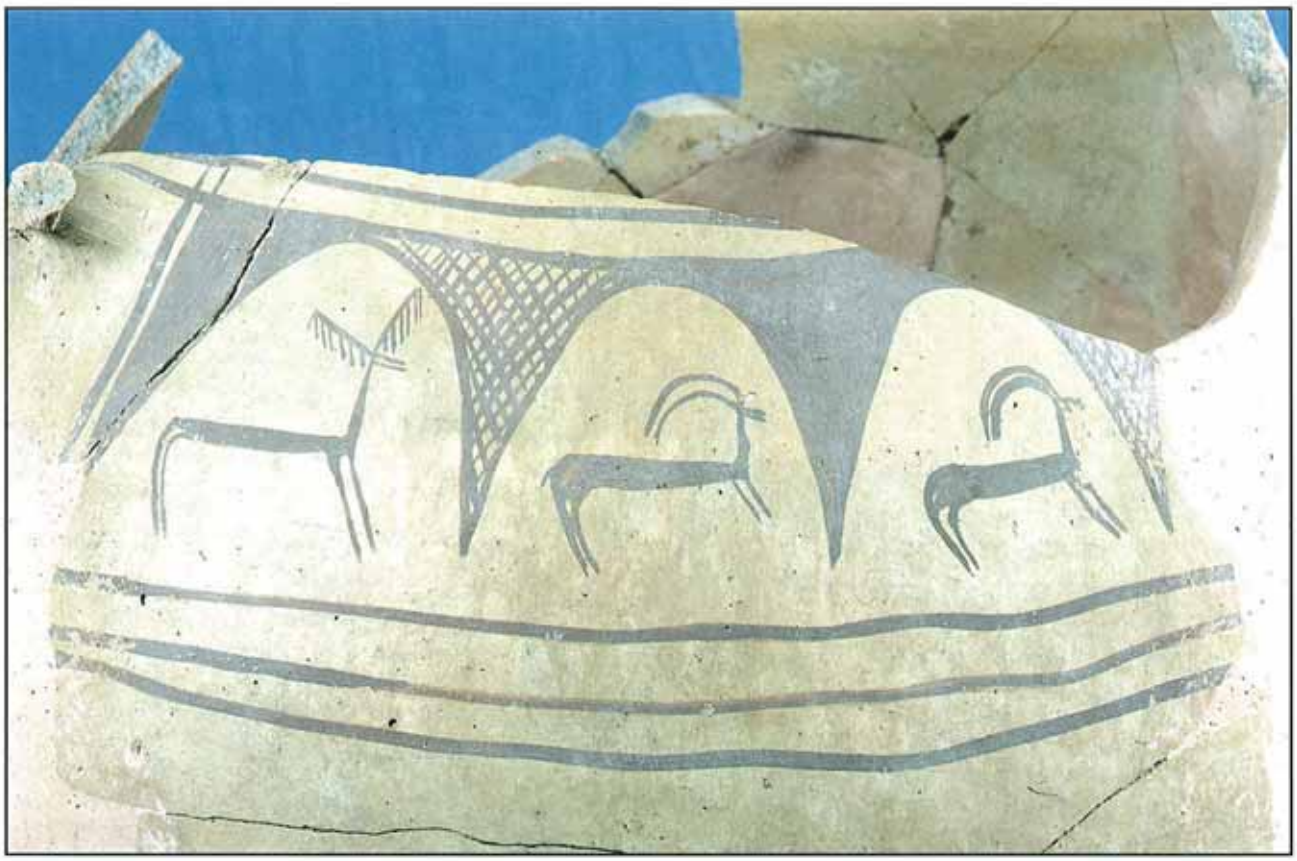

Abb 15: Krater (356/431.26.1) mit Tiermotiven (Büyükkale-II-Stufe)

Abb 16: Zweifarbig bemalte Keramik (Büyükkale-II-Stufe)

Systematic Survey in Alicante, Spain. First Results

Alicante'de (İspanya) Sistematik Yüzey Araştırması. İlk Sonuçlar

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Keywords:Systematic survey,landscape,dynamics,Middle Palaeolithic-Bronze Age,Spain
Anahtar sözcükler:Sistematik yüzey araştırması,çevresel görünüm,itici güçler, Orta Paleolitik-Tunç Çağı,İspanya

Avrupa'nın Akdeniz bölgesi arkeolojisi için yerleşme dışında gerçekleştirilen sistematik ve yoğun yüzey araştırması pek olağan değildir. Bu yazı bu tür uygulamayla ilgili bazı yöntemsel ve kronolojik sorunlarla birlikte ***Les Valls d'Alcoi*** *(Alicante, İspanya) yöresinde gerçekleştirilen yüzey araştırmasının ilk sonuçlarını tartışmaktadır.*

It is well known that information obtained from systematic and intensive survey, which uses an "off-site" strategy, is useful to any research studying human activity at a regional level (Dunnell, Dancey, 1983). However, data from this method face difficulties and shortcomings derived from two basic conditions:

- The amount and the extent of changes in the landscape due to both human (farming) and natural (erosion - redeposition) forces.
- The lack of stratified sites to help organize surface collections (especially the prehistoric ones) in to a chronological framework.

- While the first conditions tends to challenge conclusions that about the use of space, as the observed patterns might derive to a large extent from postdepositional processes, the second one raises the harsh problem of reliable assigning the observed patterns to particular chronological age. The difficulty inherent in this process gradually increases as we move back in the prehistoric calendar, and it seems that "invisibility" and chronological uncertainty are the unfortunate causes.

These difficulties may have had an influence on the planning and development of projects based on systematic and intensive survey (Cherry et al. 1991) that are nonexistent in Spain, where independently of the methodology being used, survey has been aimed at locating settlements (Ruiz Zapatero, 1988).

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A systematic survey project in the littoral valleys in the south central Valencian region of *L'Alcoià* and *El Comtat* (Alicante, Spain) began in 1987 and was coordinated by one of us (J. Bernabeu). The project was redesigned later, given the initial interest that was generated from findings and the need to study several methodological problems in greater depth, and M.C. Barton and J.E. Aura joined the coordinating team. In its final design, the survey encompassed five environments located in the region known as *Les Valls de l'Alcoi* or *Serpis*: the valley of *Polop* (headwaters of the *Alcoi*, ca. 750m above sea level), *Penàguila* (headwaters of the *Alcoi*, ca. 550m above sea level), middle *Serpis* (ca 450m above sea level), lower *Serpis* (*Lorcha*: ca 350m above sea level), and the *Vall d'Alcalà* (ca. 600m above sea level), which is nearer the coast (Figure 1). The central objective of the project was to find out the effects of the neolithization process on the territory, but, given the wide chronological range of the collections, the objective soon became limited.

In this paper, we present the first finds from the analyses of the collections of *Polop* and *Penàguila*, focusing on those prehistoric collections from the Middle Paleolithic to the Bronze Age.

1. Geographical Aspects

The valley of the upper *Polop* and the region of *Benifallim-Penàguila* are located within the geographical unit known as *Les Valls de l'Alcoi*, on the inland of Alicante. It consists of a series of small valleys that converge in a depression, the basin of *Buñol* which originated from a fault, where the *Alcoi* or *Serpis* river flows. Both the valley of *Polop* and the valley of *Penàguila* belong to that series of valleys.

The valley of *Polop* belongs to the headwaters of the *Alcoi* or *Serpis* river, and is located about 6km SW of the city of Alcoi (Fig. 2A). The average altitude ranges from 700m to 900m above sea level. It runs from SW to NE, and in the SE is surrounded by the *Sierra del Carrascal* -about 1300m- and in the NW by the *Lloma de la Fontfreda*, which has a maximum altitude of 1100m.

The valley formed a closed drainage system in the late Tertiary or the early Quaternary, and the stagnant waters in it formed a thick sequence of marls. At some point, the drainage of the lakes and the fluvial erosion left one or several high banks in the marls along the river. The main drainage at that time was in the north side, and exited along the present course of the river *Barxell* (Ferrer, Fumanal , Guitart, 1993; La Roca, 1991).

Following this initial episode of incision, the valley seems to have undergone a significant degradation. However, out wash aprons which developed in several sites and marls were covered by thick land deposits. Possibly, the deposition was not episodic but cyclical, and diverse along the valley. Throughout the survey, some objects probably belonging to a Paleolithic chronology were found 2m beneath the present surface, as part of these sediments. The reddish and well developed $CaCo_3$ horizons of these land series may represent a long period of stability in the surface, with standing other processes of erosion. A more detailed research would possibly subdivide this Pleistocene filler of the valley floor.

This sequence which cuts and fills, is found in the central part of the valley as early as the late or post-Pleistocene period. Floors developed in this sediment are less reddish and contain a tiny proportion of CaCo3. On the basis of stratigraphy, the development of floor and the association of artifacts, it seems that these sediments date to the end of the Pleistocene, and the development of floor to the Early or Middle Holocene.

Sometime during the deposition of the Pleistocene series and their subsequent displacement, the drainage system of the valley changed significantly. Primary drainage moved from the North to the South of

the valley, probably because of the capture of the river *Barxell* by the river *Polop* and its main tributary, the *Barranc del Troncal*. For the time being, an accurate chronology and reason for this change are not well understood. However, the contemporary or oldest incision of the upper course of the river *Serpis* -the streams of the upper *Polop* being its tributaries- was clearly located after the occupation of the settlement of *Niuet* in the late Neolithic (Bernabeu et al. 1994). Thus, it is still possible to understand how human activities associated with farming and stockbreeding contributed to the erosive episodes.

The surveyed zone in the valley of *Penáguila* is called *Les Puntes* (Fig. 2B). It stretches in the north of the *Serra de la Carrasqueta* and the southwest of the river *Penàguila*, about 650-550m above sea level (Roselló, Bernabé, 1978). It is sorrounded by mountains everywhere, except for the Northeast: by the mentioned *Carrasqueta*, 1330 m, and its offsets in the south and in the southwest; in the south-east les Puntes is surrounded by the offsets of the *Carrasqueta* and *Aitana*, which it joins in the East; and by the *Serreta*, 1051m, in the Northwest.

In geological terms, it is a structural valley between the calcareous anticlines of the *Serreta* and the *Carrasqueta*. Given the enveloping relief around *les Puntes*, the drainage network is clearly centripetal. Gullies converge into another, or into the main collector, the river *Penàguila*, (in a 1,25km stretch, to be accurate). Various remnants of flat surfaces are still found between gullies, *Les Puntes* being a generic toponym which conveys this meaning.

The surface is deeply dissected by the drainage network, with incisions ranging from 30m to more than 70m deep (Roselló , Bernabé, 1978: 91). Surprisingly, many of these gullies are very narrow, when compared to other transverse V-profile gullies in the region; they have no terrace, except some, which have a small recent terrace near the mouth.

All of this points to a very recent network embedding age in the *Polop* valley. The hypothesis is supported by the floor quality: the most evolved floor with a "Bw" alteration horizon and its corresponding "A" horizon, is usually buried under an "A/C" horizon, ("C" being aeolian silt and gully material). Gully waters and wind, instead of eroding this paleosoil, heaped sediments on it.

The Pleistocene drainage network was probably less deep, the deepest of which was found in the sharply sloping zones next to the mountain slopes. Paleocourses are assembled there today. Some of these slightly embedded courses probably disappeared when they reached the plain, while others went on to the main collector, acting not as a barrier to displacement as they do today.

In short, it seems that both valleys have had stable surfaces since at least the end of the Plesitocene. From then on and up until the Middle Holocene, a significant disruption took place, in the incision of water courses. Farming activities, especially ploughing, besides occasional erosion, might have a removed the old sediments which were redeposited into minor gullies, their place in the stratigraphic register was lost. Only ploughing is ubiquitous, however, and we can therefore conclude that the above mentioned conditions do not decrease the possibility of finding remnants of human habitation (which may be attributed to a long sequence in both cases).

2. Regional Sequence

Archeological research in the central and southern area of Valencia, from the inland region to the coast, has traditionally been intensive. Table 1 is based on the main stratrigraphies and their datings, and the regional sequence is adapted to the demands of the project's work. Nine periods have been retained:

Middle Paleolithic (MP). Apart from evidence concerning the Middle Pleistocene coming from the *Cova de Bolomor* (Taber-

nes de Valldigna, Valencia), near the area being studied (Fernández, 1993), the earliest evidence of human habitation in the region dates back to the Middle Paleolithic, ranging from the 80.000 bp- U/th- of *Cova del Salt* (Barton ,Clark, 1993; Galvan, 1992), to the 39.000 bp- C14- of *Cova Beneito* (Iturbe et al., 1993). The sequences in the *Cova del Salt* (Alcoi, Alicante), in the valley of *Polop*, and the nearby *Cova Beneito* (Muro, Alicante), are complete for the period.

Upper Paleolithic (UP). The sequence of *Cova Beneito* documents the evolution of the Upper Paleolithic, from the Aurignacian -ca. 34.000 BP- to the Solutrean-Gravettian -ca. 16.500 BP- (Iturbe et al., 1993). Occupations were always located in caves or shelters, open-air settlements have not yet been documented.

Late Upper Paleolithic (LUP). Broadly speaking, this period matches up with the Upper Magdalenian and the beginning of the Holocene industries (ca. 14.000-10.000 BP) in the regional sequence (Aura, 1995). The percentage of backed bladelets and burins in industries is higher than 60-70%, a defining feature of this moment. The sequences of *Cendres* and *Tossal de la Roca* (Villaverde, 1995; Cacho et al., 1995) are good examples of this.

The differentiation from the *Early Mesolithic* (EM) (ca. 10.000-8.000 BP), which matches the microlaminar Epipaleolithic, is based on the structure designed by Aura and Pérez Ripoll (1995). These authors point out an increase of end-scrapers, notches and denticulates, as well as a remarkable decrease of microlaminar tools and burins in the X millennium BP. Stratified collections belonging to this period scarcely exist (*Tossal de la Roca*)

The Recent Mesolithic (RM) or Geometric Epipaleolithic (8.000-6.800 BP) is characterized by the development of geometric microliths, mainly trapezoids and triangles. This period is well documented in the valleys of Alcoi in two sequences: *Tossal de la Roca* (Cacho et al., 1995) and *La Falguera* (Barton et al., 1990), the later in the valley of *Polop*. The late periods of these industries already had ceramics, and coincide with the early signs of farming and stockbreeding in the region.

Open-air sites are scarcely known. Only very recently some new information has indicated the existence of Late Mesolithic open air settlements. Such could be the case of *El Collado* (Oliva, Alicante), located on the present coastline (Aparicio, 1990).

The Early Neolithic (EN) falls within the wider impressed ceramics cultural horizon of Western Mediterranean (Bernabeu, 1989). Cardial decoration is representative of the early stages (NIA), while epicardial decoration (non cardial incised and impressed) is representative of more recent periods (NIB). The presence of animals (sheep and goats, cows, pigs and dogs) and plants (wheat, barley, peas and lentils) is documented in most of the settlements fitting the ceramic period, though not in all of them. This discrepancy is a central point in the debate about the neolithization process of in the Iberian Peninsula (Bernabeu, 1997; Fortea et al., 1987; Zilhao, 1993; Vicent, 1997).

According to the sequences of *Cova de l'Or* (Beniarrés) and *Cova de les Cendres* (Teulada-Moraira) , the Early Neolithic chronology is between 6.800 and 5.800 BP. The levels of La Falguera, in the valley of *Polop*, belongs to these period, following the preceramic levels of the Geometric Mesolithic.

The Middle Neolithic (5.800-4.800 BP) has been identified in the stratigraphies of *Cova de les Cendres, Cova de la Falguera* and *Cova de Santa Mayra* (Castells de Castells, Alicante). Even so, the available information about this period is limited.

There is more information about the *Late Neolithic*. Recent research, including excavations of settlements and caves, provide a

wider view of deposition, living and social organization patterns of these groups (Bernabeu et al., 1993; Bernabeu et al., 1994).

The first aspect of these sites suggests an habitation in the valley watersheds. Habitat was organized in to large settlements (ca. 10-14 ha) but actually made up of widely spread domestic structures surrounded by ditches (Bernabeu et al., 1993 and 1994). The necropolis consist of collective burials in caves and shelters around the settlements.

Living is still based on farming and stockbreeding, but several changes in the exploitation of these resources can be observed. The analysis of the sacrifice patterns suggests a better use of secondary products.

Some changes pointing to a new model of settlement in the Bronze Age (3.800-3.200 BP) have been detected along the Bell Beaker (HCT: 4.200-3.800 BP). Metallurgy appears for the first time; previous settlements located in lower lands tend to disappear; individual burials in graves within the habitat appear. A restructuring of the territory into a set of hilltop or mountain-slope settlements can be made out. Inversions in the communal structure appear at this time; terraces or walls become common which imply a new type of social organization, the complexity of which is now being debated (Jover, López, 1995; Fernández, 1993).

3. Methodology

Our project was designed according to the fore mentioned objectives; we followed a strategy of survey and analysis that was not focused on settlements, but rather on stratified sampling units. Environments (*Areas*) with different characteristics were selected from all of the valleys along the river *Alcoi*. Each area was then subdivided into *Sectors* and *Subsectors*.

We used topographic maps (1:10.000 scale) to delimit sectors: gullies, tracks and roads served as the limits, but we always tried to represent the diversity of the geomorphological regions in our final results. Aerial photography (1:9.000) was used to delimit subsectors, the limits of which were forced to match up with farming terraces. Consequently, subsectors have different areas. In this way, each survey unit could be characterized by a three digit code: Area, Sector and Subsector.

3.1. Sampling system and strategy.

The existence of different environments was taken into account in designing the survey in both valleys. Thus, 4 regions were defined in *Polop*, on the basis of their situation relative to the main fluvial stream (North-South) and their altitude. These four regions were called Upper North (UN), Lower North (LN), Lower South (LS) and Upper South (US). Each of them was subdivided into sectors and subsectors, which are the smallest survey units.

Two regions were defined in the valley of *Penàguila*, on the basis of their altitude, and the following steps were the same as in the case of *Polop*. The identification of materials is simpler here: BP-2-4 means the valley of *Penàguila* (BP), *Sector* and *Subsector*. Table 2 shows the results of this design.

Several descriptive sections were included in the field card, the concerned location, geomorphological features, visibility, land-use and finds, with simply a presence/absence recording of basic categories e.g., lithics, polished stone, ceramics (handmade or wheeled) and structures.

3.2 Analysis techniques. Flint and pottery

Material remains collected during field work were carefully analysed in the laboratory, the data of which were saved in a database. The data were then statistically processed using SPSS 6.1 program. In both cases, the results were exported to MapInfo (a GIS program) for later processing.

Flint and pottery were assigned several common descriptive method: place where they were found-subsector-; material state of remains: *rodado* (smooth) for flint, and *erosionado* (eroded) for pottery; total amount of objects with identical characteristics; number of times the site has been visited.

Regarding flint, *rodado* (ROD) variable takes into account the presence of ridges -not edges- , blunt-like or not; on the other hand, the existence or absence of a edge damage have also been considered: irregular flakes in the edges and the amount of them (Mec1=no signs; Mec2; 25% edges; Mec3=>25%). In ceramics, only the first of these fields regarding the state of the surface has been taken into account (*erosionado*, EROS).

The next step in flint was the technological classification of the remains (flakes, blades, cores, etc). Morphological rather than metrical criteria have been considered in discriminating laminar products (blades and bladelets), i.e. more or less parallel edges that bear witness to their extraction from a laminar core.

Different fields (*size, cortex, heel*) give a detailed description of the categories above. *Section* (trapezoidal, triangular or irregular) and *dimensions* (if they are complete) fields are added when considering blades and bladelets.

Typological description comes after classification and technological description, once pieces with edge damage have been discriminated.

The ceramics description includes fields for the morphological classification (rim, neck, decoration) besides the already mentioned fields.

4. Taphonomy.

The variability observed in the densities of both lithics and ceramics (we are considering only prehistoric pottery here) is surprising.

One outstanding finding from *Polop* is the low frequency of ceramic objects (275 fragments) compared to lithic objects: 2676 cut lithic remains. In *Penàguila*, on the contrary, ceramic frequency (2066 evidences) are roughly equivalent to that of flint (2658 evidences). Nevertheless, standard deviations clearly show a significantly varied density in both collections. The resulting pattern is characterized by a huge dispersion of material throughout the surveyed zones (Fig. 3; Table 3).

The form and distribution of surface collections may be understood as a consequence of prehistoric activity, but the picture may also be result of other factors. This raises two questions in regards to an understanding of prehistoric behavior:

a) Is the variability of the sampling significantly influenced by the observation (collecting) condition?

Observed densities may no doubt depend on both observation condition and prehistoric activity (Nance, 1994). Some experiencies (Terranato, Ammerman, 1996) show that visibility (obscured by such things as vegetation) has a significant influence on the density of sites in a Km2. In our case, we had to redesign the analysis, as the analysis was based on a strategy of arbitrary survey units.

Some factors, (e.g. the vegetation layer, the time of the day when the survey was carried out, the seasonal effects of farming and rainfall, as well as erosion and redeposition of the geomorphological processes) played a more or less important role in the variability of the observed densities.

Some of these variables were registered during field work allowing different subsectors to be divided into three categories, according to surface visibility conditions (vegetation, farming and rainfall). Thus, a subsector with little or no surface vegetation which had been recently ploughed, and or surveyed a few days after rainfall, would ha-

ve the highest visibility; on the contrary, the barren survey units, with plentiful and tall vegetation, would have a low degree of visibility.

On the basis of these groups, and considering separately lithics and ceramics density, Student T test was done to compare the average density of each group. Analysis were done in two levels: a) subsectors with remains; b) all subsectors (table 4).

The test shows some significant differences. For instance, differences in subsectors with some remains are significant ($p<0,05$) in ceramics and among those subsectors with middle or low visibility; if all subsectors are considered, differences between those with low visibility and the rest are significant. However, a different behavior between ceramics and flint was seen: average densities of ceramics were lower between V1-V2 than between V1-V3. Consequently, the following conclusions can be drawn:

- There is not a clear connection between an increase in visibility and higher average artifact density. For such a connection to exist, there should be an increase of average density between V2 and V3, but this is not the case.
-Yet, it is obvious that those subsectors with the lowest visibility have the lowest average densities, particularly in ceramics. This is because the subsectors with no remains are more significant in this group, as Table 5 shows.

It is not easy to understand this phenomenon since the absence of remains associated with subsectors with low visibility may be a consequence of both the field condition and the actual present or absence of remains. It seems, therefore, advisable to use the information provided by subsectors with remains in the evaluation of differences in densities.

- On the basis of previous observations, we can state that the level of remain densities are only partly influenced by visibility. Other variables must have influenced our observations. Present density may have a significant bearing on, which would explain why materials are found even under low visibility conditions. Consequently, we can conclude that collecting conditions do not alter significantly the representative character of collected collections, that character being stronger, the more the low visibility subsectors are and the lower the present density of remains is. Visibility effects, then, will not distort significantly our analysis.

b) To what extent have postdepositional factors shaped the variability of our samples?

Even if our picture were to match with reality, the question as to what extent this reality matches prehistoric activities remains open. To answer this we must study not only the global structure of the sample, but also its differential distribution among the various survey units.

In order to evaluate the effects of these postdepositional factors (or at least some of them), different variables aimed at measuring the effect of these processes were quantified. Thus, variables such as Mec2, Mec3, undetermined fragments, or fractures (including flakes and fragmented blades) can be considered signs of tillage; variables such as ROD and EROS, on the other hand, seem to indicate natural processes.

Ceramic surface erosion proved useless, as most of the collected fragments, with no exception, had eroded surfaces. For this reason, we will focus exclusively on the lithic analysis (Table 6).

Processes that may have influenced the distribution and composition of surface collections were common in both valleys. For instance traditional ploughing, limited by farming terraces was one such processes. Both valleys seem to have been cultivated for thousands of years, though over varying periods of time. This activity, while uncovering buried materials, reduces the resolution of spatial distribution patterns.

Regarding this subject, the practice of making terraces seems to have had similar displacement consequences that predate the introduction of the plough. In this case, however, materials are not likely to travel long distances, and their diffusion falls quickly with time (Odell, Cowen, 1987; Cowen, Odell, 1990). Actually, experience suggest that once a given distance has been traveled, the possibility of objects either moving back or away from their original position is balanced (Ammerman, 1985).

Terracing implies moving the land from a higher level and redepositing it on lower terrace. This suggest that materials on the higher terraces should belong to buried materials, those in middle terraces, to the original surface level, and those in the lower area should be mixed. Apart from this, movement of material will always take place within the limits of the terrace. Traces of ploughing, either traditional or mechanical, will also be detected, due in part to mechanical action: such as fractured material, edge damage, and a higher level of undetermined pieces.

Erosion, and the subsequent redeposition of materials, work on a higher scale, that may have altered the original distribution of the remains through a displacement of sediments in some zones with sharp slopes. Marly soils have facilitated the movement of materials that erode and redeposit with time, though they never go long distances from their original position. It may even happen in terraced areas, if farming fields were left for a long time. Together with this phenomenon, incision of fluvial streams -a seemingly recent occurance- might have destroyed the record completely in several areas of the valley (Berbaneu et al. 1994: 10-11).

Given the homogeneity of postdepositional factors, comparing the variables from both collections (especially samples that describe the state of the collection best) is surprising.

Pieces that show a slight mechanical alteration (Mec2: ca. 60%) predominate in both collections. The proportion of undetermined fragments and those that are identifiable (flakes and blades/bladelets) is high, but diverse. As a whole, the results show a collection consistent with a surface in use from constant farming. It would be interesting to compare these results with the corresponding results of collections from settlements in order to evaluate the influence of these processes. To this end, we have begun to analyse a collection from the Neolithic settlement of *Niuet*. From its results we will be able to establish if the values observed in the categories of undetermined fragments and the identifiable fragments can be understood a result of this process itself.

The most significant differences between both collections refer to proportions in the variables Mec1 (pieces with no mechanical alteration), Mec3 (very altered), and smooth (with clear evidence of erosion in their edges). Mec3 and Smooth clearly show higher values in *Polop* than in BP. The reason of this differential behavior becomes clearer through a more detailed analysis of the distribution of smooth pieces and those which have not been altered by technological or typological categories (Fig. 4).

The distribution of rolled pieces in *Polop* indicates that they concentrate in categories thought to represent an older chronology (Levallois /discoid cores, Scrapers, end-Scrapers). The proportion of the most recent pieces (blade cores, backed tools, geometric tools, retouched blades/bladelets) are very low or do not exist at all. The situation is the same in the BP collection, though the size of the sample (50 rolled pieces) does not allow a similar detailed analysis.

Categories with no samples of mechanical action tend to concentrate on the most recent pieces in both cases. Some interesting conclusions can be drawn from these observations:

-Firstly, smooth pieces seem to be associated with their own original chronology. Size is not likely to be a variable worth considering, as the cores show: levallois, flakes and blades are nearly the same size, but they have different proportions of eroded or mechanically retouched pieces (Fig. 4, b).

- Secondly, we may assume that these pieces were originally located in sharply sloped areas and, consequently, more likely to have undergone the earlier mentioned eroding processes.

-As a consequence, when we interpret the results of land-use patterns, we must take in consideration that these pieces was found in lower levels, as part of more recent collections.

The surface collection chronology can provide additional information with which to check these assumptions.

5. Chronology of Surface Collections

As we said earlier, the difficulty in organizing a surface collections made up of prehistoric material into some kind of chronological order is possibly one of the reasons why systematic survey projects based on an off-site strategy have made little impact.

We approached this problem by devising a rank system where every subsector was given a probability of belonging to each chronological period. The rank was based on the presence/absence of particular archaeological artifacts.

5.1. Chronology, ranks, and probabilities

From the most characteristic elements, on diachronic level, we developed a chronological evaluation criterion for surface remains. Table 7 states explicitly the criteria used to assign the ranks according to periods. Once these criteria were applied, each subsector received an assigned probability of belonging to every chronological period.

We should stress that, as we move forward along the chronological scale, the resolving capacity of materials is higher, thus the highest ranks (5 and 6) have not the same defining difficulty in all the cases. A comparison of preceramic and ceramic periods for a rank =6 shows that the distinctive factor in the former is defined by the combination of various objects, as well as by the lack of other objects. In the ceramic levels , the presence of a particular remain is sometimes enough to consider the highest probability in assigning a given chronology.

On the other side, some subsectors were visited twice or three times in the intervening years as the field work was carried out. A previous analysis of the chronological ranks has shown that there may be significant differences, if all the available information (all the collected materials) is used between the original survey and the subsequent surveys. In order to minimize errors that may derive from this circumstance, we have used all the available information to assign chronological rank to each subsector; in later calculations, however, only the materials collected in the first field work were taken into account, which guarantees a uniformity in the analyzed sample.

Figure 5 shows the Total Occupied Area for each period in both valleys. Its values are the summed area (Km2) by chronological periods, considering three different degrees of probability.

Figure 5A shows the added values of ranks 3 to 6. Rank 3 is less demanding concerning presence, but as restrictive as ranks 5 and 6 concerning absences.

Figure 5B includes rank 4, whose characteristics are similar to rank 5, although less restrictive, as it demands no absences.

Figure 5C adds up ranks 5 and 6, i.e. the ranks most likely to belong to their respective chronological periods.

In spite of several variations, the essentials in both collections are kept regardless the value of the rank used to assign each subsector to a particular chronological period. The most remarkable effect of using progressively higher ranks is the reduction of the occupied area for each period, with not a significant change in the observed tendency.

By using all the rank=3 or higher implies an availability of larger samples that, however, do not have a high chronological resolution. Rank 4, which allows for the possibility that collections belong to several different periods, demands the combined presence of various items. That is why we will base our observations on subsectors with a rank>3. It means admitting that the Late Upper Paleolithic periods in both valleys, the Middle Neolithic in *Polop*, and the Late Mesolithic in *Penàguila* (BP) are not represented.

Differences between *Polop* and *Penàguila* are evident: while preceramic periods, particularly the Middle Paleolithic, in *Polop* provide the great part of the materials, these same periods are practically nonexistent in *Penàguila*, whose materials seem to be related to ceramic periods. It corroborates the first impressions after the taphonomic analysis. These impressions, however, may be deceptive. We need some quantification that associates in an unequivocal way the probability that smooth material belongs to the most ancient periods.

The **Local Density Index** (LDI) measures the density of finds that are likely to belong to a given period, i.e. according to their rank. Their values, besides being an indispensable element (see later) for the understanding of the occupation/exploitation patterns, can be used to check the assumption that rolled materials must be related, in most cases, to the oldest collections. Fig. 6 shows the correlation coefficients (Pearson's R) between the percentage of smooth material and the LDI for subsectors rank >3 within each period. The results corroborate the initial assumptions:

- The values in *Polop* are 0,8 or higher for MP, UP and bell beaker periods, but are only statistically significant ($p<0,05$ of getting similar values in a random series) for the first two periods.

In BP, this relation only appears for the Upper Paleolithic period (the Middle Paleolithic being poorly defined in BP, as we noted earlier)

The consequence is evident: research on the settlement patterns that concern the differential location of settlements can only be carried out with reference to the oldest collections (Middle Paleolithic and, to a lesser extent, Upper Paleolithic).

If, alternatively, we merely describe and interpret globally those characteristics that define the patterns of occupation/exploitation, the picture of the long term tendency will not be significantly distorted as a result of postdeposition alterations.

6. Lond-Use Dynamics: Descriptive Values

We use two related variables to describe the pattern and distribution of the surface collections: Frequency/Recurrence and Specialization/Diversification.

6.1. Frequency and Recurrence. Seize and Intensity of Occupation

While the calculation of occupational use area allows one to evaluate the importance of each chronological period to the collection as a whole, it may misleade if these values are used as the occupations **Frequency Index** (FI). We should note, for instance, that the Middle Paleolithic covers a longer period than all other periods as a whole. Consequently, if we want to get more accurate information about occupation frequency, we need an index that relates the occupied area to the temporal probability of its occupation. In our case, we divided the total extension by the number of millenia in each period, according to the following va-

lues: MP=40; UP=20; LUP=4, EM=2, LM=1,2; EN and MN=1; LN=0,6 and Bell Beaker (HCT)=0,4.

Similarly, the calculation of the occupied extension tends to minimize the actual differences between various occupation types. It is difficult to establish these types on the basis of surface collections, but material density can be used as an index to provide information about intensity (absolute values) and recurrence of occupation (repeated frequency of occupation at the same place).

This information can be obtained through the **Local Density Index** (LDI). LDI is found by multiplying the rank of a collection (subsector) by the density of its materials, differentiating between preceramic and ceramic periods. Finally, original values are transformed into Z values, so that they can be compared between different periods and to make their graphic processing on plans easier. Thus, every subsector will have two values: one reflecting the probability of belonging to a particular period (rank); the other trying to reflect the kind of occupation (LDI), which ranges from high to low density.

The **Intensive Occupation Area** is calculated from LDI values, as the sum per periods of the areas (km2) with rank >3 and LDI>1s. If, as it happens with extension, their values are measured according to the millenia each period covers, the resulting value may be understood as the **Recurrence Index** (RI) of the occupation, the higher RI, the higher LDI. This index, if combined with frequency, yields an interesting information to describe the trends in the regional occupation/exploitation.

6.2 Specialization and Diversification

Densities and their variation can also provide us with relative information regarding the degree of specialization/diversification in the exploitation of regional resources. However, it would be pretentious of us to insist that all possible activities could be understood from surface collections. Our only interest lies in having information available with which subsectors can be ordered based on their density and variation. This assumes that a set of activities, limited or large are properly reflected in the object density of subsectors.

We understand that the tendency for artifact density and artifact type variation (calculated as the Coefficient of Variation) with time reflects an increase in the kinds of activities and, consequently, an increase in the exploitation of resources. The average density and the Coefficient of Variation have been calculated from of all subsectors with a rank>3.

Differences in the exploitative specialization of resources can be considered at a spatial level. If we divide the calculation of the proportion Intensive Occupation Area and the Total Occupied Area for every period, we get a picture of the evolutionary trend (ELI: **Specialized Locational Index**). Clearly, the highest specialization will coincide with a value of 1, where all the occupied lands will have a LDI higher than 1. This value, however, must be compared with the Total Occupied Area, so that specialization can be compared with periods in which it shows lower values.

7. Land-Use Dynamics: Some Understandings

Charts in Figure 7 summarize the information about frequency/recurrence and specialization/diversification in both valleys (A, B, and C for *Polop*; D, E, F for BP). In order to compare average densities and their corresponding variation coefficients at different scales, the absolute values of the former (objects/Km^2) were divided by 10.000. The following conclusions can be drawn after the comparison:

7.1. Preceramic periods in *Polop* can be divided into two groups. In the early stages (Middle Paleolithic) a remarkable feature of

the occupation and exploitation of resources is the sporadic though recurrent pattern of land-use. This pattern persists for the entire 40 000 years of the *Middle Palaeolithic*. The low frequency of occupation, together with the lower average density per period, and an average variability (VC=1) in the kinds of occupation, suggest a barely diversified pattern in the exploitation of resources. Nevertheless, there is no spatial correlation: a low proportion of intensive occupation causes a diversified spatial distribution (Fig. 8).

The change in tendency seems to appear in the Upper Paleolithic. Its characteristics are: a gradual increase in frequency, that despite recurrence is kept within moderate limits; a slight increase in the average density of artifacts per period (0,21-0,25 compared to 0,18 in the Middle Paleolithic) and a lower coefficient of variation quotient; a reduction of the total occupied area and an increase in the *ELI*, which moves into its highest values in the Early and Late Mesolithic periods (values for the Late Mesolithic should be considered carefully, as only one subsector has a rank=4).

Overall, activity was concentrated in very limited zones that were repeatedly visited, and a wider range of activities were carried out in these zones, as the increase in the average density shows. Outside these sites, the impact of the occupation/exploitation is very limited, and so low in intensity that very few areas from focal points (Figs. 8 and 9). When comparing this picture with that corresponding to the Middle Paleolithic, there is a remarkable reduction in occupational intensity and a lack of a low intensity evidence.

This is probably the result of a situation in which foragers often repeatedly visited the same places as part of a year round cycle. We are facing, then, an increase in diversification, both in the exploitation of resources, and in the location of settlements. There is not much evidence from the Early Neolithic, but it seems to suggest that the tendency did not change significantly from the previous model.

7.2. The dramatic change in the exploitation of resources and in the occupation patterns likely took place in *Polop* during the Late Neolithic. Frequency and recurrence of occupations change dramatically, as Fig. 7A shows. The increase of average density (the highest one in the valley) and the Coefficient of Variation clearly suggest a higher intensification and diversification; the low *Specialized Locational Index*, moreover, points to the existence of remarkable occupational diversity, places with a high level of activity, and other more marginal places all, within a context where the proportion of intensive occupation decreases in relation to the total occupied area, which increases in relation to the Early Neolithic.

This suggests a village farming organization, with a stable central occupation, where energy consuming activities were carried out, and the widest range of activities took place. Apart from it, other locations can be found, which are characterized by lower recurrence and diversity, or greater specialization. The map at the top of Fig. 10 shows this situation, with a set of subsectors that are located in the center of the valley, where most of the materials from the period are concentrated. With regards to this period, the HCT suggests a reduction of the occupied area and a clear tendency towards specialization (Figs. 7B and C).

7.3. Preceramic periods s in *Penàguila* (BP) are not that important (as, for instance, the small absolute extension ascribed to the Middle Paleolithic shows). The pattern of the periods (UP and EM) does not differ from that described in *Polop*.

The Early Neolithic, however, displays a similar pattern to that described for the Late Neolithic in *Polop* (Figs. 7D, E and F).

We are inclined to interpret this model as the consequence of a new village system inaugurated by Neolithic groups: radial exploitation focused on areas of highest re-

source density and diversity. This would produce a location pattern characterized by densely occupied central areas, surrounded by other less densely occupied areas. Other locations that reflect more sporadic or specialized occupations may exist in further out or alternatively, there may be new occupations derived from the segmentation of the original group.

Fig. 11 shows the distribution of the subsectors belonging to the Early Neolithic according to LDI values. The spatial organization described above can be clearly seen: a central core, (Sector BP-2; subsectors 4 and 6) where areas with the highest density concentrate, surrounded by others with a decreasing LDI. Another small core, made up of two subsectors further up the river courses (Sector BP-3), points the presence of one of these more specialized occupation points.

7.4. The expanding occupation of the valley, based on the same organizational pattern, reached its most important development in the Late Neolithic (Fig. 12). The densest occupation and greatest intensity of exploitation belong to this period, which shows an expansion of the settlement. Ironically, the next period, basically defined from denticulated sickle tools, has the opposite effect: the occupied area become smaller, and the average density and the variation coefficient dropped (Fig. 7 D and F). This tendency, in more pronounced way, can also be seen in *Polop*.

This process announces the characteristics of the Bronze Age, when occupations tend to be located on the highest levels in the valleys. A clear change in the farming system takes place at this time (ca. 3.800-3.200 BP): from a farming point of view, increasingly marginal areas were occupied and exploited after the introduction of the plough. From this perspective, we might understand a lack or a small presence of occupation from Bell Baker period and from the Bronze Age, the results of a farming exploitation directed from other sites was considered beyond the surveyed sectors: on the hilltops of the surrounding valleys (Bernabeu et al. 1989).

8. Discussion

The results of comparing two collections belonging to *Polop* and *Penàguila* river valleys have been presented in the sections above. Both collections were collected as part of a systematic survey project based on an off-site sampling and analysis strategy.

This kind of survey strategy is unusual in Spain, where locating settlements is the systematic survey project's starting point. In the course of our investigation we have learned that this methodological perspective did not fit the nature of the surface register, often characterized by a continuum of materials with varying densities. Using the settlement as a central focus has raised two serious problems:

- what densities should or should not be considered settlements,
- what densities should be disregarded in the analysis beyond the arbitrary limits imposed by the first problem.

The off-site survey strategy frees us from these problems and allows to examine all available information which we can use to enrich our understanding of region-wide occupation and resource exploitation strategies.

It is not our intention to outline alternative conclusions. Rather we have intended our conclusions to complement others reached by alternative survey techniques and excavation. Ultimately our conclusions will have to be compared against those from excavation. Some of the conclusions are worth discussing:

1. Toponomic analysis has shown that collections in a secondary position are more likely to be associated with older periods in both valleys. However, this does not apply to all subsectors, but it clearly limits

an approach where location is an important variable. Therefore, more detailed analysis of subsectors should be carried out, including variables, such as slope or present-potential erosion of floors.

All variables concerning the impact of constant farming on surface collections must be compared to collections from stratified contexts. Nevertheless, in order to explain the observed variability between *Polop* and *Penàguila* (i.e., the proportion of indeterminet fragments (much higher in *Polop*) and identifiable fragments higher in *Penàguila*) other variables will have to be studied. For instance, in *Polop*, the highest proportion of indeterminent fragments may be due to constant farming in places where raw material is located. In *Polop*, resources are plentiful and accessible through ploughing, which is not tha case in *Penàguila*. If this were true of *Penàguila*, this category might have been included in all the calculations that indicate use density.

2. Broadly speaking, understandings of regional occupation/exploitation patterns are mutually consistent. However, the different behavioral pattern revealed in Polop and Penàguila concerning the appearance of village organization (Recent Neolithic in *Polop*, and Early Neolithic in *Penàguila*) must be explained. The central feature of the debate about the transition to agriculture has been polarized between the so-called indigenous position (diffusion of information) and migration position (diffusion of population).

The dual model (Bernabeu, 1997) suggests that the neolithization process did not end with the assimilation of local Mesolithic groups, even in places where Mesolithic groups came in contact with expanding Neolithic groups. After the initial stages, the stabilization of an agricultural border (caused by ecological and social factors), gave rise to interaction where by Mesolithic groups experienced a neolithization process. A segregation between both communities, which keep different territories throughout the whole process, was the consequence of that situation. Different economic and cultural variables enable us to read this territorial segregation in the peninsular Mediterranean area.

This situation is likely to give a more accurate understanding of the observed pattern in *Polop* and *Penàguila*. Thus, settling of Neolithic groups in regions with favorable ecological conditions for the development of early farming systems (*Penàguila*) favors interaction processes with Mesolithic groups located in the border (*Polop*), that eventually will end up transforming. Along all this period, not only the use of economic resources, but also the territory occupation and exploitation patterns keep different between both groups, in spite of not being far away one from the other, as it happened in the case we discuss in this paper. The shelter of *La Falaguera*, with superimposed aceramic and ceramic levels, in the *Polop* valley is being excavated now, and the information to check this assumption will be provided by this excavation.

NOTLAR

1. Bell Beaker: pottery decoration.
2. Pflecha. Flint arrowheads
3. Hinv. Blades/bladelets with invasive retouch.
4. Labs. Enlarged rims associated with open shapes (plates).
5. Dhoz. Denticulated shickle blades.
6. G2. Geometric tools. Lunates or rectangles.
7. G1. Geometric tools. Trapezes or triangles.
8. Esgr. Curved pottery decoration.
9. Epi. Epicardial style. Pottery decoration: impressed and incised.
10. Card. Cardial. Shell impressed decoration on pottery.
11. Tldro. Bifacial drills.
12. Ehoz. Sickle blades.
13. Hret. Blades and bladelets with marginal retouch.
14. Blade tech: Blade technology (blades, cores)
15. M1. Microburins.
16. Dorso: backed blades or bladelets.
17. Trc.: Truncations
18. Rsp. End-scrapers
19. Blr. Burins.
20. Must.: Side-scrapers; levallois and musterian points.
21. MyD. Notches and denticulations (on flakes)
22. Flake tech. Flake technology: flakes, levallois-discoid cores.

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PERIOD	^{14}C BP	SITE
Middle Palolithic (MP)	80.000-39.000	Beneito Cave
		El Salt, Cave
Upper Paleolithic (UP)	35.000-14.000	Beneito
Late Upper Paleolithic (LUP)	14.000-10.000	Tossal de la Roca, Shelter
		Cendres, Cave
Early Mesolithic (EM)	10.000-8.000	
Late Mesolithic (LM)	8.000-6.800	La Falguera, Shelter
		Tossal de la Roca
Early Neolithic (EN)	6.800-5.800	Or, Cave
		La Falguera
		Cendres
Middle Neolithic (MN)	5.800-4.800	La Falguera
		Cendres
Late Neolithic (LR)	4.800-4.200	Les Jovades, Open air site
		Niuet, open air site
Bell Beaker (HCT)	4.200-3.800	Cendres
		Arenal, open air site

Table 1. Regional framework based upon stratified sites.

	POLOP	PENAGUILA (BP)
Total Area	6,37	8,09
Random	2,53 (39%)	1,56 (20%)
No Random	1,19 (18%)	0,56 (7%)
TOTAL	3,72 (57%)	2,12 (27%)

Table 2.The sq. Km and proportions of surveyed areas in Polop and Penàguila valleys.

	Lithics	Ceramics
POLOP	Average: 1132,5	Average: 198,5
	S. Deviation: 2974,8	S. Deviation: 1861
	Rank: 0-23968,6	Rank: 0-22969,9
PENÀGUILA (BP)	Average: 1342,6	Average: 1348,1
	S. Deviation: 4448,4	S. Deviation: 5009,1
	Rank: 0-49428,5	Rank: 0-57500

Table 3. Observed distribution on lithics and ceramics.

Visibility Groups	Sample 1	Average	Standar Deviation	T Test prob.	Sample 2	Average	Standar Deviation	T p
Ceramics								
V1	14	15,9	59,4	-3,11	47	4,7	32,4	-3,08
V2	27	3263,2	5416,8	<0,01	43	2049,1	4550,9	<0,01
V1	14	15,9237	59,4	-1,22	47	4,7	32,4	-2,79
V3	74	7,1	7197,8	0,22	106	1659,5	6100,9	<0,01
V2	27	3263,22	5282,5	0,58	43	2049,116	4550,9	0,43
V3	74	377,1	7197,8	0,56	106	59,5	6100,9	0,67
Lithics								
V1	14	923,3	1242,9	-1,2	47	275,1	786,6	-1,89
V2	27	4106,8	9806,6	0,23	43	2578,7	7972,9	0,07
V1	14	923,3	1242,9	-0,97	47	275,1	786,6	-3,18
V3	74	1883,2	3629,9	0,33	106	1314,6	3148,9	<0,01
V2	27	4106,81	9806,6	1,15	43	2578,7	7972,9	1,01
V3	74	883,2	3629,9	0,26	106	1314,6	3148,9	0,32

Table 4. The effect of visibility on the observed densities of lithics and ceramics in Penàguila valley. For comparative effects a T Test was calculated separatedly between Subsectors with finds (sample 1) and all Subsectors (Sample 2).

	V1	V2	V3	TOTAL
0	33 (70%)	16 (37%)	32 (30%)	81 (41%)
1	14 (59%)	27 (63%)	74 (70%)	115 (59%
TOTAL	47 (24%)	43 (22%)	106 (54%)	195

Table 5. Subsectors without (0) and with artifacts (1) by visibility groups: V1= poor; V2= middle V3= good

	Total	Smooth	Mec1	Mec2	Mec3	F.indet.	Fracturas
POLOP	2672	355	397	1590	685	1464	755
		(0,12)	(0,15)	(0,60)	(0,25)	(0,55)	(0,28)
BP	2658	50	623	1696	339	967	1186
		(0,02)	(0,23)	(0,64)	(0,13)	(0,36)	(0,44)

Table 6. Absolute values and proportions of the taphonomic variables in Polop and Penaguila (BP) collections.

	6	5	4	3	2	1	0
BELL BEAKER (HCT)	P: Bell Beaker.	P: Dhoz.	P: Pflecha	P: Hinv + Labs.	P: hinv or labs.	P:Lithics,pottery	
							A: Artifacts
LATE	P: Pflecha + Labs. + Hinv.	P: Pflecha + (Hinv or Labs)	P: Pflecha or hinv or Labs	P: Blade Tech. + (hret, tldro, ehoz, Cerámica or G1)	P:Blade tech+ (Hret, Tldro,ehoz,Pottery, or G1)	P:Lithics,pottery	
NEOLITHIC	A: Bell Beaker, Dhoz	A: Bell Beaker, Dhoz		A: Bell Beaker, Dhoz,Esgr,Card			A: Artifacts
MIDDLE	P: Esgr.	P: (Hinv or G2) + (Epi or Peina)	P: (Hinv or G2)+ (Epi or Peina)	P: Blade tech..+ (hret, ehoz,Pottery, o G1)	P: Blade tech. + (Hret, Tldro, ehoz, Pottery o G1)	P:Lithics,pottery	
NEOLITHIC		A: Bell Beaker, dhoz, pflecha		A: Bell Beaker, Dhoz,Pflecha, Card.			A: Artifacts
EARLY	P: Card.	P: Epi+ (G1 or Trc); (Hret, Tldro or ehoz) + (G1 or Trc) + pottery	P: Epi+ (G1 or Trc); (Hret, Tldro or ehoz) + (G1 or Trc)+ Pottery	P: Blade tech + (Tldro,Hret, ehoz, Pottery, or G1)	P: Blade tech. + (Tldro, Hret, ehoz, Pottery or G1)	P:Lithics,pottery	
NEOLITHIC		A: Campaniforme, Pflecha, Esgr, Dhoz.		A: Campaniforme, Pflecha,Esgr,Dhoz.			A: Artifacts
LATE MESOLITHIC	P: (G1 o M1) + dorso + (Rsp or Trc)	P: (G1 o M1) + Rsp + (Dorso or Trc)	P: (G1 o M1) + rsp + (Dorso or Trc)	P: Blade Tech.+ (G1, Trc or Rsp)	P: Blade tech.+ (G1,Trc or Rsp)	P:Lithics	
	A: Pottery, G2, hoz, Pflecha	A: Pottery, G2, hoz, Pflecha		A: Pottery, G2, hoz, Pflecha			A: Lithics
EARLY	P: Dorso + Rsp + myd.	P: (Dorso o Rsp) + MyD.	P: (Dorso or Rsp) + MyD.	P: Blade tech or . Rsp o Dorso	P: Blade tech. or Rsp or Dorso.	P:Lithics	
MESOLITHIC	A:G1,G2, Hoz, Tldro, Pottery, Pflecha	A:G1,G2,hoz, Tldro, Pottery, Pflecha		A:G1,G2,hoz, Tldro, Pottery, Pflecha			A: Lithics
LATE UPPER	P: Rsp + Brl + Dorso	P: Dorso+ (Brl. or Rsp)	P: Dorso + (Brl. or Rsp.)	P: Blade tech. Or Rsp, Brl o Dorso	P: Blade tech. or Rsp, Brl or dorso	P:Lithics	
PALEOLITHIC	A:G1,G2,hoz,Tldro, Pottery, Pflecha	A:G1,G2,hoz, Tldro, Pottery, Pflecha		A:G1,G2,hoz, Tldro, Pottery, Pflecha			A: Lithics
UPPER	P: Blade tech. + Rsp+ Brl	P: Blade tech + (Rsp or Brl)	P: Blade tech. + (Rsp or Brl)	P: Blade tech or Rsp or Brl	P: Blade tech or Rsp or Brl	P:Lithics	
PALEOLITHIC	A:G1,G2, hoz,Tldro, Pottery	A:G1,G2, hoz,Tldro, pottery		A:G1,G2, hoz,Tldro, Pottery			A: Lithics
MIDDLE	P: Flake tech + MyD + Must.	P:Flake tech. + (Must. or myd)		P:Tec Lascas + (Must or myd)	P: Flake tech. or Must.	P: Flake tech. or Must.	P:Lithics
PALEOLITHIC	A:Pottery, Blade tech., . Pflecha	A:Pottery, Blade tech, Pflecha.		A:Pottery, Blade tech, Pflecha.			A: Lithics

Table 7. Chronological periods and associated ranks. P= Presence; A= Absence.

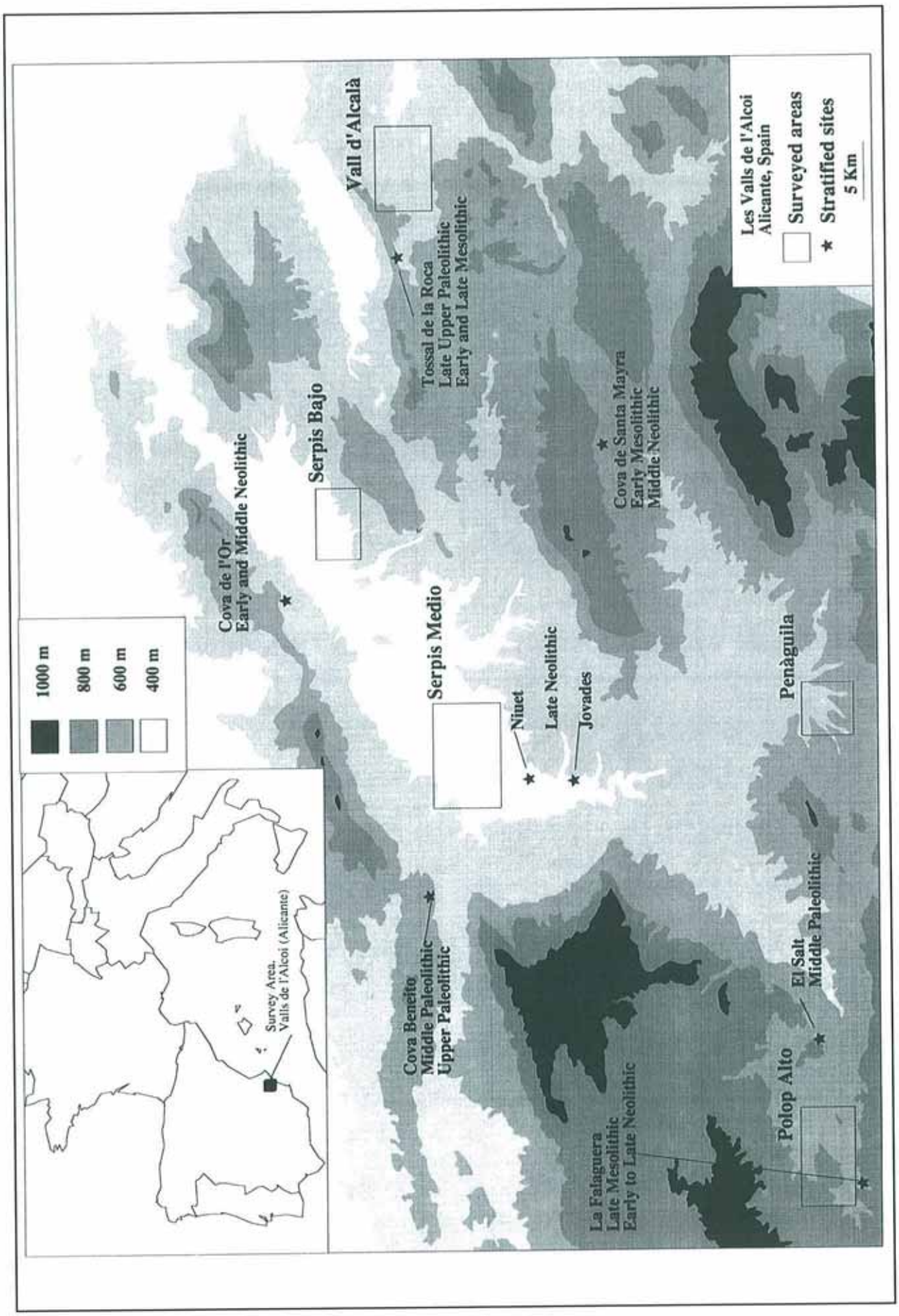


Figure 1: Survey area project.

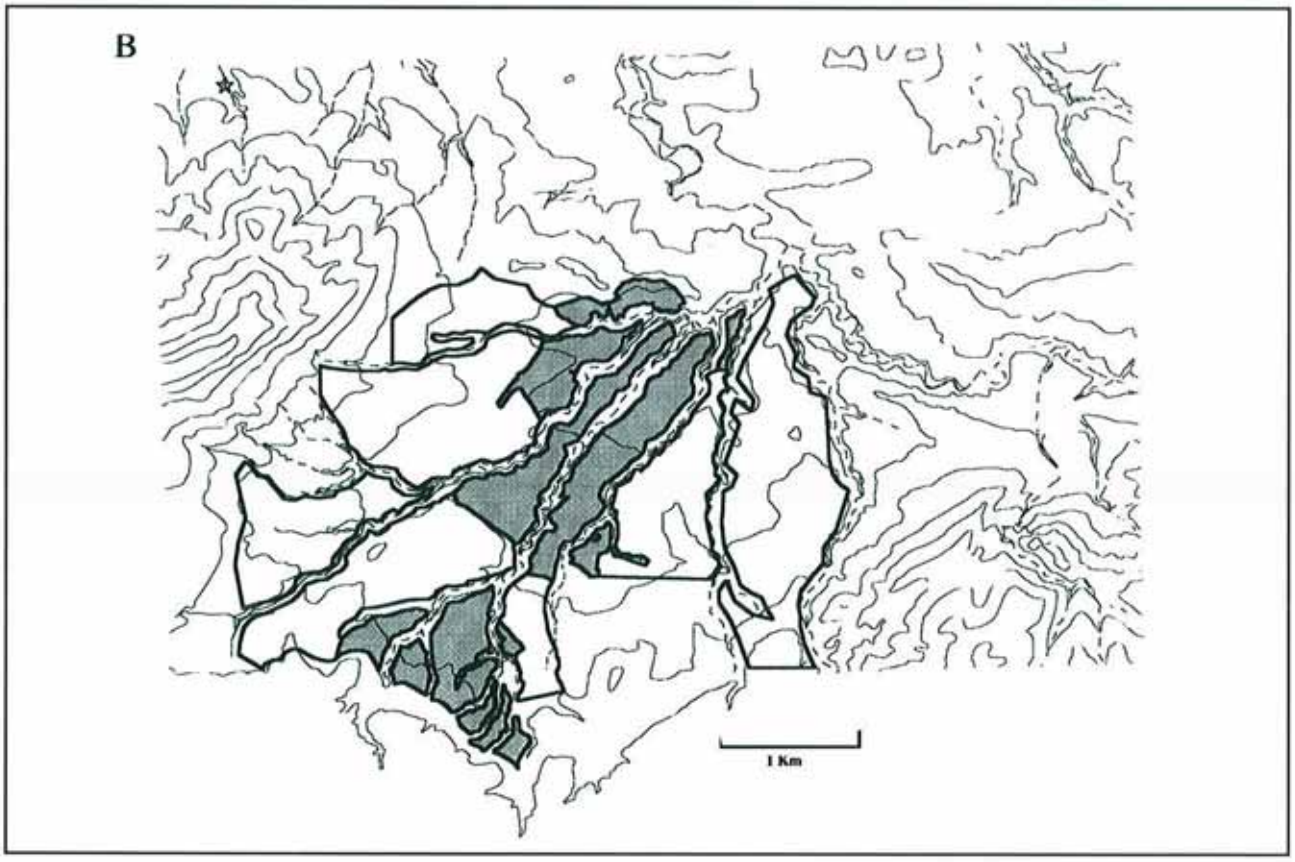
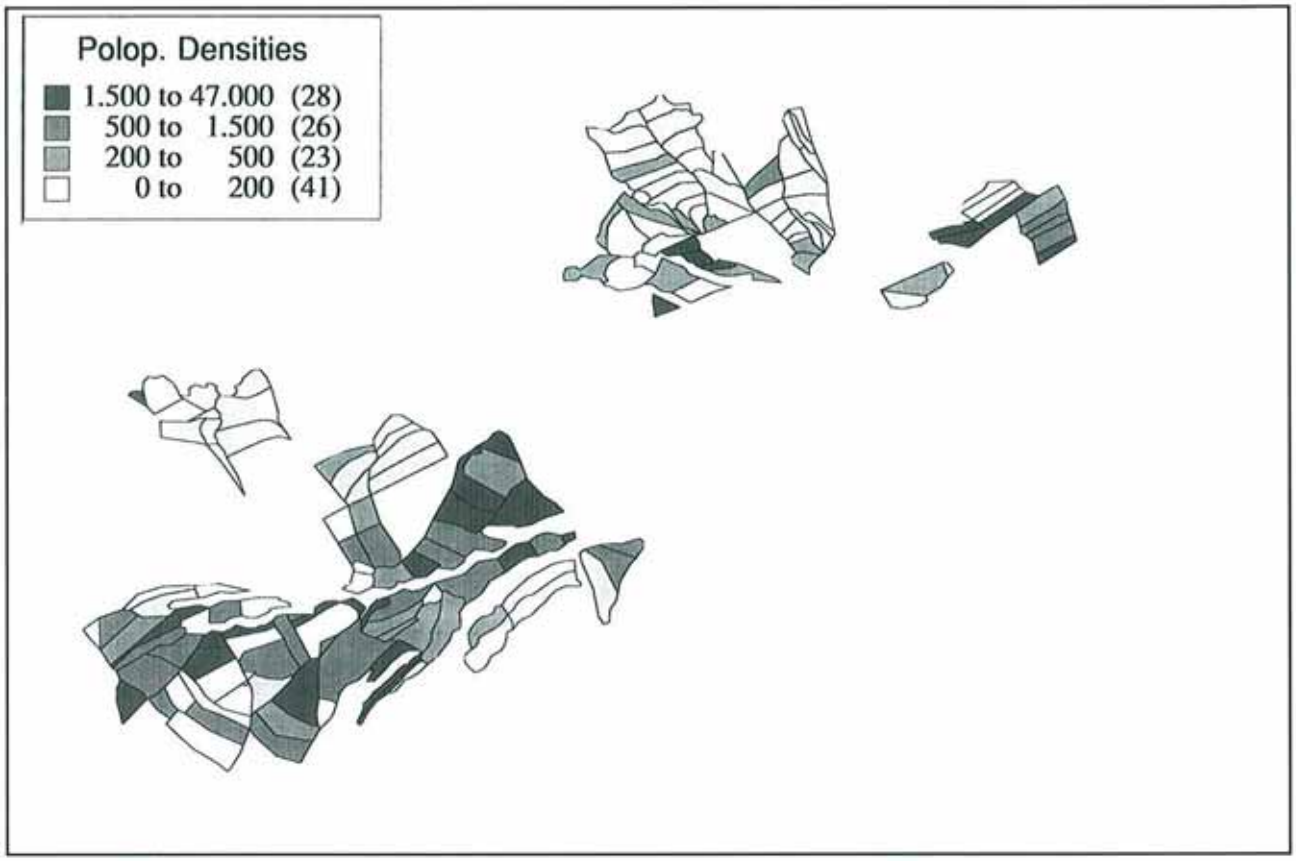


Figure 2: Polop (A) and Penáguila (B) valleys. Surveyed sectorsin grey.



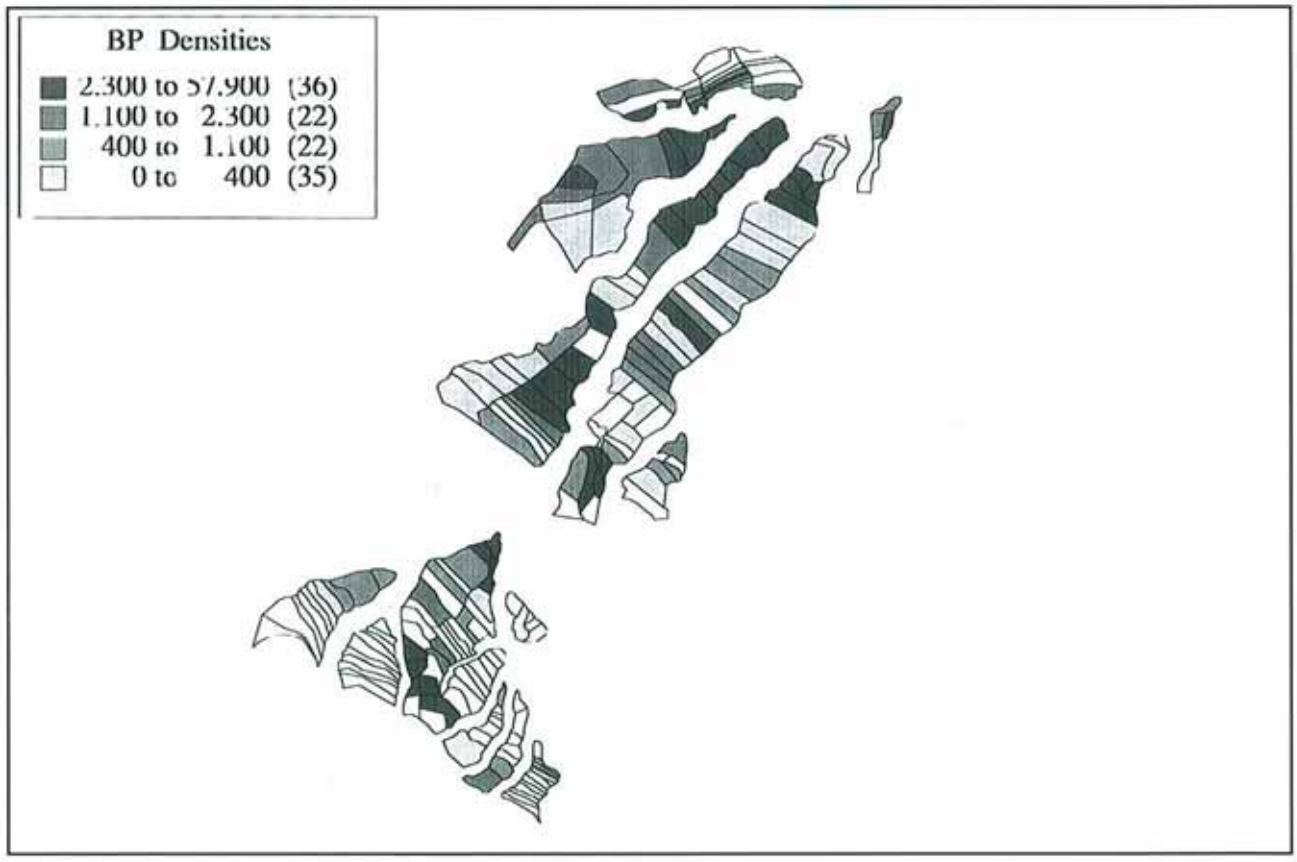
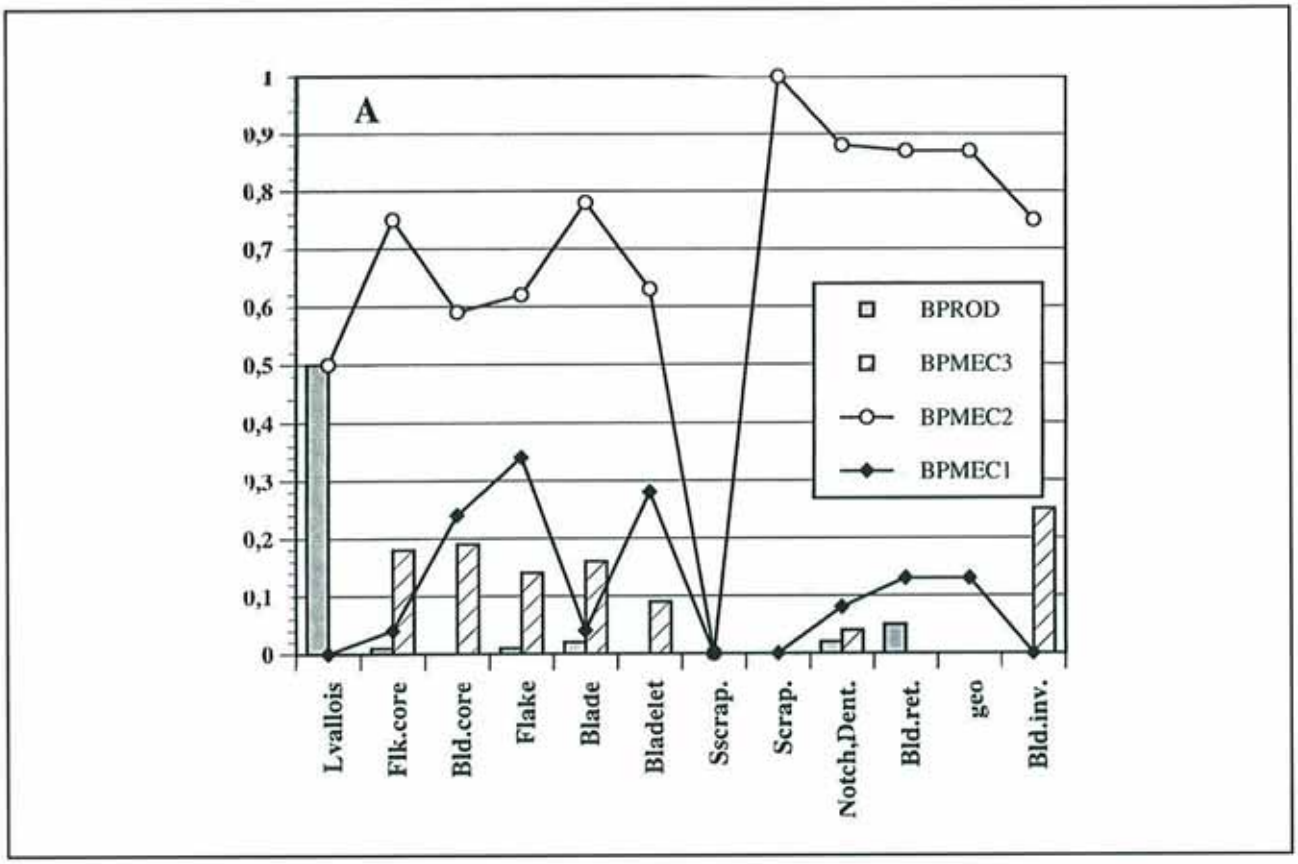


Figure 3: Subsectors by densities in Polop and Penáguila (BP) valleys.



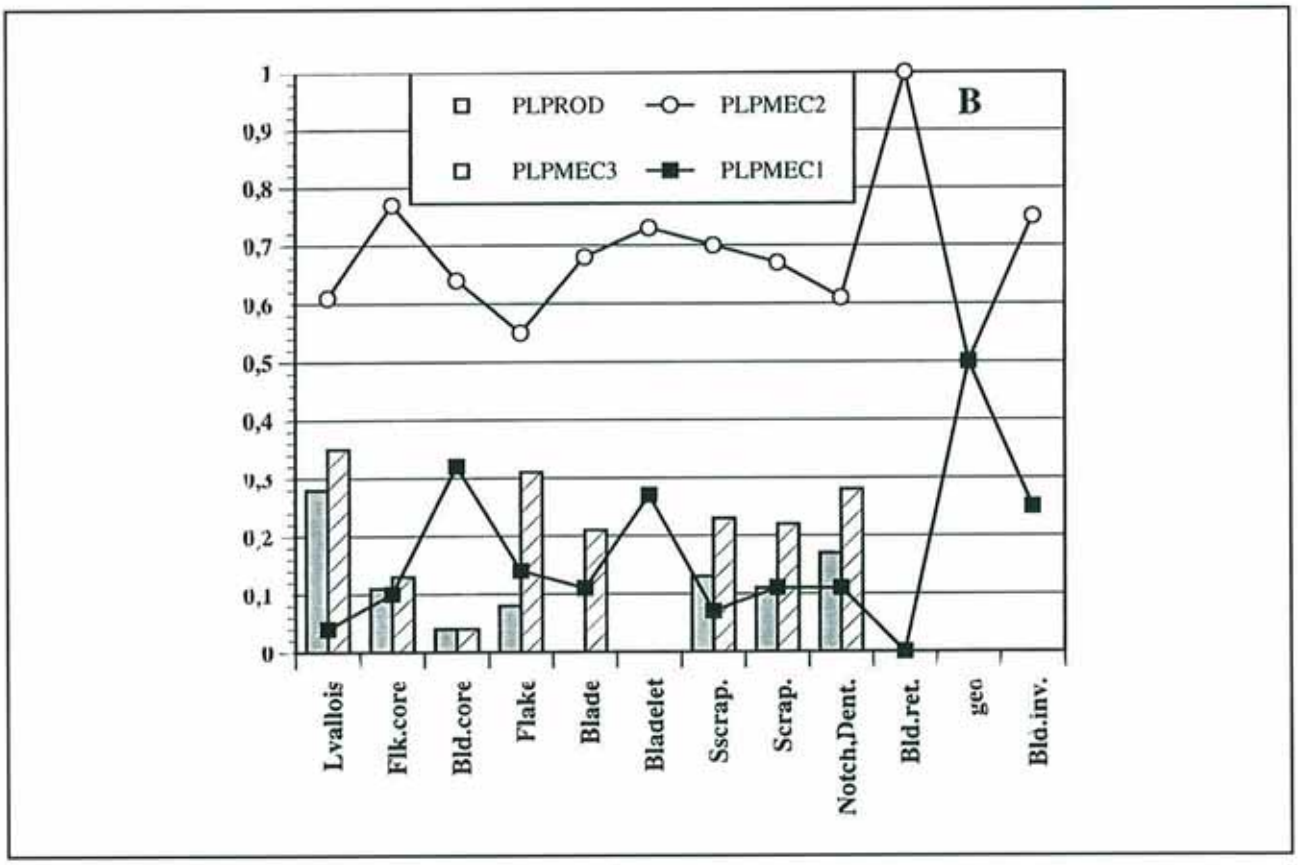


Figure 4: Smouth ridges (ROD) and edge damage (MEC) by technological and typological categories in BP (A) and Polop (B).

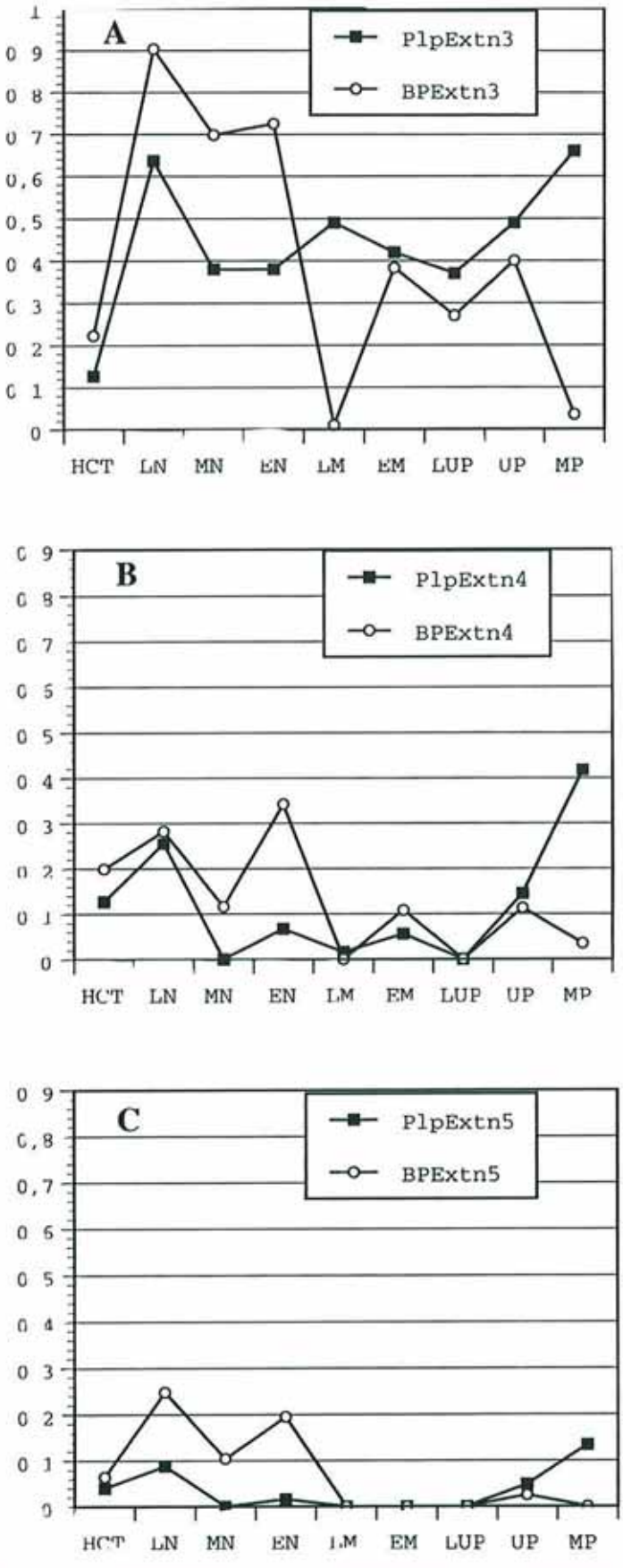


Figure 5: Summed areas by period of Polop (Plp) and Penáguila (BP) using subsectors with rank>3 (A), rank>4 (B) or rank>5 (C).

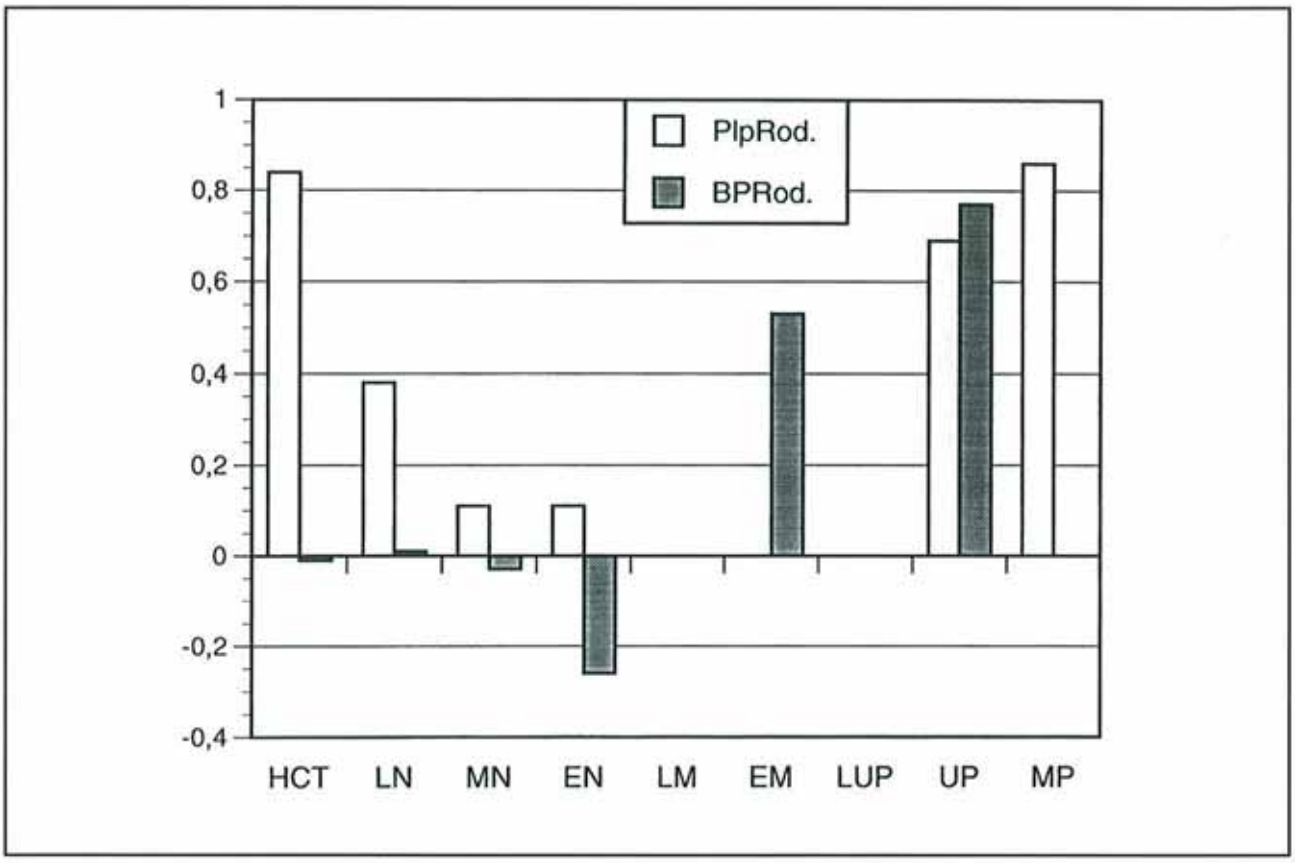


Figure 6: Correlation coefficients between smooth ridges and chronological periods in Polop (PlpRod) and Penáguila (BPRod)

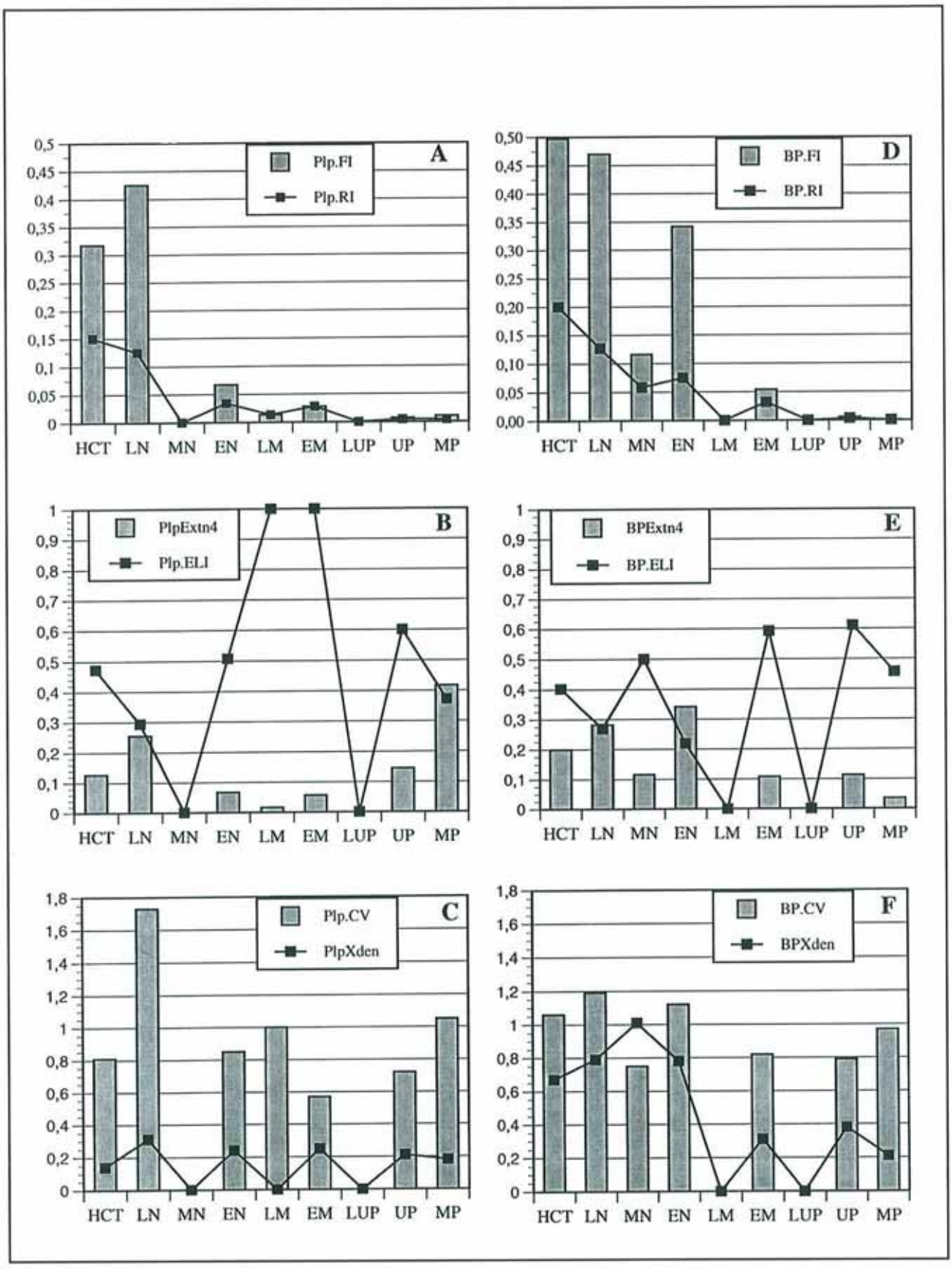
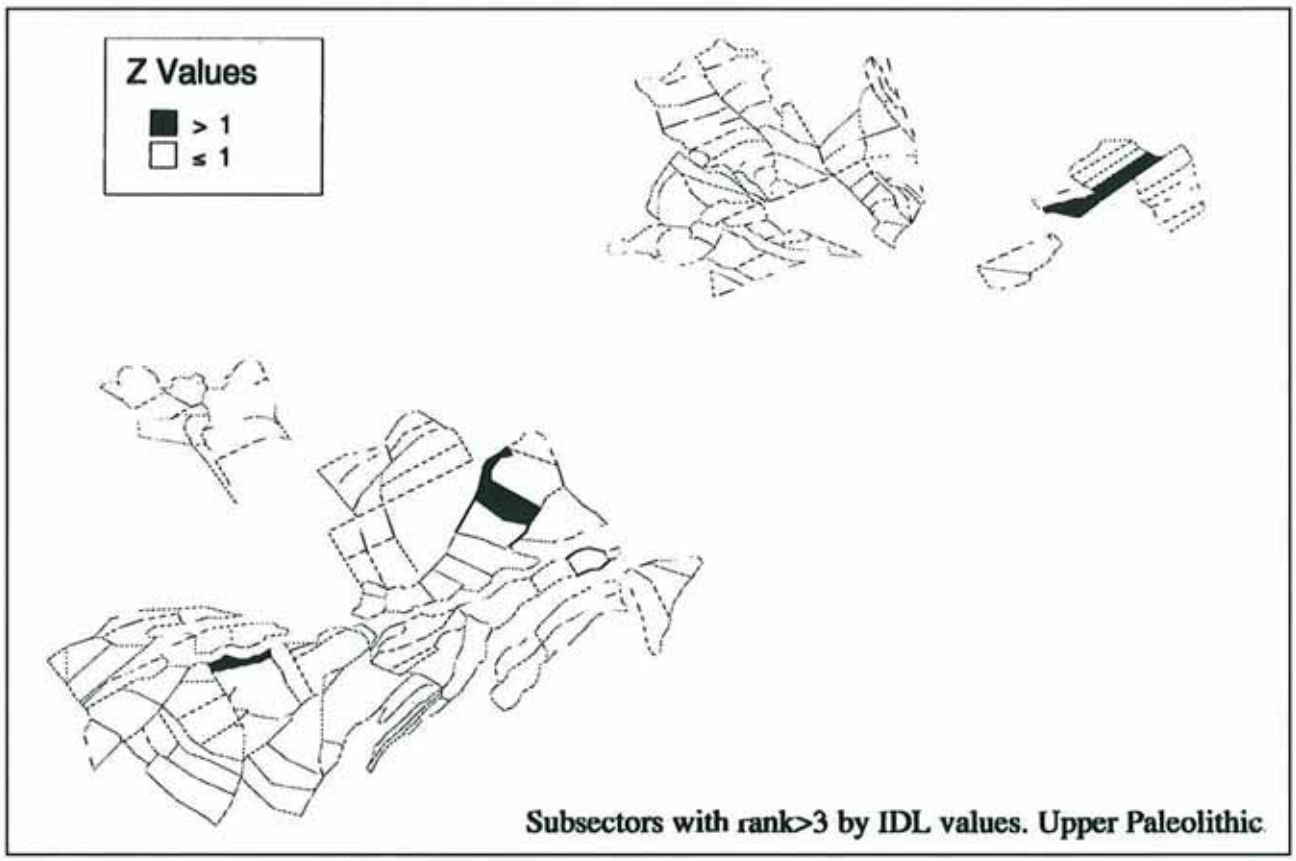


Figure 7: Comparative values of different indexes from collections of Polop (Plp) and Penáguila (BP). See text (points 5 and 6) for explanation. FI= Frecuence Index; RI= Recurrence Index; Extnt= Total Occupied Area; ELI= Especialized Locational Index; CV= Coefficient of Variability; Xden= mean of artifact density.



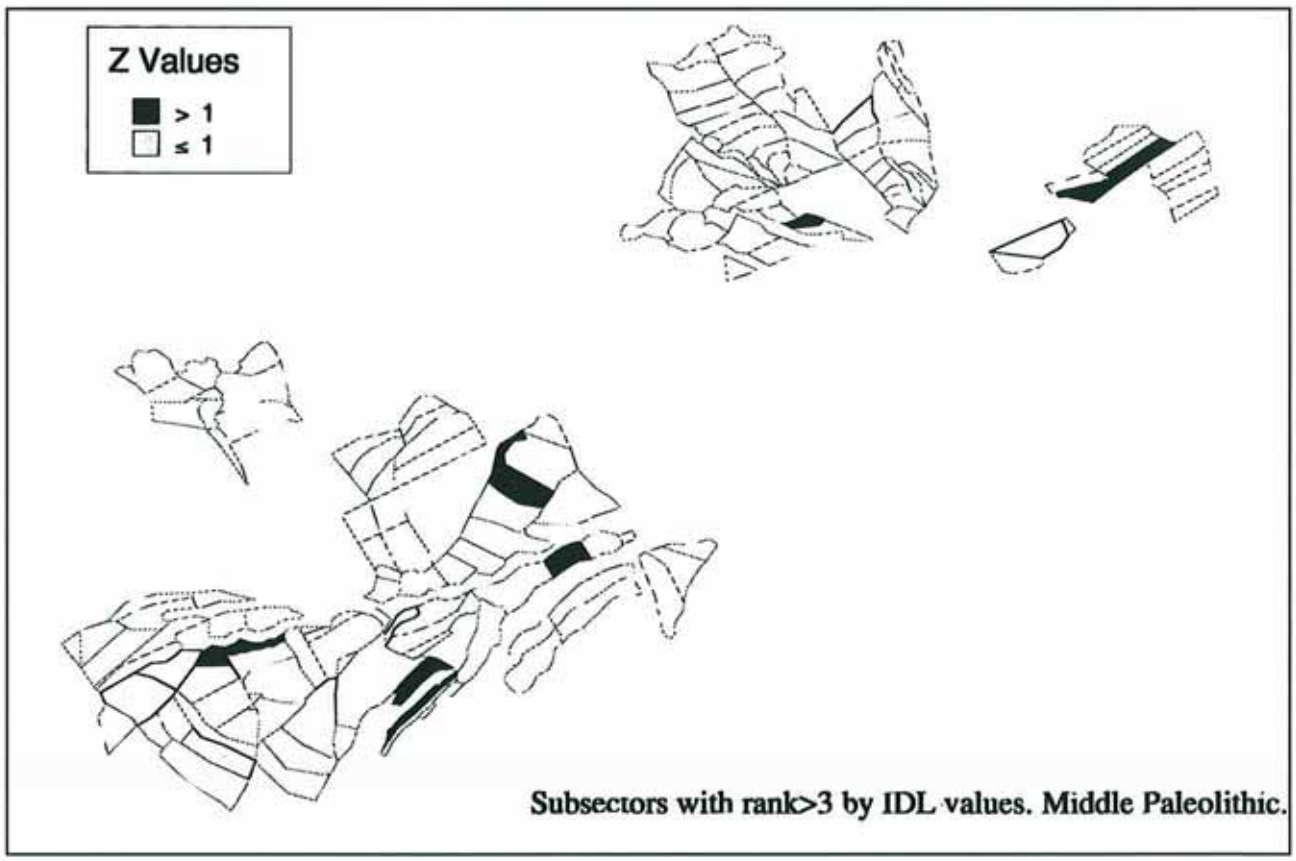
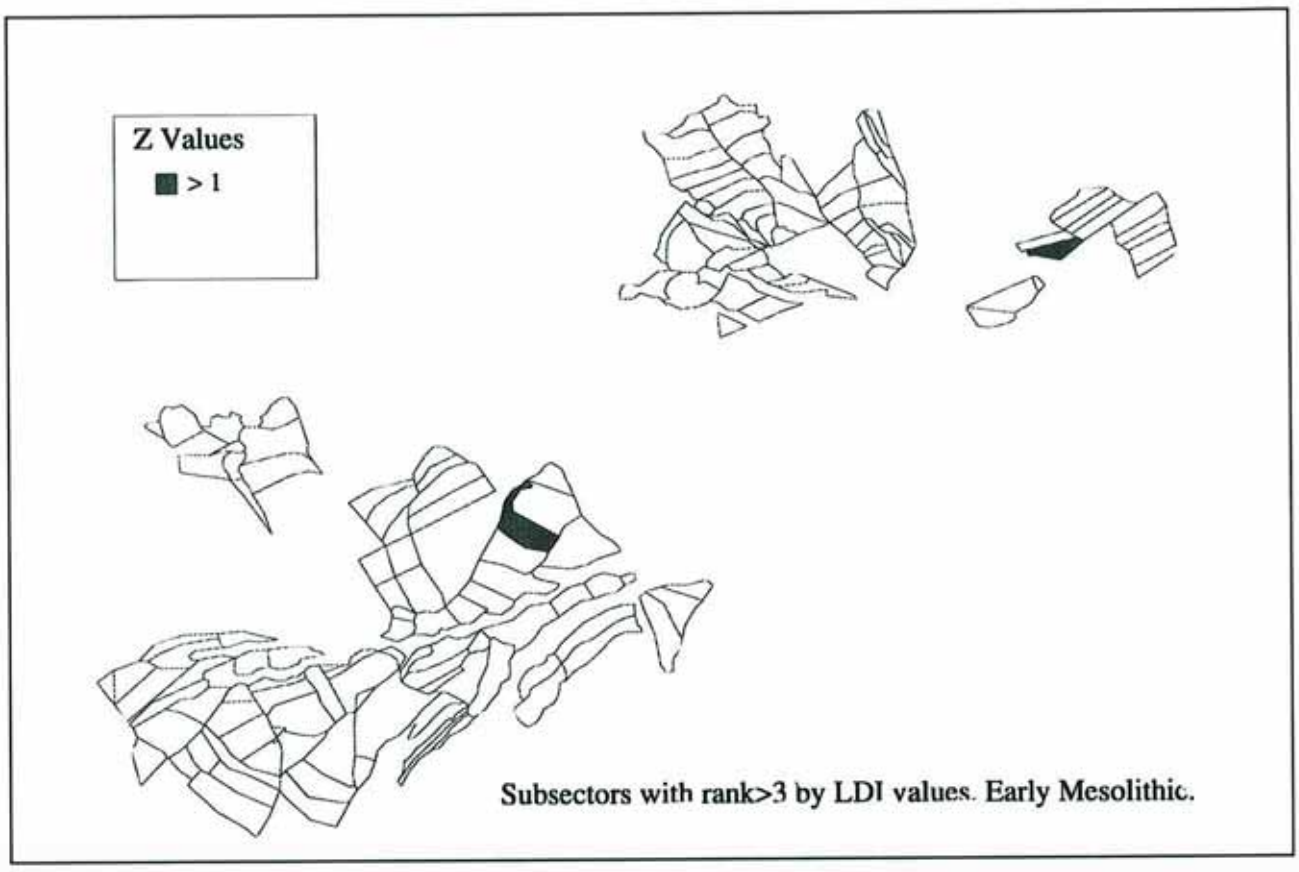


Figure 8: Polop valley.



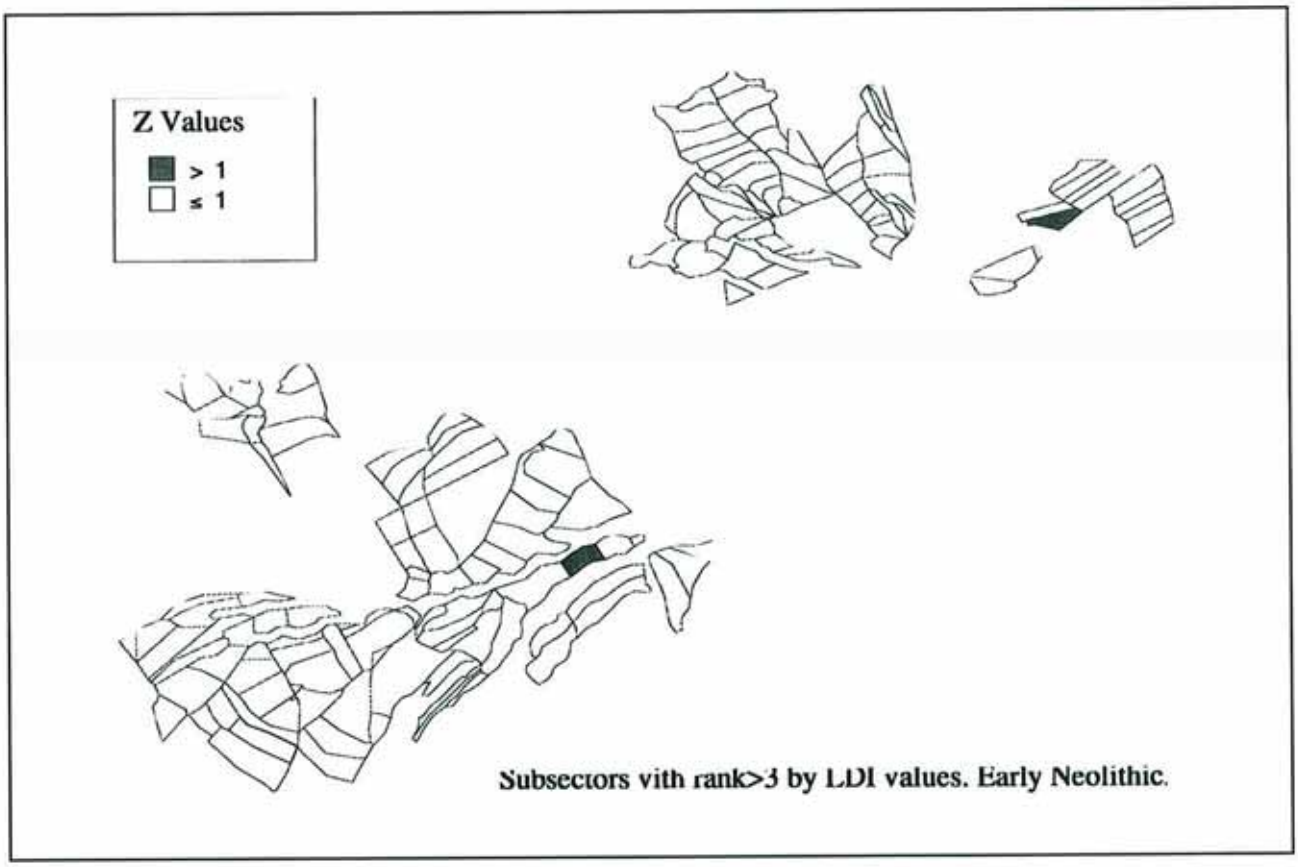


Figure 9: Polop valley.

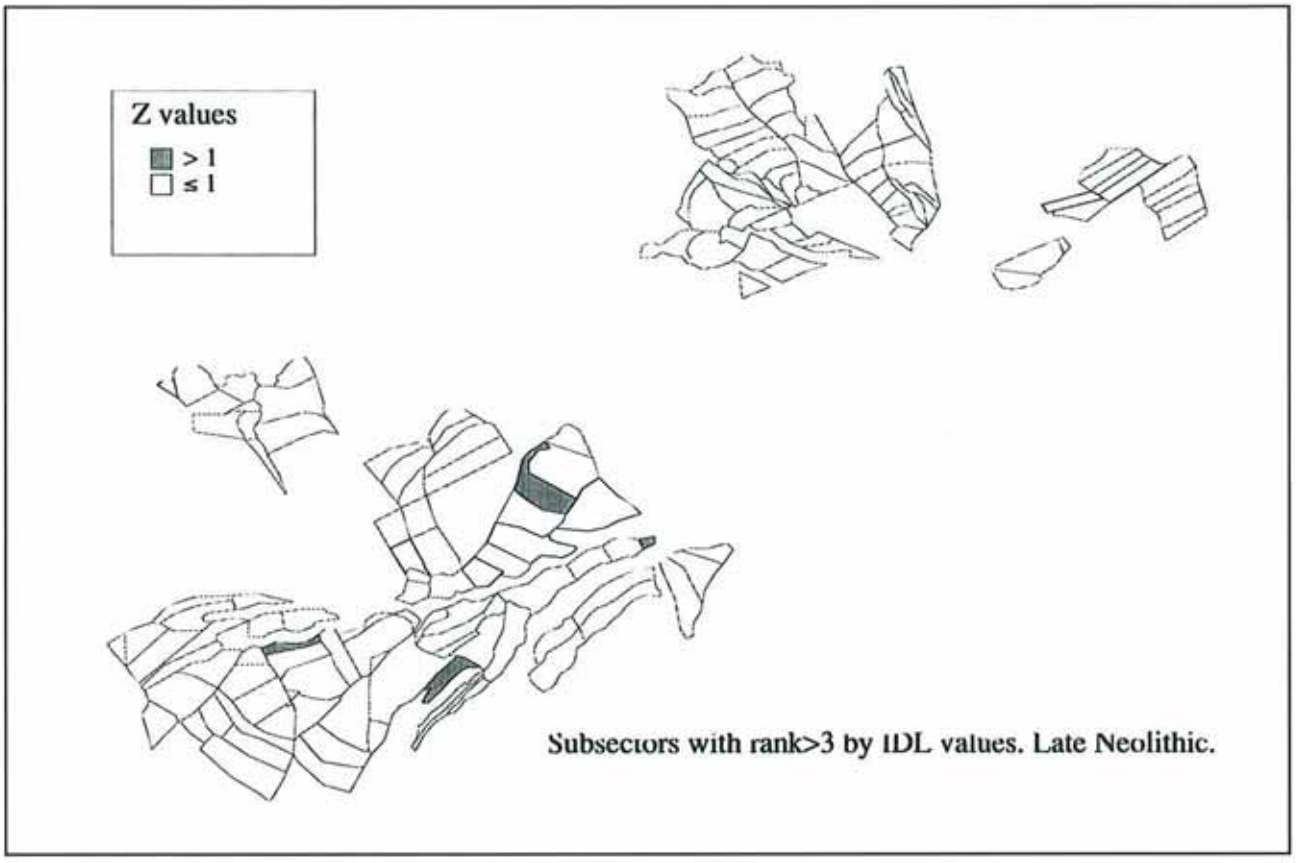
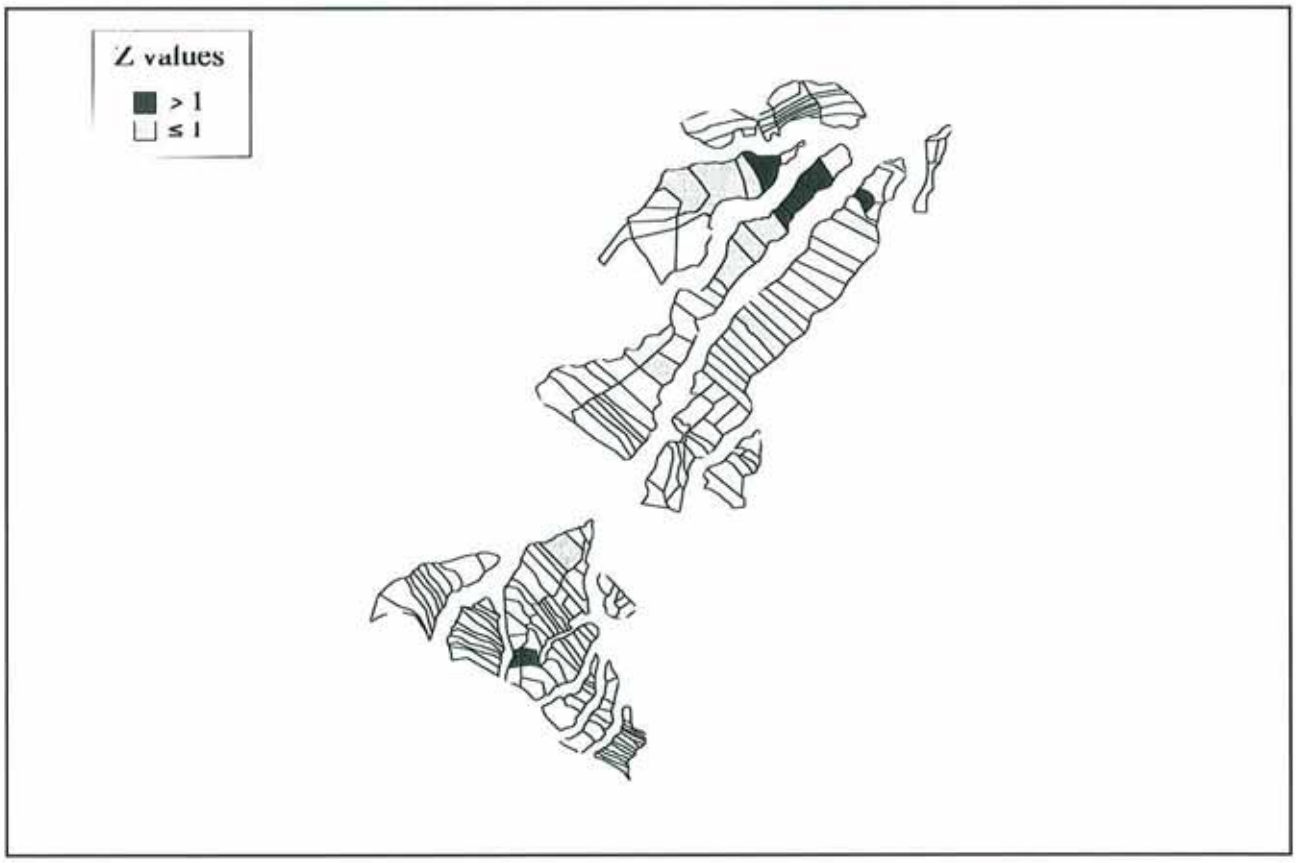
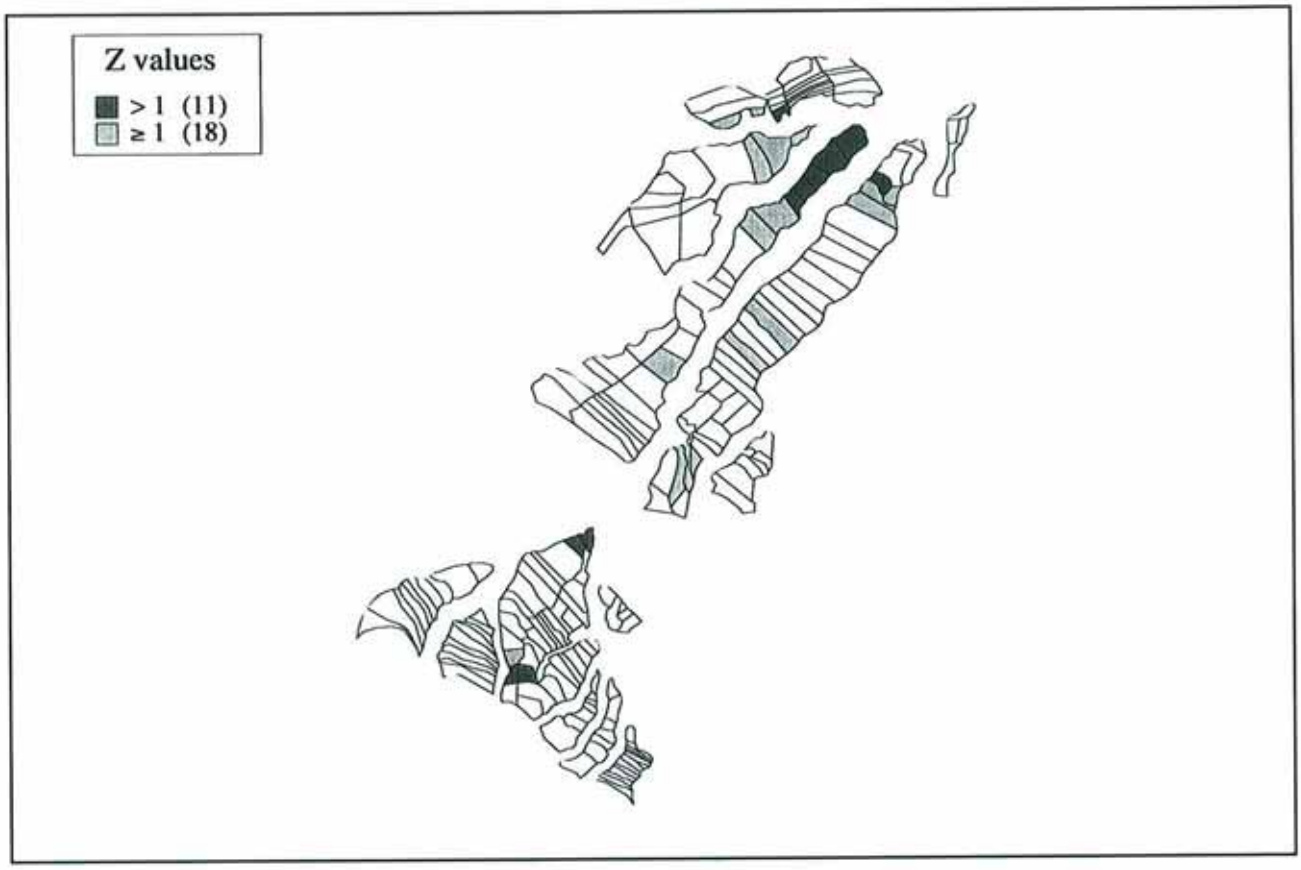


Figure 10: Polop valley.



Figür 11: Penáguila valley. Subsectors with rank>3 by LDI values. Early Neolithic.



Figür 12: Penáguila valley. Subsectors with rank>3 by LDI values. Late Neolithic.

A Large-Scale Geophysical Prospection in Acemhöyük, the site of the Assyrian Trade Colony Period

Asur Ticaret Kolonileri Yerleşmesi Acemhöyük'te Uygulanan Geniş Ölçekli Jeofizik Aramalar

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Keywords: Acemhöyük, archaeogeophysics, magnetic, resistivity, self potential
Anahtar Sözcükler: Acemhöyük, arkeojeofizik, manyetik, özdirenç, doğal gerilim,

Bu yazı Orta Anadolu'da bulunan ve Asur Ticaret Kolonileri dönemine tarihlenen Acemhöyük'te uygulanan geniş ölçekli jeofizik çalışmaları ve sonuçlarını içermektedir. Asur Ticaret Koloni Çağı sürecinde Orta Anadolu ticaret, sanat ve kültür bakımından üstün düzeydeydi. Böylece ticaretin atılımıyla bölgedeki kentsel gelişim de hızlanmıştır. 1960'lı yıllardan beri süren kazılar Acemhöyüğün Asur Ticaret Kolonileri Çağında (M.Ö. 1900 - 1800) çok önemli bir merkez olduğunu göstermektedir. Bununla birlikte kent M.Ö. 1789± 50'de bilinmeyen bir nedenle tümüyle yanıp tahrip olmuştur. Böylece 3. kat olarak tanımlanan bu kültür evresi diğer katmanlarla karşılaştırıldığında farklı bir fiziksel özelliğe sahiptir ve jeofizik anomali oluşumu açısından da önemli bir katman durumundadır. 3. kat yapı birimleri ve onların diğer mimari yapı katlarıyla olan ilişkisini saptamak amacıyla, geniş ölçekli jeofizik çalışmalar gerçekleştirilmiştir. Bu araştırmalar sırasında özdirenç, manyetik ve doğal gerilim yöntemleri uygulanmıştır. Çalışmaların başlangıcında ölçümler, arkeolojik özellikleri iyi bilinen Asur Ticaret Kolonileri Çağıyla ilişkili Hatipler Sarayının kuzeyinde bazı jeofiziksel test profilleri alarak yapılmıştır. Ölçümler, yanık arkeolojik yapılar ve nesnelerin seçilen jeofizik yöntemlerle saptanabileceğini göstermiştir. Acemhöyük kazı alanında yürütülen jeofizik çalışmalar höyüğün arkeolojik yerleşimleri üzerinde önemli jeofizik anomaliler oluşturan bir katmanın varlığını göstermiş ve yerleşmenin özelliğine uygun olarak seçilecek jeofizik yöntemlerle arkeolojik kalıntı ve yapıların belirlenebileceğini göstermiştir. Jeofizik araştırmalar sonucunda yerleşmenin iki değişik bölgesinde kazılar yapılmış ve jeofizik veriyle uygun bazı sonuçlar alınmıştır. Kazı sonuçları, alanda yanık durumda bulunan 3. yapı katının jeofizik yöntemlerle belirlenerek bulunduğunu ortaya koymuştur.

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Introduction

Archaeological sites have long been investigated by geophysical methods. However, large-scale implementation of geophysical methods has only been practised in the last decade. Since then, recent technological improvements in the fields of geophysical instrumentation and computer technology have enabled archaeologist to quickly collect and exploit data from archaeological sites. It has become possible to explore on map archaeological locations in more detailed ways with new geophysical methods, thanks to the rapid development of signal and image processing techniques in the past decade. Even non specialists can interpret the data collected from the archaeological sites once the data have been processed. Thus, within the context of archaeometrical studies interest in geophysical prospection has increased rapidly. Furthermore, when such positive results can be correlated with geophysical evidence it will be possible to increase the reliance of the method. Mound sites hills, which could be widely seen on the Anatolian and Mesopotamian landscape, were of great importance to understand trade, culture, and art, as well as in ancient urban development. Mud brick, an important building material, quickly erodes by natural agencies and over time, it finally turn into small hills which in geophysics we observe in the form of covered anomalies. Mound sites includes stone building foundations, walls of various materials, ovens, furnaces, mine processing workshops, rubbish wells, and intensified ceramic materials. Considering that almost all of them were exposed to fire, they are important locations in terms of potential geophysical studies. Yet, since there have been few geophysical studies made on mound sites, there is little information that such areas can be determined by geophysical methods.

The objective of this study is to reveal methods that would be more suitable to specific research programs, especially programs where research is conducted on artificial hills. During the large-scale geophysical studies from 1992 to 1994 on Acemhöyük, we tried to describe the hill in geophysical terms, and we searched for the potential success of geophysical methods on the hill. The significance of large-scale geophysical prospection is best evidenced in areas exposed to fire especially by the excavation of the 3rd building level in NE-SW and NW-SE directions in the site.

The Geological-Geographic Setting and a Brief History of Acemhöyük

The archaeological site of Acemhöyük situated at the south end of Tuz Gölü lies on the west side of a normal fault, east of the lake. The mountainous part, east of the fault, is covered by a thick layer of andesitic and ignimbrite basalt which are of Neogene age, originate from the volcanic system of Hasan Dağ and Erciyes dağı. The region, on which Acemhöyük is located, is part of the larger Konya plain, and is covered by Pliosen and Quaternary sediments of younger age. The main materials of these young sediments, which are composed primarily of clay, occasionally sand and rarely of unhydrite salt sequences, are volcanites which were eroded from the east (Drahor et al., 1999).

Acemhöyük is located in the town of Yeşilova which is 18km northwest of Aksaray near Hasan dağı. The artificial hill lies near the Melendiz river in the middle of a large and fertile plain. The hill, which has an oval shape, is one of the largest artificial hills of Anatolia, measuring 700m long on the east-west axis and 600m wide on the north-south axis. The maximum height of the hill is about 20m. In addition, it is thought that there was a large Karum located at the site, now probably buried under the present town.

Excavations at the site began in 1962; even though the initial settlement at the site is at least as early as the Early Bronze Age (3000BC); however, the most prosperous period of the höyük was from the Assyri-

an Trade Colonies era, between 2000 and 1700 BC. Following that period, both the mound and the Karum site were deserted and they were not inhabited again until the Early Hellenistic period. The resettlement of some parts of the hill and Karum during Hellenistic and Roman periods ended in 3rd. Century AD. The topography of the site is raised to form four large bulges on the landscape. Excavations on three of those bulges revealed in the 3rd stratigraphic level the presence of great buildings, burned down during the age of the Assyrian Trade Colonies. The building in the south, is called Sarıkaya Palace, the one in the north is called Hatipler Palace and the one in the west is named burnt building (Yanık Bina). On the lower bulge in the northwest, lies the palace's kitchens. The foundations of the palace and other buildings are composed of a stone base, where thick wooden beams were placed on it. The ruins of the two-storey palace were built of wood and mud bricks. The walls are usually 1-1.5m in width. The palaces were abandoned after the great fire dating to 1789±50 BC. (Özgüç, 1968; Öztan, 1990).

Geophysical Research Plan

Geophysical prospection in Acemhöyük is oriented to two major objectives:

Detecting archaeological layers in höyük type archaeological settlements by using geophysical methods; particularly in the highly burned archaeological structures.

Mapping the mound by implementing geophysical methods in large areas, and thus the buried architectural plan could be imaged by using geophysical data.

The first instalment of these surveys was carried out in the north of the Hatipler Palace, an area that was highly burned and was partially excavated in 1960's. The geophysical surveys were conducted by a test profile in this area. After obtaining positive geophysical results in the test profile, geophysical surveys were initiated on a larger-scale in different areas of the mound. These areas and the applied geophysical techniques are as follows;

Resistivity, magnetic, and self-potential surveys in the north of Hatipler Palace (Fig.1).

Magnetic surveys between Hatipler and Sarıkaya Palaces (Fig.1).

Magnetic surveys in the burned structure (Yanık Bina) which was found to the south of the höyük (Fig.1).

Resistivity, magnetic, and self-potential surveys in the north Karum which was located around the höyük (Fig.1).

The survey procedures of these geophysical methods are:

Resistivity: In the survey, the twin probe array was used. In measuring procedures, the grid interval was 1.5m and the investigation depths were 1,2,3 and 4m. The other important advantage of this array is the gradient measurement, which can be easily compared to self-potential data.

Magnetic: The data by gradient measurement were collected at a grid intervals of 2m.

Self-potential: SP data were collected in 1 and 2m grids and in 1,2 and 6m electrode intervals using gradient measuring techniques.

Geophysical Surveys on the Test Profile

First geophysical measurements were carried out as a test profile in a selected area to the north of the Hatipler Palace. The purpose of the profile was to determine the different geophysical responses on the höyük, and to determine survey procedures that could be effectively used in this area. The measuring profile was 54m, and geophysical data were collected by 1m intervals from east to west direction.

Resistivity: This is the oldest geophysical method used in archaeological prospection. Its application showed that the method was very effective in archaeological settlements (Atkinson, 1952; Hesse, 1966a,b; Clark, 1975; Hesse et al., 1986). However, the disadvantage in using resistivity is the low contrast between soil and archaeological settlement resulting from the intensive use of mud brick materials. This phenomenon is especially more intense if there is a thick mud brick layer in the area. Moreover, if the amount of stone in the walls and foundations is too few or absent, the low resistivity contrast is a considerable problem. The Acemhöyük archaeological remains, however, were burned in very intense fire; the mud brick material changed in both its physical and chemical composition. We therefore believed that this conflagration would increase the success of resistivity method on the mound. For this reason, resistivity measurements were carried out by Wenner, dipole-dipole and twin probe array, and the depth investigations were chosen at 1,2,3 and 4m intervals in the test profile. At this stage, we searched for the appropriate array. The results showed that the twin probe array revealed more acceptable anomalies than the other arrays. Furthermore, we believed that one other advantage of this array produced a gaussian anomaly which could be an advantage in signal processing. Thus, we decided that the large-scale resistivity studies would be carried out by twin probe. The data obtained in the test profile were plotted against the different investigation depths. Moreover, the easily observed physical changes seen in the profile from former archaeological excavations were also included in the plots. Thus, these results were compared to each other and the effective interpretations were made. When we look at the resistivity graphics in fig.2a, we observe that the resistivity anomalies in burnt walls are very visible, particularly in graphics of 1m investigation depth. Thus, we believed that the burnt walls could be determined by the resistivity method in this area.

Self-potential (SP): Use of the self-potential (SP) method on archaeological sites has been very limited; only Wynn and Sherwood (1984) in the USA have obtained positive results. For this reason a new method could be tried, the response of which could be observed due to the very different chemical and physical make-up in höyük type archaeological settlements. Furthermore, a big fire such as the type Acemhöyük experienced, may have altered the properties in these areas. The self-potential data were collected by a gradient array in1m measuring interval. In this process, the electrode interval was choosen as 2m. Total SP data were also obtained by arithmetical addition of the corrected gradient data at the measuring points. Afterwards, gradient and total SP data were display graphically. As can be seen in this graphic, the SP anomalies were observed in areas of physical and chemical changes and in burned zones. This is an important result about self-potential anomalies in archaeological settlements, and it shows that detailed surveys must be applied in this area. The anomalies were processed by forward and inversion techniques, and thus the parameters (i.e., the polarisation angle, and the depth and origin of co-ordinates selected directly above the centre of the source) were determined. The most important result in this area is the similarity between the observed changes in the soil and the parameters revealed with SP geophysical exploration. Thus, areas containing different changes may be modelled with geophysical methods (Fig.2b).

Magnetic: The heavily burned materials were the principal reason for using magnetic prospection in this area. Burned areas are important because they produce magnetic anomalies; the data can be collected by gridding and mapping to determine archaeological structures. (Weymouth, 1986; Becker, 1993; Tsokas et al., 1994). In this study, the total magnetic field measurements were carried out in the first 38m of the extremely burned test profile. The anomaly amplitudes, caused by burned material, increase or decrease according to its

depth. Extremely magnitized burial structures that are close to the surface, produce very strong anomaly amplitudes. If the structures is at a depth of 3-5 rate, the anomaly amplitude will decrease. Thus, magnetic anomalies can be found in all sensor heights for structures, that are extremely magnetized and very close to the surface. In contrast, the selection of sensor height will be important. When structures are buried at different depths they are magnetized at different values in the höyük type of deposits. The height of the sensor is important in detecting buried structures. In this study, we collected data with the Geometrics G-856 total field proton magnetometer. The sensor heights was placed at 60, 120, 180 and 240cm. Then the data were organized in graphical form and compared with each other. After this, we found that sensor heights, of 60 and 180cm were the next effective in detecting archaeological structures. Thus, gradient data were easily obtained with these two sensor heights. The results (collected by both top and bottom sensors and the gradient process) are shown in fig.2c,d. As can be seen from the total magnetic field and gradient curves, very strong anomalies are found over the extremely burned zones, walls and other archaeological objects (Fig.2c,d). Thus, we believed that magnetic anomalies can easily be detected by using these sensor heights.

Large-Scale Geophysical Explorations

Rather recently, geophysical instruments are well developed by electronic and computer technologies, and can collect a lot of information in one day at any archaeological site. Thus, a research area can be mapped entirely in a very short time. This is called large-scale geophysical exploration and is extensively used. In studies of this kind, many geophysical methods are used in combination and the physical properties of buried archaeological objects can be investigated in a very short time, and can help quite effectively archaeological excavation compared to traditional excavation techniques. Acemhöyük was selected as a prototype because the area had been excavated for very long time, and the architectural plan of the Assyrian Trade Colony period was partly known. Controls by excavation gave the possibility to make comparison with our large-scale geophysical prospections. After receiving positive geophysical results from the test profile, the large-scale geophysical explorations were carried out by implementing 3 different geophysical methods. The first geophysical study (i.e., magnetic, resistivity and self-potential) was conducted in the north part of Hatipler palace. The second survey (using the magnetic method) concentrated on the area between Hatipler and Sarıkaya palace, covering a large area. Small-scale magnetic prospection studies were carried out in the burned structure area (Yanık Bina). In the final stage of these surveys, a small-scale area was selected to the north of the Karum. Magnetic, resistivity and self-potential methods were used.

Resistivity surveys

The resistivity surveys were carried out north of Hatipler palace and in the northern part of the Karum area (Fig.1). The first study area was north of Hatipler palace, 17m from the test profile. The investigated area was determined according to the grid-system of the archaeological excavation. The surveyed area was 50x76m in dimension, and the measuring points and profile intervals were selected at 1.5m and 2m, (1.5x2m) respectively. The resistivity data were collected by resistivity profiling using twin probe array. In this array, a current and one potential electrode were placed in a fixed position. The other current and potential electrodes are transported between each measuring point . Furthermore, the mobile electrodes are transported along the rope, which are marked according to the operational grid system. So, this process is quickly completed on the measuring profile. In this setting, the configuration factor of the array was approximately $\pi.a$ where a is the spacing of the mobile electro-

des (Aspinall and Lynam, 1970; Drahor, 1993a; Tsokas et al., 1994). In this study, the resistivity data were collected for 1 and 3m depths. The measurements were made by the METZ SAS-203 resistivity instrument, which is a signal average system. There was not a climatic change and the moisture content of soil did not change during our measurements. Thus, the background values were not affected by the different environmental conditions. Only a few differences, which occurred when we moved fixed points, were corrected by a simple correction technique.

The data collected from the north of Hatipler palace was imaged by gray scale at two different depths (Fig.3a and b). As can be seen in the maps, the anomalies have different characteristics. Due to the high clay content of the soil, the resistivity contrasts did not appear on these maps. However, at the 1m depth the map shows a higher resistivity contrast compared to the map at the 3m depth level. We thought that this could be from the Islamic graves, which are very close to the surface. These graves have a simple form and contain a gravestone over the head of the body. The gravestones were buried inside at a depth of 30-40cm sometime in the last century. Thus, the high resistivity anomalies in the 1m depth map may be due to these burial gravestones. In order to eliminate measuring errors, we applied a low-pass filter to the raw data. We can show that the 1m depth map was cleaned of surface disturbances, and that the burial gravestones clearly appear (Fig.4a). To determine the shallowness of archaeological remains, however, we applied a high pass filter to these data (Fig.4b). Furthermore, to increase the signal-noise ratio, we added a signal detection filter. The signal detection filter maps show that the shallower gravestones (Fig.4c) produced the anomalies in the southwest part of the map. Similar processes were applied to the 3m depth map, and the high resistivity anomalies found in south and southwest part of the investigation area were more effectively imaged (Fig.5a,b,c).

Another resistivity study with a dimension of the 34x41m, was carried out in the northern Karum area. The data was collected by the dipole-dipole array due to modern settlement. As the modern houses were very close to the investigation area, the fixed probes of the twin array were not inserted. The resistivity survey was carried out at 1 and 3m depths. As can be seen from the maps, a strong resistivity contrast, as observed on the höyük in resistivity maps, could not be obtained. We estimate that the high resistivity anomalies in the northern and southern parts of the dipole-dipole 1m map are generated by the effects of structural foundations near the surface (Fig.6a). For the 3m spacing in the same area, the anomalies generally ran in aa NE-SW direction, although the resistivity contrast decreased (Fig.6b) (Drahor et al., 1996). After the signal detection filter had been applied to the same data, these anomalies more clearly be observed. Therefore, an architectural structuring similar to a höyük can be considered.

Self-potential (SP) surveys

The use of self-potential (SP) method at archaeological sites has been very limited; thus anomalies resulting from SP method are not well understood. It is for this reason that the method is not frequently used in archaeological prospection. We believe that vertical capillary water flow around stone walls the porosity of soil surrounding archaeological structures, the moisture and clay ratio of soil, and changes in soil pH values of the soil, may contribute to SP anomalies. However, an SP anomaly may also occur if moist conditions are cutting through the sulphiric and oxidized deposits below the surface (Drahor et. al., 1996). We believed that the SP method might give a positive result in a höyük type setting, and therefore we used this method in several areas. In the surveying process, the physical changes, which can easily be seen from the surface area, were observed by empirical methods, and these observations were added to the graphics and to the maps. Moreover, measu-

rements were plotted on a detailed plan, which would be used as theoretical and detailed background for future surveys. As mentioned above, the SP surveys were successfully carried out in the test profile. The detailed SP surveys were continued in the A, E and Karum areas. SP electrode intervals were chosen at 1 and 2m intervals for area A and 2 and 6m for area E and the Karum. In addition, the SP data were collected in two directions perpendicular to each other in area E, and changes from the measuring directions were also investigated. The gradient SP data obtained by 2m electrode intervals from area A and E were mapped by gray-scale imaging (Fig.7a). As can be seen from the SP gradient map, the positive and negative voltages were similar to the directions of archaeological structure. In the western part of the map, the anomalies, which follow each other in regular form, were in same positions as the anomalies on the 3m depth resistivity map. The main goal of an SP survey is to explain the possible mechanism by which structures were buried. For this reason, SP data were processed by forward and inversion techniques, and three important parameters were determined. Thus, the area was modelled by means of SP parameters, which might signed the burial of archaeological remains. In the first stage, the data was processed by the nomogram technique (Bhattacharyya and Roy, 1981), and the results formed the initial values in inversion process (Ram Babu and Atchuta Rao, 1988; Jagannadha Rao et al., 1993). In the inversion process, sphere, vertical cylinder, inclined sheet and 2-D sheet models were used. After this process, the appropriate parameters were established according to the measuring position in cartesian co-ordinates, thus the horizontal projection of the polarization centre was found (Fig.7b). This drawing technique demonstrated that polarization angles and variations of depth could easily be seen; thus the investigation area was modelled in simple form. The results of inversion processes pointed out that our models, produced from the same polarization angle, were in a NE-SW and NW-SE orientation, the same as the archaeological structures. This is an important result in terms of SP analysis for archaeological investigations. This situation showed that the archaeological structures could be easily recognised by the self-potential method in höyük type of sites (Drahor, 1993 a,b; Drahor, 1994; Drahor et al., 1996). Furthermore, the anomalies which were observed in a N-S directions in the middle of the map, corresponded to deposits from earlier excavations (Fig.8, shown with arrow. We can therefore say that the SP method is rather sensitive to soil changes. To control our results, an excavation was made in a 5x5m area (shown as a square on fig.7b). The results obtained from this excavation will be discussed below.

Another survey area where the self-potential method was applied is a 26x26m section in the Karum area. The data was collected in 6m electrode intervals by gradient measurements. The gradient data shows that anomalies are generally oriented in NE-SW and NW-SE directions. Thus, the anomalies are similar to the höyük (Fig.6c). We suppose that similar architectural plans might be found in this area.

Magnetic surveys

Magnetic survey is one of the oldest methods used in archaeological prospection. The method has been applied in large number of archaeological sites to solve problems and it has been refined through time (Aitken, 1959; Aitken and Tite, 1962; Scollar and Krueckeberg, 1966; Clark, 1975; Weymouth, 1986; Tsokas et al., 1994). The method is fast and effective especially in areas where the features are burned. The initial work was the test profile, and rather it was extended to cover a large area where positive results had already been obtained. The data was collected in 2x2m grid intervals by gradient measurements. The sensor height was placed at 60 and 180cm along the test profile. The data was corrected by the base correction method and then mapped. As the area between the Hatipler and Sarıkaya palaces was designed as the area for archaeologi-

cal excavations our magnetic prospection was more intensively implemented in this part. Furthermore, magnetic surveys were also set up to define the limits of the Karum and of the Burned Structure (Yanık Bina) (Fig.1). The magnetic measuring began between Hatipler and Sarıkaya palaces in area E, just north of the Hatipler palace. Magnetic measurements continued to the south in AHS1 (contains AHD1, AHD2, AS2 and AS3 areas) and AHS2 (contains AH1, AH2, AH3, AS1, and AS). In addition, geomagnetic gradient, resistivity and SP maps were drawn to show the directions of anomalies on topographic maps (Fig.8). Interesting anomaly groups were observed in area AHS1, among them a circular anomaly found in the south-west part of the map was very specific. The results showed that this anomaly may be related to an archaeological structural layer in the eastern part of the Hatipler palace (the burned fortification wall?). The anomaly groups are generally concentrated in the north, and run in a NE-SW and NW-SE direction. They may indicate the burned archaeological remains. Moreover, the anomaly with low amplitudes and in the northwestern part of the map also has some very interesting characteristics. Lower magnetic anomalies were also observed in the western part of the map in area AHS2. However, the magnetic values were strengthened in the eastern part of the map (particularly in area AS). The magnetic gradient values fluctuated between -40 and 40 nT/m in this area, and the magnetic contrast was very good. Furthermore, the difference between the maximum and minimum levels obtained by the bottom sensor was 180 nT in this area. We can say therefore that this area may be highly burned. The magnetic anomalies were generally concentrated in northern and southern part of the area. The anomaly directions also run in a NW-SE and NE-SW direction, which may point to another burned architectural deposit. The anomalies in the southern part of the map are very interesting and may be related to a third archaeological layer (Fig.9a).

The main target of geophysical survey in this sector was to determine the geophysical properties of buried archaeological remains, such as their location and depth. Furthermore, different signal analyses and image processing techniques were also applied to the geophysical data, so the interpretation could be strengthened. We obtained very interesting results by using two new techniques. The first technique is an inverse filtering of magnetic data. Karousova and Karous (1989), Tsokas and Papazachos (1992) and Papazachos and Tsokas (1993) explain the theoretical properties of the method in detail. The main purpose of this method is to determine the total magnetic field by the superposition method at every measuring point over bodies which were found at different depths. Then the data thus obtained were screened with a filtering coefficient. We used several filtering coefficients, to determine the different properties of structures in the surveyed area. In this process, filtering coefficients were convoluted with its shape function, and therefore best filter coefficients were obtained to determine the burial structures in investigation area. After this process, the parameters are as follows:

Burial depth of the body: 2m, Inclined angle of body: 90°, Inclined length of body: 2m, Length of body: 3m, Width of body: 2m

This filter gave good results in area AHS2 where the highest magnetic contrast in the Acemhöyük area was located. The gray-scale image (shown in fig.9b) was created by these coefficients that were convoluted with bottom sensor magnetic data in area AS. As shown in this figure, the anomalies in the southern part of the map are clearly enhanced. The anomaly groups with NE-SW and NW-SE direction are associated with the structural bases part of the third layer excavated since 1960's. Resistivity and self-potential surveys in northern of the Hatipler palace also revealed similar results. Furthermore, archaeological excavations from 1966 pointed out a similar association with the third architectural layer (Özgüç, 1968).

Another processing technique applied in this area is pseudo-gravity. Baranov (1957) and Baranov and Naudi (1964) defined the theoretical properties of this technique. Here the pseudo-gravity equations obtained by Hilbert transforms were used (Ram Babu et al., 1989). In this process, the vertical and horizontal magnetic field, reduced to magnetic north, vertical and horizontal gradient, and pseudo-gravity values were independently obtained by the total magnetic field data ; these results were then compared with one another. The pseudo-gravity anomaly map of area AS is presented in fig.9c. The magnetic anomalies found in the southern part of the map were clearer than the anomaly group in the northern part. The results of this technique were not as useful as the other methods applied during this study. The foundations of the Burnt Building has also revealed high magnetic values. The area of this building, designed as AO and AO1 cover an area of 40x40m (Fig.1). The data was processed and interpreted by similar techniques. An anomaly with high magnetic values was found in the southern part of the area; this anomaly may be due to a highly burned structure. Furthermore, after processing, an anomaly in the shape of a square was determined very clearly. We thought that this structure might be burned and therefore similar to structures found in area AS (Fig.10a,b,c,d).

The final geophysical work was the magnetic survey in the northern part of the Karum. The area selected for geophysical testing is 30x40m. As it is evident on the map, the high magnetic anomalies are generally located in the southern part of the investigation area; this situation is similar to the results of the resistivity and to SP prospections (particularly 1m dipole- dipole map). An interesting anomaly is located in the middle of the investigated area, and it is indicated with an arrow in the maps, points out that this location might also have been burned. It was possible to observe this anomaly with clearity in the results from self-potential and magnetic methods (Fig. 6c and d).

Result

The results of our geophysical prospection at Acemhöyük can be summarized as;

The central part of the höyük was partly mapped by implying geophysical methods on a large-scale (approximately 2 hectars) (magnetic, resistivity and self-potential). Especially, the intensively surveyed part around the Hatipler and Sarıkaya palaces, has yielded significant results.

Test and field studies showed that the highly burned mud brick wall remains could clearly be determined through resistivity methods. Unburned mud brick walls however, were not clearly detactable due to their weak resistive contrast. Thus we can say that if there is no visible burnt material in the deposit, it will be difficult to find anomalies by impulses resistivity studies.

The implementation of the SP method at Acemhöyük is important, as it is the first experimentation of this method in a mound site. This survey pointed out that the self-potential method is improved the interpretation in highly burned areas. Furthermore, the method was experimentally developed by field observation and experiment, and we can conclude that highly burned archaeological materials produce SP anomalies. The amplitudes of these anomalies are about 10-20mV/m, but these amplitudes reach to 40mV/m in some areas. This amplitude is very important in determining the cause of SP anomalies. An SP anomaly appears at our site corresponded to physical changes in the surface of the höyük.

In the process of measuring, we collected three different mud brick materials for magnetic susceptibility measuring. They were burned at different temperatures and they were analysed by N. Orbay (1994). According to Orbay (1994, pers. comm.), the burned materials (for example slag) have high magnetic susceptibility values. This result showed that these kinds of materials

might be important for magnetic surveying. After the magnetic researches, these kinds of materials were clearly determined by magnetic prospection method. The magnetic data were processed by different signal processing techniques, which greatly facilitated the interpretation of the map.

Our work at Acemhöyük by implementing different types of geophysical prospection on large scale, has clearly demonstrated the advantages of this strategy at höyük type of archaeological sites.

The results of our geophysical prospection was controlled by two archaeological soundings. The first excavation was carried out in 5x5m grid in area A- just north of Hatipler palace. The excavation continued down to 2.5m in depth, and 1st, 2nd, and 3rd layers related to Assyrian Trade Colony period were exposed. In the 2nd layer, a kiln, an oar processing workshop and other structural foundations were found which can be related to processing workshop. Furthermore, ceramic vessels used for copper processing were found (Öztan, 1993, 1994) (Photograph.1). These fragments were highly eroded due to oxidation and the moisture in the soil. We believe that the self-potential anomalies obtained in this trench may comes from the kiln and buried copper fragments. Thus the experimental results show that burned mud brick materials produce SP anomalies. Another important result in this area was the unburned third level. A sounding to test the results of geophysical prospection was carried out in AS. The test excavation was 10x10m and located between the following co-ordinates: (10,32), (10,42), (20,32) and (20,42). After the excavation, a highly burned building complex, related to the 3rd layer, (contemporary with the palace) was found. The excavation shows that an intense fire burned the building. Like the palace, the mud brick walls of the building were 90cm thick. The whole extent of the palace's big room was found. What was recovered by archaeological excavation concords well with the results of our geophysical prospection, both in its orientation and in its size (Öztan, 1995). By inverse filtering, the anomaly indicated a building with the dimensions of 7 x 7 m, and this was justified with the results of the excavation (photograph 2). This result showed that data processing and enhancement techniques were very successful and that they were effective in recording buried archaeological structures. Accordingly, we can suggest that the inverse filtering technique might determine the other buried structures, and their dimensions.

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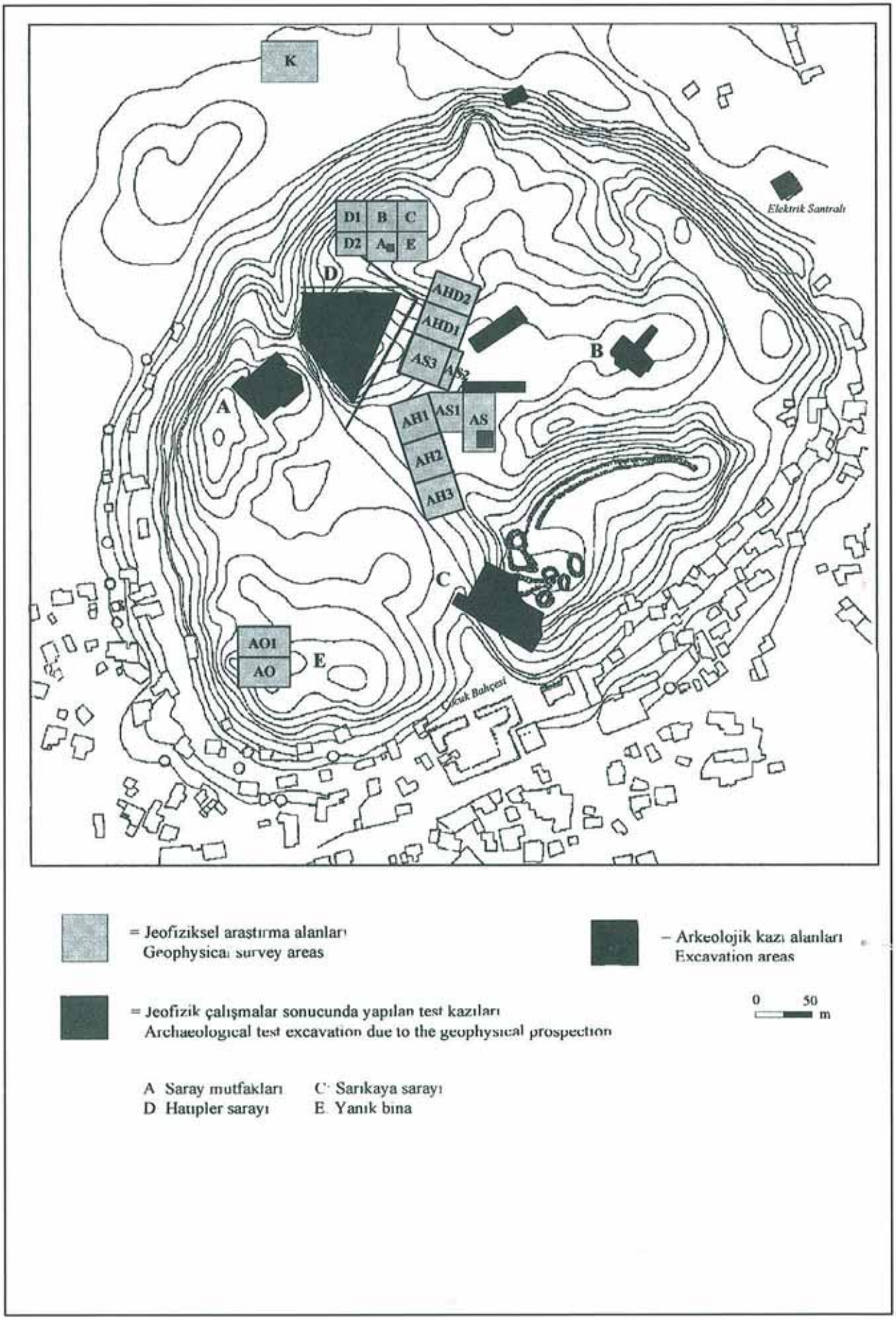


Figure 1: Topographical map of Acemhöyük and geophysical explorations

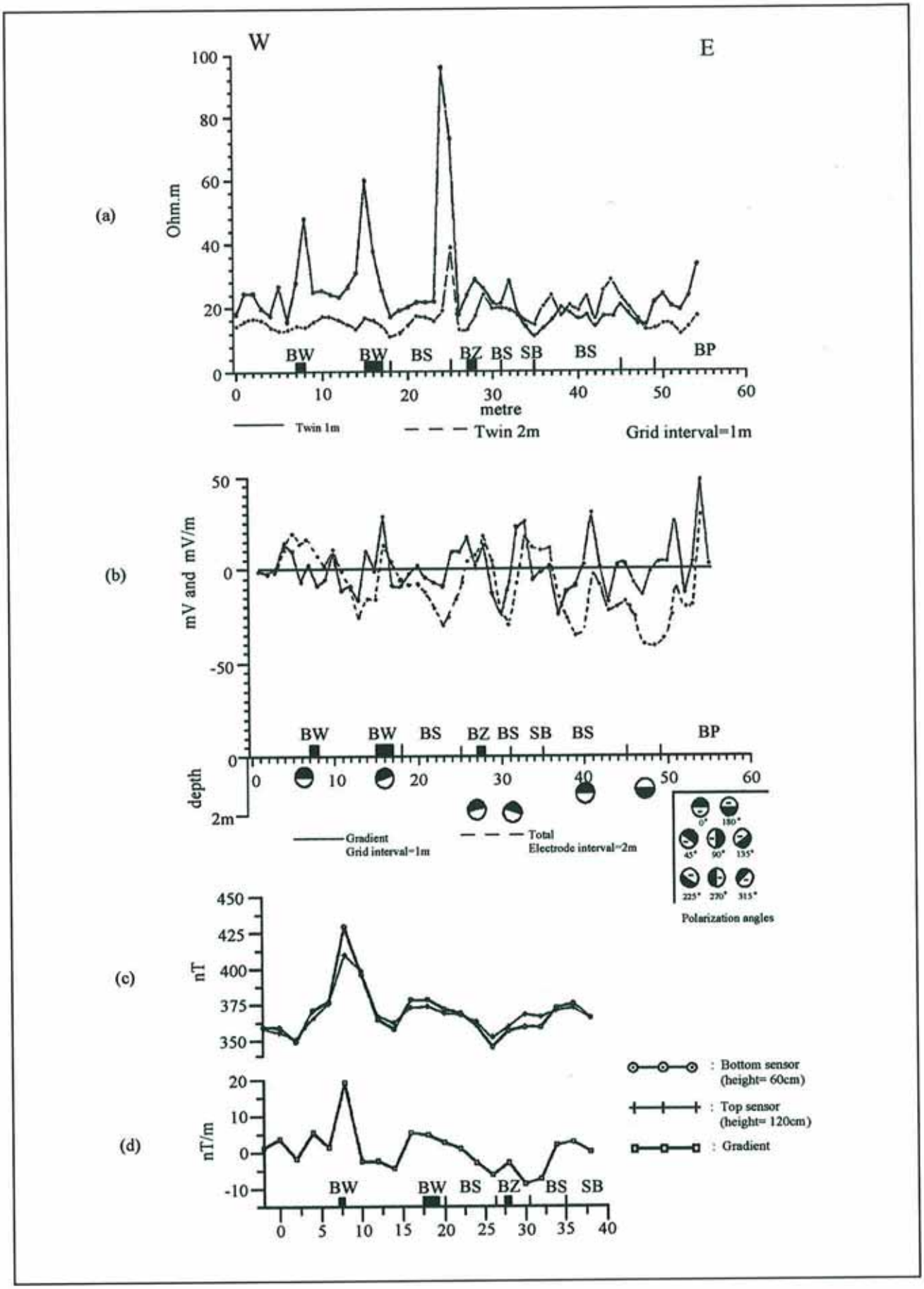


Figure 2: a) Resistivity, b) Self-potential, c) Total magnetic field (top and bottom sensor) and d) Magnetic gradient data on the test profile at the Hatipler palace. (BW, burnt wall; BZ, burnt zone; BS, burnt soil; SB, stone bases; BP, border of the palace; n, polarization angles and depths) (from Drahor et al., 1996).

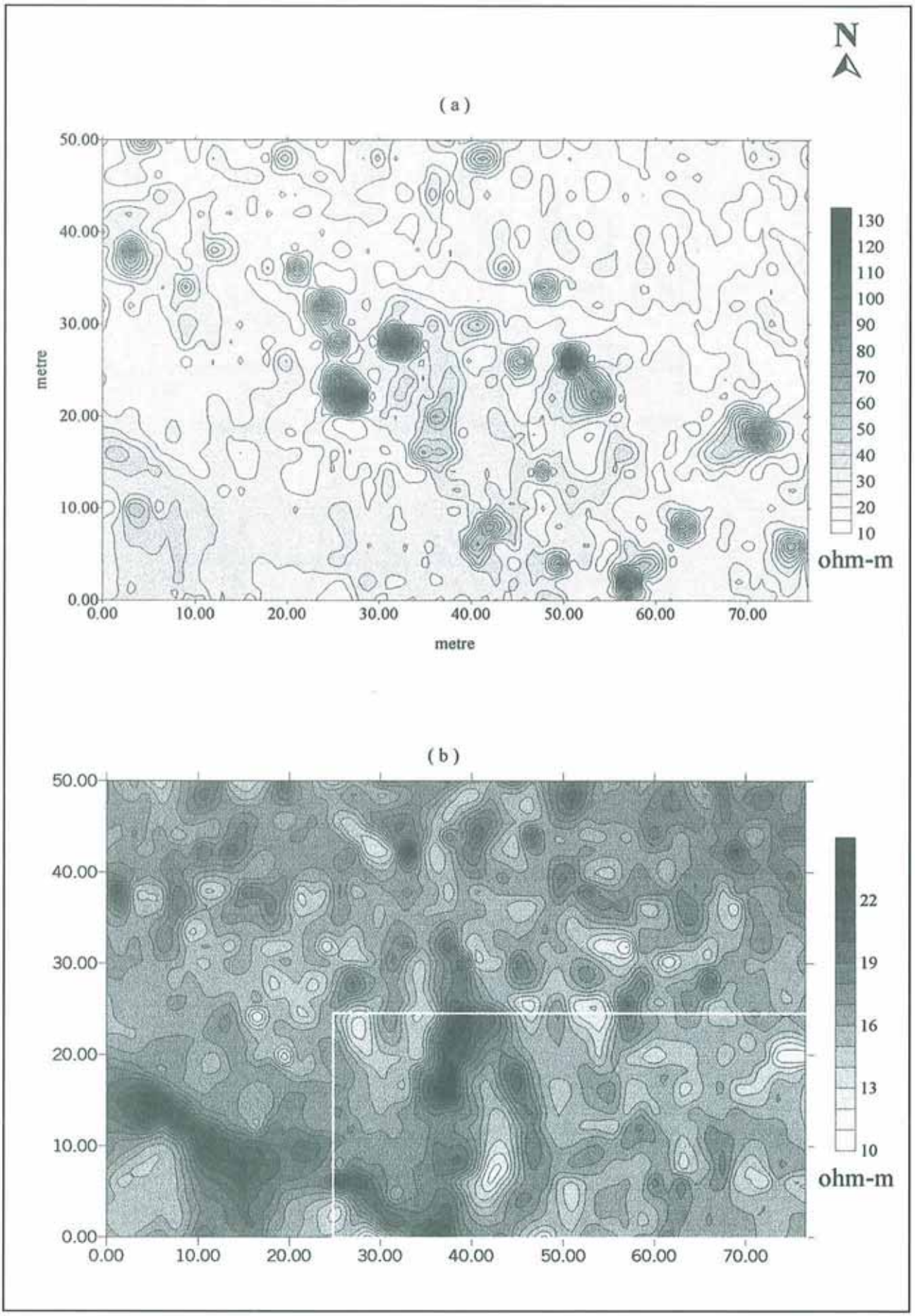


Figure 3: a) Apparent resistivity map of area ABCDE (twin 1m), b) Apparent resistivity map of area ABCDE (twin 3m) (SP study area indicated by white perpendicular).

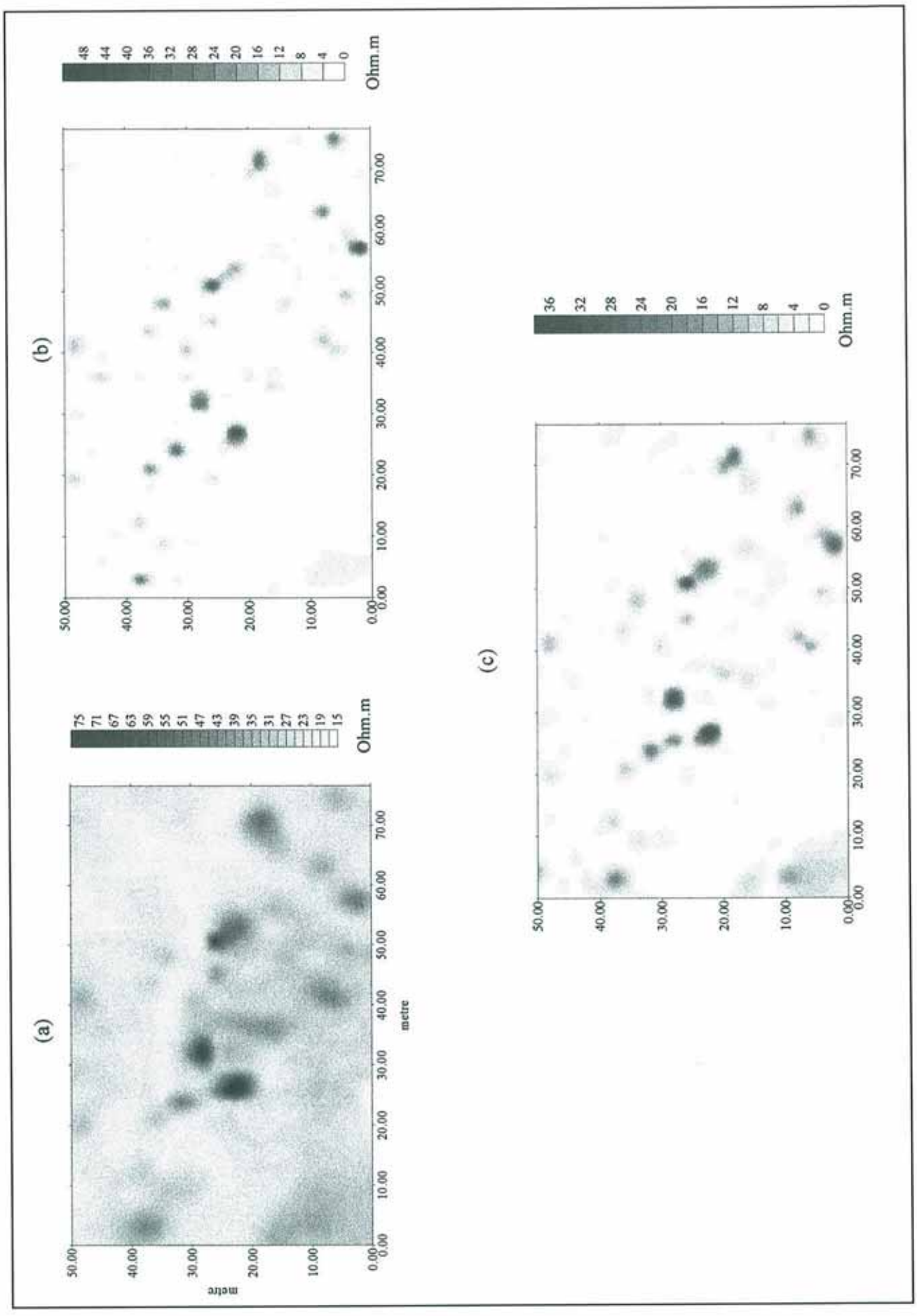


Figure 4: a) After low pass filtering, b) after high pass filtering, c) after signal detection filtering of raw data (twin 1m).

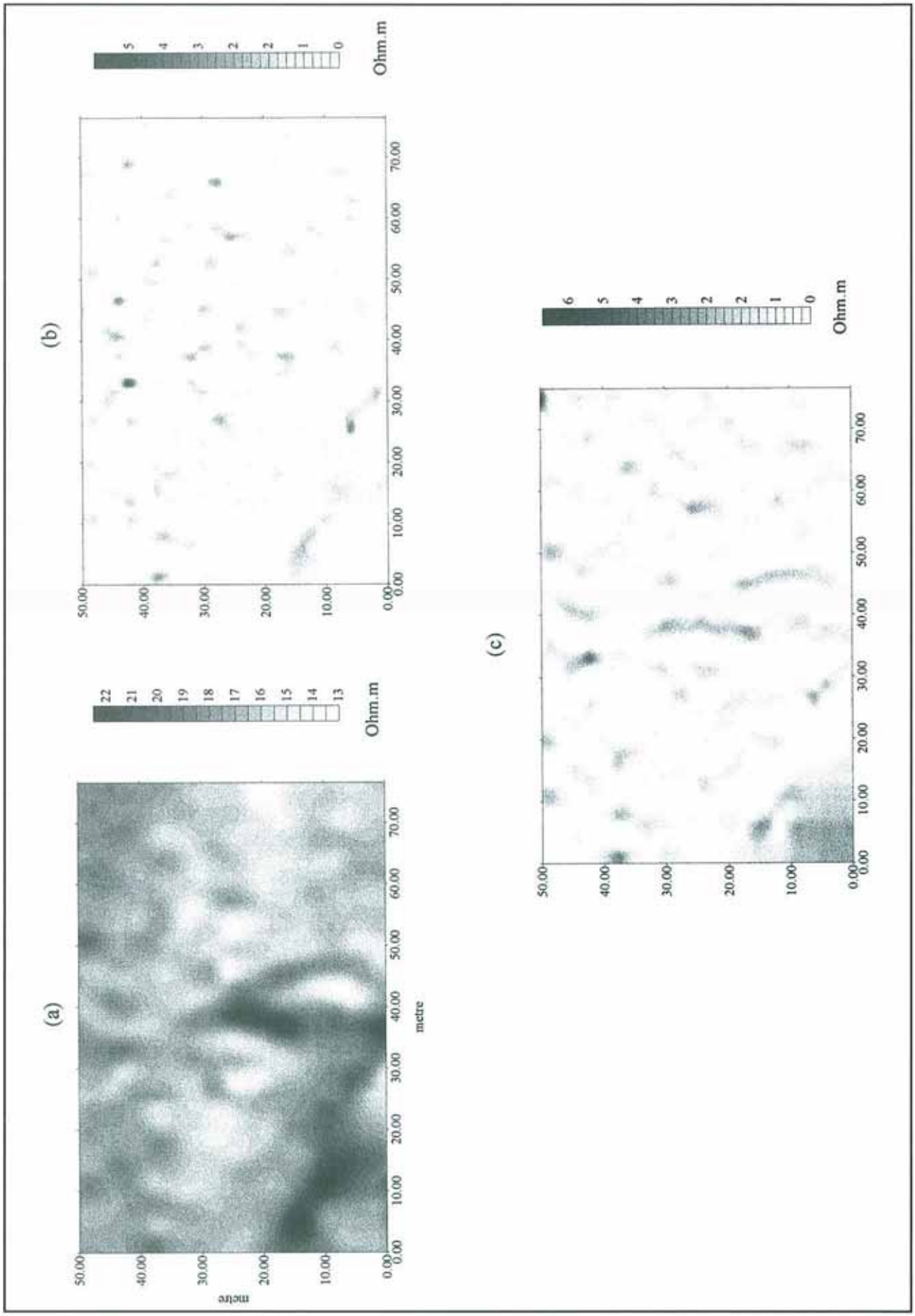


Figure 5: a) After low pass filtering, b) after high pass filtering, c) after signal detection filtering of raw data (twin 3m).

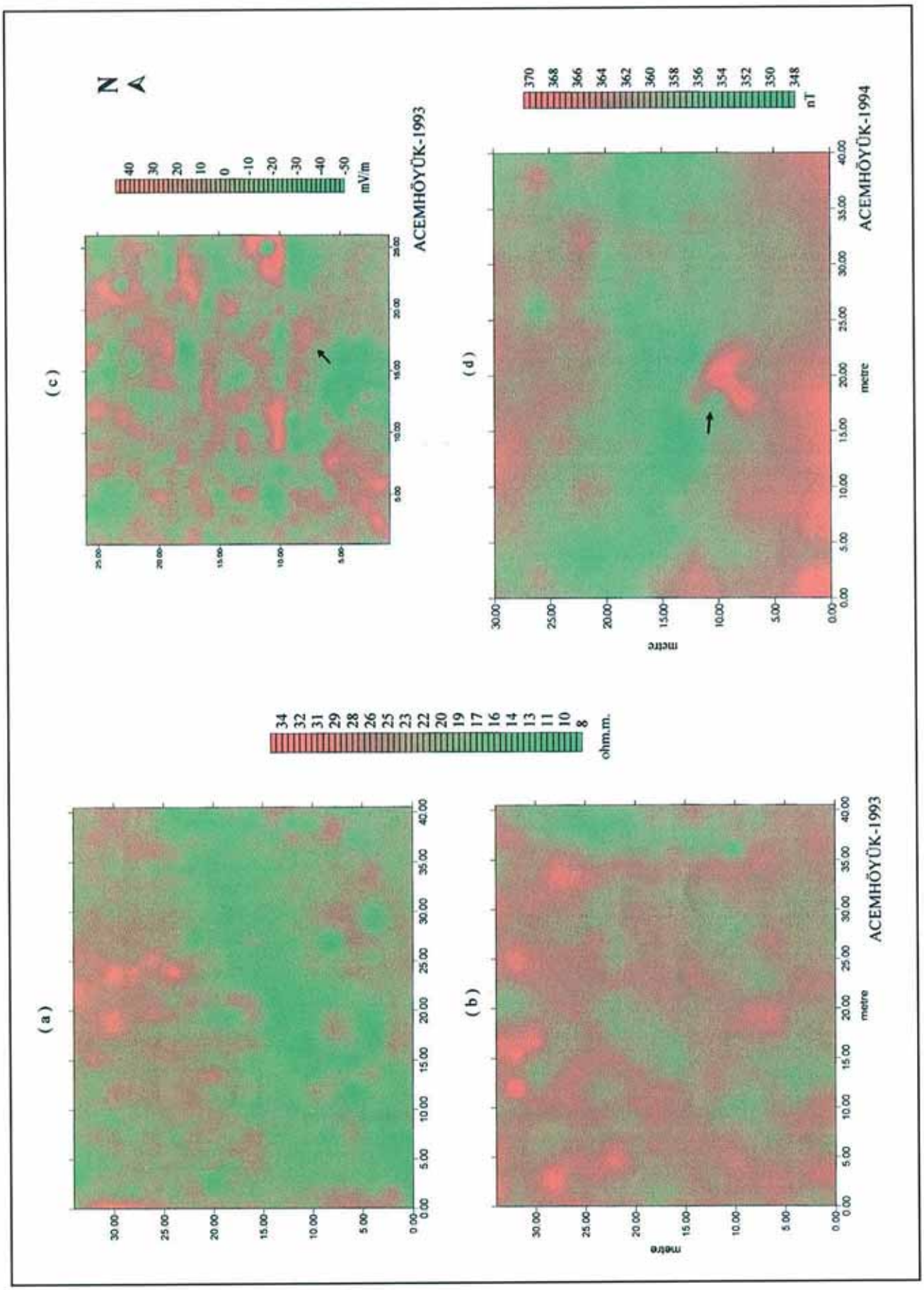


Figure 6: a) Apparent resistivity map of the Karum area (dipole-dipole 1m), b) apparent resistivity map of the Karum area (dipole-dipole 3m), c) gradient SP map of the Karum area (electrode interval=6m), d) total magnetic field map of the Karum area (sensor height=60cm) (Drahor et al., 1996).

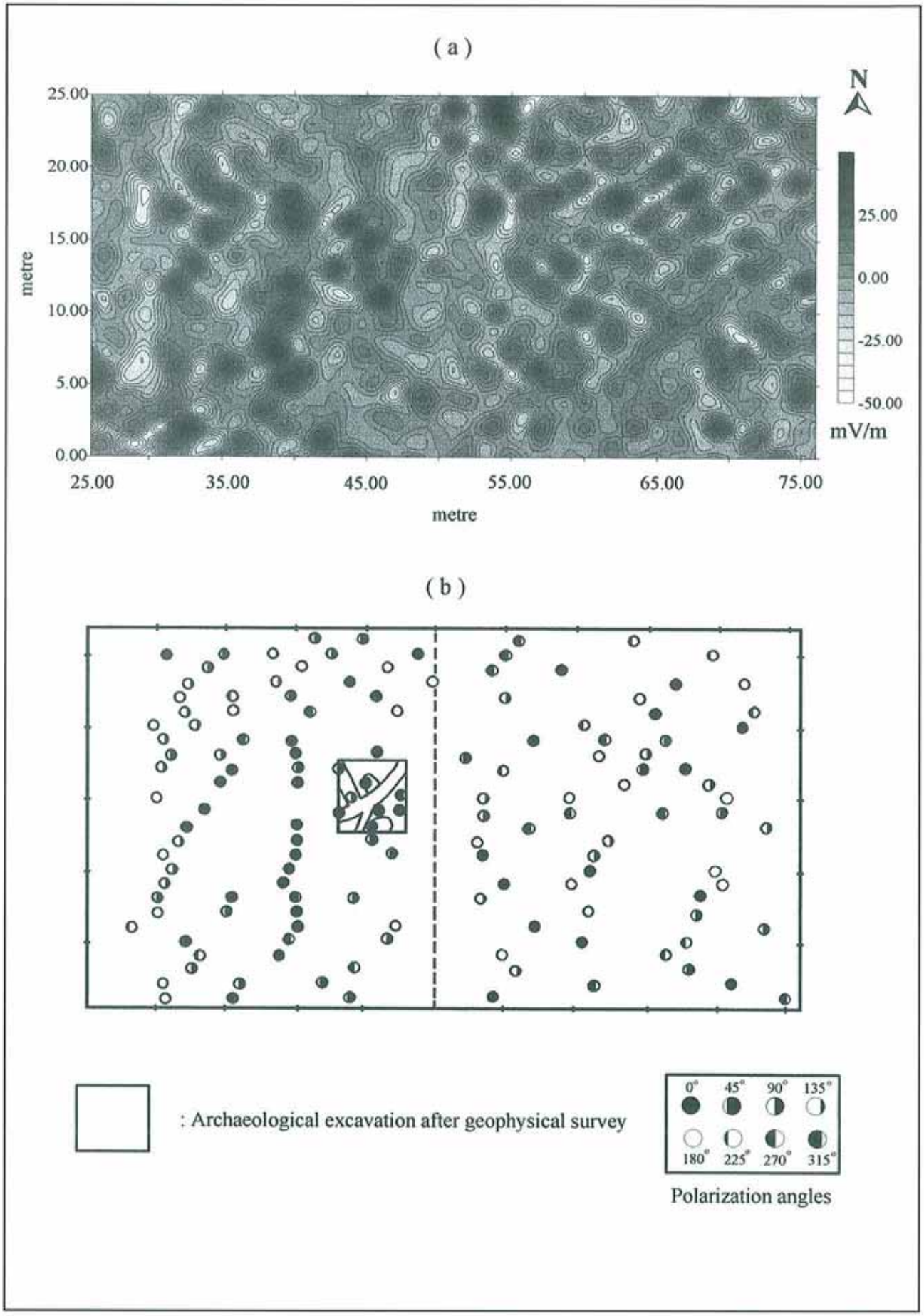


Figure 7: a) Gradient SP map of area AE, b) Horizontal projection of the polarization centres at Hatipler palace (areas A and E) (measured with non-polarizable electrodes). Direction, W-E; electrode interval: 2m; polarization depths, all depths (Drahor et al., 1996).

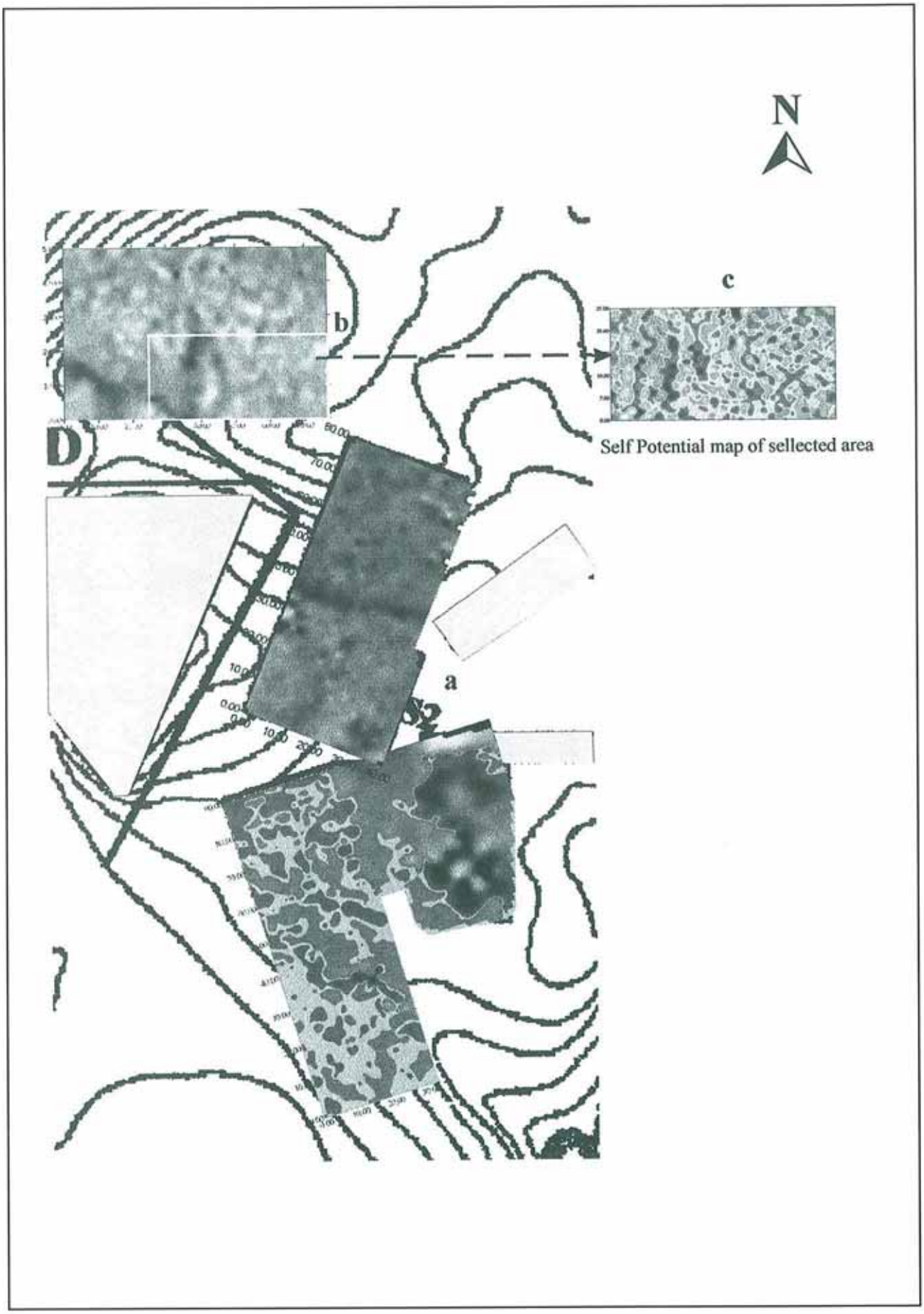


Figure 8: Large-scale geomagnetic, resistivity and SP maps in the höyük. a) Geomagnetic, b) resistivity, c) self-potential.

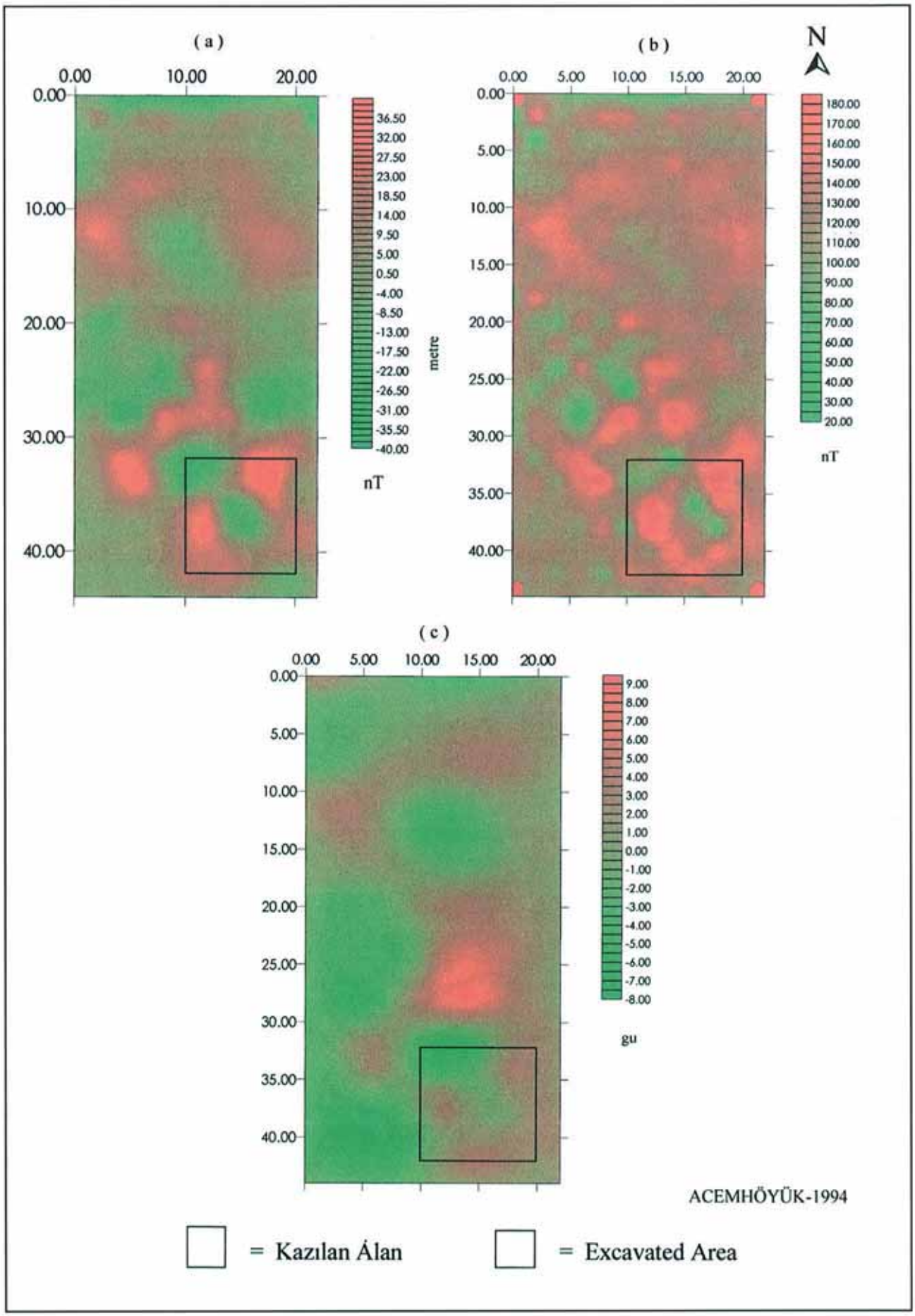


Figure 9: Geomagnetic gradient maps of area AS. a) Raw data obtained by bottom sensor, b) after inverse filtering, c) pseudo-gravity.

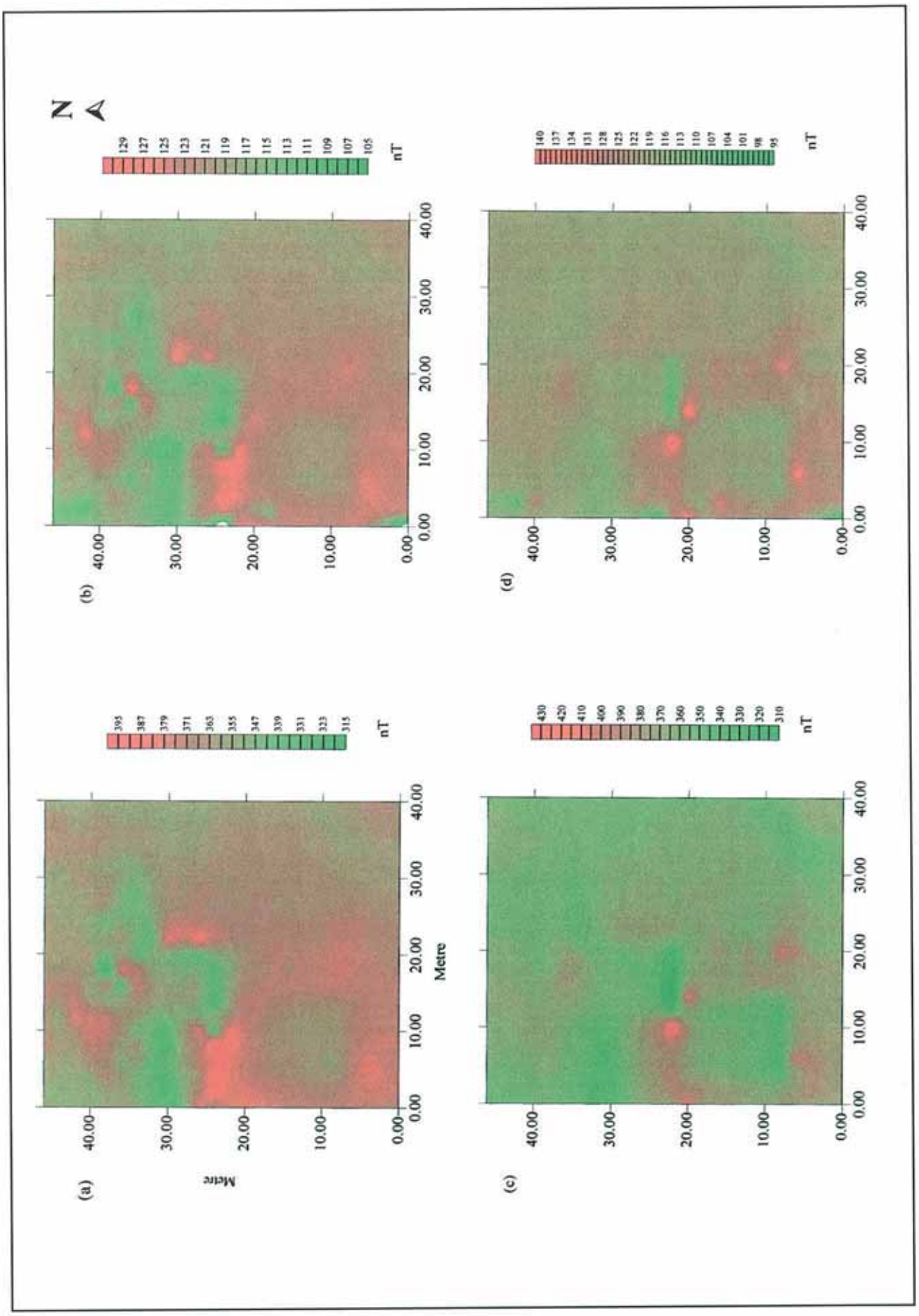
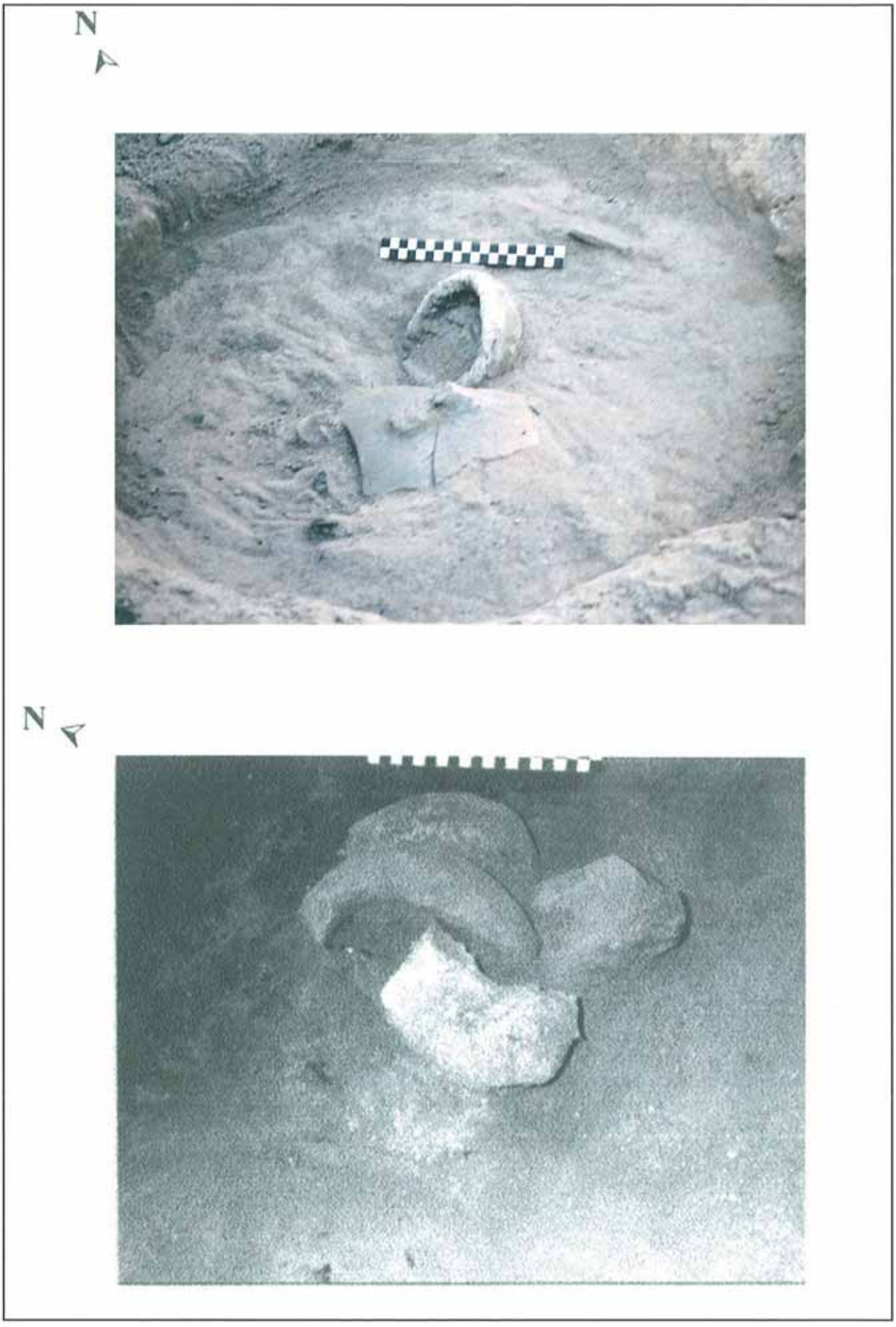


Figure 10: Geomagnetic gradient map of area AO and AO1. a) Observed data by bottom sensor, b) observed data by top sensor, c) after inverse filtering of bottom sensor data, d) after inverse filtering of top sensor data.



Photograph.1: The results of archaeological test excavation in area A after the magnetic data.

Photograph.2: The results of archaeological test excavation in area AS after the magnetic data.

Frühchalkolitische Metallfunde von Mersin - Yumuktepe: Beginn der Extraktiven Metallurgie?

Mersin Yumuktepe ilk Kalkolitik Maden Buluntuları: Ekstraktif Metallürjinin Başlangıcı?

Ünsal YALÇIN*

Schlüsselwörter: Anatolien, Mersin, Yumuktepe, frühe Metallurgie, Kupfer, Verhüttung, Gießen, chemische Analyse, Metallographie.
Anahtar Sözcükler: Anadolu, Mersin, Yumuktepe, eski madencilik, bakır, izabe, döküm tekniği, kimyasal analiz, metallografi.

Anadolu'nun en önemli prehistorik yerleşmelerinden olan Mersin Yumuktepe'nin, Anadolu Maden'ciliğinde önemli bir konumu vardır. İyi tarihlenmiş XVI. kültür tabakası (M.Ö.5000) metal buluntuları dünyanın ilk metal aletlerini oluşturmakta ve böylece metalin günümüzden 7 bin yıl önce günlük yaşama girdiğini belgelemektedirler: iki keski, bir balta ve beş rulo başlı iğne bakırdan dökme tekniği ile yapılmış ve daha sonra çekiçlenerek son şekli verilmiştir. Kullanılan bakır ise cevherden izabe yoluyla kazanılmıştır. Alınan bu sonuçlarla Anadolu'da „ekstraktif" madenciliğin „başlangıcı" ve metal döküm tekniği ilk defa Mersin'de belgelenmektedir.

Einleitung

Der am „Müftü Deresi" gelegene Siedlungshügel Yumuktepe erhebt sich im Stadtzentrum der Provinzhauptstadt Mersin. Er zählt zu den wichtigsten prähistorischen Siedlungen in Anatolien (Abb. 1). In Mersin wurde zum ersten Mal im Jahre 1937 unter der Leitung von John Garstang, Universität Liverpool, ausgegraben. Die vom British Museum/London und vom Oriental Institute Chicago unterstützten Grabungsarbeiten mußten mit Ausbruch des zweiten Weltkrieges im Frühjahr 1940 eingestellt werden. In den Jahren 1947-48 kam Garstang noch einmal nach Mersin, um seine unterbrochenen Arbeiten fortzusetzen.

Der zweite Weltkrieg hatte nicht nur die Arbeiten unterbrochen, er hatte auch die Grabungsberichte weitgehend vernichtet: Bei einem Bombenangriff war das Gesamtarchiv des Archäologischen Instituts in Liverpool verbrannt. Trotz dieser unglück-

* Deutsches Bergbau - Museum, D-44801 Bochum /Deutschland

lichen Umstände konnte Garstang das übriggebliebene Berichtsmaterial wie eigene Handnotizen, Karten und Zeichnungen aus Privatbesitz und die aus dem Oriental Institute, zusammentragen und 1953 in einem Buch publizieren.[2] Nach dieser langen "Pause" wurden die Arbeiten in Mersin im Jahre 1993 wieder aufgenommen.[3]

Durch die Ausgrabungen der Jahre 1937-40 und 1947-48 konnten in Mersin - Yumuktepe 33 Kulturhorizonte festgestellt werden, die vom Frühneolithikum (Schicht XXXIII) bis ins Mittelalter (Schicht I) reichen. Diese ange Zeitspanne in einem einzigen Siedlungshügel ist fast beispiellos und unterstreicht die Wichtigkeit von Mersin für die Geschichte der Region. Aus archäometallurgischer Sicht sind die Kulturschichten XXI(?) und XVI von besonderer Bedeutung, da die ersten Metallfunde von Mersin aus diesen Schichten stammen.[3]

Ein Teil der Metallfunde von Mersin wurde von U. Esin (1969) analytisch untersucht.[5] Diese immer wieder unter den frühesten Metallfunden Anatoliens gern zitierten Objekte aus den Schichten XXI und XVI wurden bei dieser Arbeit noch einmal analytisch und metallographisch untersucht, um sie einerseits besser zu charakterisieren und andererseits die Herstellungstechnik zu rekonstruieren. Nach freundlicher Einladung von Prof. V. Sevin und mit Genehmigung der Antikendirektion in Ankara konnten die Objekte erneut beprobt werden.[6] Über die erzielten Untersuchungsergebnisse und die neue Interpretation wird im Folgenden berichtet.[7]

Frühchalkolithische Metallfunde von Mersin

Zwei der untersuchten Metallfunde (MY 1703 und MY 1589) stammen nach Garstang (1953) aus der Kulturschicht XXI (aus der Tiefe 11,10-11,50 m.), die anderen 5 Nadeln (MY 1325, 1330, 1331, 1332, 1333) und beide Meißel (MY 1329, MY 1323) aus Schicht XVI. Er berichtet außerdem von einem weiteren Meißel (MY 1508) und einem Siegel (MY 1562) aus der Schicht XVII, einem Beil (MY 1334), einer Nadel (MY 1325a) und einem Stück Kupfer oder Kupfererz aus der Schicht XVI.[8]

Für die Anfänge der Metallurgie in Anatolien sind die beiden Nadeln aus der Schicht XXI. von besonderem Interesse, da sie nach Garstang die frühesten Metallfunde der Siedlung darstellen. Die Importkeramik aus der Schicht XXI zeigt große Ähnlichkeit mit der mesopotamischen Hassuna-Keramik und läßt sich chronologisch mit Amuq B parallelisieren.[9] Amuq B wird bekanntlich nach der kalibrierten ^{14}C-Daten etwa um 6.000 v.Chr. datiert. Er schreibt andererseits, daß die beiden Nadeln nicht aus sicherem Kontext stammen: Sie wurden nach seinem Bericht in einer Schuttschicht gefunden, die zum Fundamentieren der zur Befestigungsmauer der Schicht XVI gehörenden Rampe diente. Da somit die letzte Bewegung der Artefakte zur Zeit der Schicht XVI erfolgte, stellt dieser Zeitpunkt den einzigen Anhaltspunkt in diesem Zusammenhang dar. Es ist daher nicht zulässig, die Objekte der Schicht XXI zuzuschreiben, wie Garstang es annahm.

Garstang beschreibt dagegen die Fundumstände der Metallfunde aus der Schicht XVI genauer. Sie lassen sich daher sicherer datieren: In den sogenannten „barrack rooms" der Schicht XVI (Abb. 2) finden sich zwar vereinzelt Halafscherben, doch die Mehrheit der gefundenen Keramik zeigt Frühubaid-Merkmale. Demnach läßt sich Schicht XVI in die Übergangsphase Halaf-Ubaid zuordnen. Die Halaf-Ubaid Übergangsphase wird nach kalibrierten ^{14}C-Daten etwa auf 5.000 v.Chr. datiert. Mellink (1992) vergleicht Mersin XVI mit Amuq E, womit 5000 v.Chr. als Datierung bestätigt wird.[10] 1995 wurde eine neue ^{14}C-Datierung durchgeführt. Demnach wird Schicht XVI etwa 5940 ±70 BP datiert.[11] Auch diese letzte Datierung bestätigt die bisherige zeitliche Ausetzung von Schicht XVI.

Die bei dieser Arbeit untersuchten Metallobjekte von Mersin wurden in der Tabelle 1 zusammengefaßt.

Inv.-Nr.	Objekt	Kontext
MY 1703	Nadel mit gebogenem Kopf	Mersin XXI (?)
MY 1589	Nadel mit nagelförmigem Kopf	Mersin XXI (?)
MY 1325	Nadel mit eingerolltem Kopf	Mersin XVI, Raum 169
MY 1330	Nadel mit eingerolltem Kopf	Mersin XVI, Raum 189
MY 1331	Nadel mit eingerolltem Kopf	Mersin XVI, Raum 189
MY 1332	Nadel mit eingerolltem Kopf	Mersin XVI, Raum 184
MY 1333	Nadel mit eingerolltem Kopf	Mersin XVI, Raum 189
MY 1323	Meißel	Mersin XVI, Raum 169
MY 1329	Meißel	Mersin XVI, Raum 189

Tabelle 1: Metallfunde von Mersin - Yumuktepe. Es wurden nur die bei dieser Arbeit untersuchten Funde aufgeführt (für den archäologischen Kontext siehe Garstang 1953: 76, 137, 140). Die Datierung der Funde MY 1703 und MY 1589 wurde mit einer Fragezeichen versehen, da sie in der Schuttschicht der Fundamentfüllung der Befestigungsmauer der Schicht XVI gefunden wurden und damit wahrscheinlich der Schicht XVI angehören.

Visuelle Beschreibung der untersuchten Metallobjekte

Die untersuchten Metallobjekte wurden vor der Probeentnahme von Korrosion befreit. Dabei konnten auf der Oberfläche Bearbeitungs- und Benutzungsspuren beobachtet werden. Demnach waren alle Objekte im Gebrauch. Deutliche Schmiedespuren konnten bei den Nadeln festgestellt werden. Die Hammerspuren auf den beiden Meißeln rühren wahrscheinlich von ihren Gebrauch her. Die teilweise gut erkennbaren Schleifspuren deuten darauf hin, daß die Oberfläche der Objekte jeweils gefeilt wurde. Die makroskopischen Beobachtungen werden im folgenden detailliert beschrieben (vgl. dazu Tafel 1 und 2)[12].

1. MY 1703 (Abb.3, Zeichnung 7): Nadel mit schleifenförmig gebogenem Kopf (Länge der Nadel: 56 mm, Schaftdurchmesser: 3 mm). Das Objekt ist früher mit Säure gesäubert worden, so daß die Oberflächenmerkmale wie Schleif- und Hammerspuren nicht mehr zu erkennen sind. Die Spitze der Nadel ist abgebrochen.

2. MY 1589 (Abb. 3, Zeichnung 6): Nadel mit nagelförmigem Kopf (Länge der Nadel: 85 mm, Schaftdurchmesser: 3 mm). Die Nadel ist in sehr guter Zustand und besitzt eine Malachitpatina. Der quadratische Kopf wurde separat hergestellt und nagelförmig angesetzt. Der Schaft ist nahezu rund und im unteren Drittel gebogen. Die Hammer- und Schleifspuren deuten darauf hin, daß die Nadel durch Schmieden hergestellt wurde.

3. MY 1325 (Abb. 3, Zeichnung 1): Nadel mit eingerolltem Kopf (Länge der Nadel: 91 mm, Schaftdurchmesser: 3 mm, Breite des Kopfes: 8 mm). Sie ist sehr gut erhalten. Die deutlichen Hammerspuren deuten auf eine Herstellung durch Schmieden hin. Der Kopfteil wurde vor dem Einrollen flach geschmiedet (0,2 -0,3 mm). Im unteren Teil sind deutliche Schleifspuren zu erkennen. Es ist anzunehmen, daß die Spitze durch Hämmern und Feilen gespitzt wurde.

4. MY 1330 (Abb. 3, Zeichnung 2): Nadel mit eingerolltem Kopf (Länge der Nadel: 92 mm). Sie ist im Kopfbereich eckig (3,6 x 4,7 mm) und nimmt nach unten hin allmählich eine Kreisform ein (3,8 x 4,1 mm). Der Bereich an der Spitze ist dann kreisförmig (Durchmesser: 1,5 mm). Das Kopfende wurde nur leicht flach geschmiedet und (wahrscheinlich deshalb) beim Biegen gebrochen. Das Objekt zeigt keinerlei Gebrauchsspuren und ist in gutem Zustand. Es besitzt eine Patina aus Cuprit und ist leicht korrodiert.

5. MY 1331 (Abb. 3, Zeichnung 5): Nadel mit eingerolltem Kopf (Länge der Nadel: 69 mm, Durchmesser im Kopfbereich: 2,7 mm, in der Mitte: 2,1 mm). Dieses Objekt wurde in gleicher Weise hergestellt wie MY 1325. Es ist etwas schlechter erhalten als die anderen Nadeln. Die Spitze ist abgebrochen.

6. MY 1332 (Abb. 3, Zeichnung 3): Nadel mit eingerolltem Kopf (Länge der Nadel: 113,5 mm). Sie ist am Kopfbereich eckig (4,1x 4,2 mm) wird zur Mitte hin kreisförmig (4,2 mm). Die Spitze der Nadel ist abgebrochen. Sie zeigt deutliche Hammerspuren. Das eckige Kopfende wurde leicht flach geschmiedet und eingerollt. Die obere Hälfte des Objekts ist sehr gut erhalten, während die untere Hälfte leichte Korrosion zeigt.

7. MY 1333 (Abb. 3, Zeichnung 4): Nadel mit eingerolltem Kopf (Länge der Nadel: 107 mm). Sie ist ähnlich wie MY 1330 im Kopfbereich und oberen 2/3 eckig geschmiedet (Kopfende: 2,8 x 3,3 mm, Mitte: 3,0 x 3,3 mm). Erst zur Spitze hin wird sie rund (2 mm). Das Kopfende wurde vor dem Einrollen flach gehämmert. Das Objekt ist teilweise stark korrodiert. Die Spitze ist abgebrochen.

8. MY 1323 (Abb. 4, unten): Meißel in trapezoider Form (erhaltene Länge: 68mm, Breite im Nacken: 16 mm, in der Schneide: 28 mm, Dicke im Nacken: 16 mm, in der Schneide: 1 mm). Der Nacken des Objektes wurde offenbar abgebrochen. Die breite Schneide schwingt etwas aus. Das Objekt ist insgesamt in einem guten Zustand. Die bis zu 1,5 mm dicke Korrosion zeigt teilweise rossettenartige Ausblühungen von Kupfersalzen. Im restaurierten Zustand sind teilweise sehr feine Hammerspuren zu erkennen. Das Objekt wurde wahrscheinlich zuerst in Meißelform gegossen und danach mit einem harten Gegenstand retuschiert. Die Schneide ist einseitig gedengelt. Sie zeigt deutliche Gebrauchsspuren.

9. MY 1329 (Abb. 4, oben): Länglicher Meißel in stark trapezoider Form (Länge: 112 mm, Breite am Nacken: 4 mm, in der Schneide 30 mm, Dicke am Kopfende: 4 mm, in der Mitte 14 mm, in der Schneide 1 mm). Das breite Ende schwingt etwas aus, um eine gebogene Schneide zu bilden. Das sehr gut erhaltene Objekt enthält eine deutlich erkennbare Patina. Die groben und feinen Hammerspuren und engständig parallel laufenden Schleifspuren deuten darauf hin, daß das Objekt nach dem Gießen sehr sorgfältig überarbeitet wurde. Die Schneide ist beidseitig gedengelt. Der Meißel war im Gebrauch: Am Kopfende hat sich durch Klopfen mit einem harten Gegenstand ein „Bart" gebildet.

Naturwissenschaftliche Untersuchung

Die frühen Metallobjekte der Schicht XVI und ein weiteres Objekt der Schicht XVII (?) waren schon in 60 er Jahren mittels optischer Emissionsspektralanalyse (OES) untersucht worden[13]. Die Analysen wurden damals im Rahmen eines Großprojektes zur Erfassung der Metallfunde Europas von der Stuttgarter Gruppe Junghans/Sangmeister/Schröder durchgeführt. Dabei wurden noch weitere Metallfunde aus den jüngeren Schichten von Mersin und einige hundert aus anderen Lokalitäten analysiert.

Die Analysenergebnisse der Objekte aus der Schicht XVI deuteten schon damals darauf hin, dass gediegenes Kupfer als Ausgangsmaterial wahrscheinlich nicht in Frage kommt. Nach Esin (1969) gehören diese Objekte zu der Gruppe der chalkolithischen Metallfunde der Entwicklungsstufe II („IÜS II"), in der gediegenes Kupfer und reines erschmolzenes Kupfer nebeneinander auftreten.[14] Die Analysenergebnisse von Esin sind unten in der Tabelle 2 aufgeführt. Es ist zu betonen, daß die Nachweisgrenzen einiger Elemente wie z.B. As, Sn, Sb und Pb bei einigen hundert ppm lag und deshalb darunter liegende Werte entweder als 0 oder als Spuren angegeben wurden.

Die frühen Metallfunde von Mersin wurden in dieser Arbeit noch einmal Gegen-

Inv-Nr.	Objekt	Fe	Sn	As	Sb	Pb	Ni	Ag	Bi
MY 1325 (17875)	Nadel	Spur	0	Spur	3600	0	Spur	200	Spur
MY 1330 (17878)	Nadel	+	0	0	Spur	0	0	1100	0
MY 1331 (17877)	Nadel	++	7500	1100	5800	1800	1900	400	0
MY 1332 (17879)	Nadel	Spur	0	0	Spur	Spur	Spur	1800	0
MY 1333 (17876)	Nadel	Spur	0	3000	6200	100	<100	400	50
MY 1323 (17873)	Meißel	Spur	0	Spur	Spur	0	200	300	0
MY 1329 (17872)	Meißel	Spur	0	0	900	0	0	1800	0
MY 1334 (17874)	Beil	Spur	0	Spur	3900	0	<100	2600	70
MY 1562 (17871)	Siegel	++	6000	2000	Spur	15500	600	300	Spur

Tabelle 2: Frühe Metallfunde von Mersin – Yumuktepe: Die Analysen stammen aus Esin (1969).
Zur Erläuterung:
Zahlen bedeuten Konzentrationen in ppm.
0 bedeutet unterhalb der Nachweisgrenze (Werte nicht angegeben).
Spur, +, ++: relative Angaben für Spuren- und Nebenelemente- mit geringen Konzentrationen (spur: <0,01 %; +: < 0,1 %; ++: <1 %). Der Hauptbestandteil Kupfer ist hier nicht aufgeführt. Zusätzlich wurden Au, Co und Zn gemessen, die durchgehend unterhalb der Nachweisgrenze lagen und deshalb hier nicht mehr aufgeführt sind.

stand der naturwissenschaftlichen Forschungen, da ihre Rolle für die Entwicklung der Metallurgie in Anatolien immer wieder betont aber bis jetzt nicht klar definiert wurde. Sie wurden teilweise mehrfach beprobt. Für die chemische Analyse wurden Bohrspäne, für metallographische Untersuchung Stückproben entnommen. Die dabei entstandenen „Zahnlücken" wurden vom Restaurateur wieder ersetzt. Da die Objekte vor der Probeentnahme von der Korrosion befreit wurden, konnte eine zusätzliche Analysenverfälschung durch Kontaminierung vermieden werden. Die chemische Analyse wurde mit ICP-OES (optische Emissionsspektralanalyse mit Anregung durch ein induktiv gekoppeltes Plasma) der Firma TJA-Unicam durchgeführt.[15] Ziel der Untersuchungen war die genaue Bestimmung des Rohstoffes und die Rekonstruktion der Herstellungstechnik der Objekte. Dabei ging es vor allem um die Frage, ob gediegenes oder geschmolzenes Kupfer als Rohstoff gedient hat.

Die chemische Zusammensetzung der Proben ist in der Tabelle 3 zusammengefaßt. Die teilweise niedrigen Kupfergehalte deuten auf teilweise korrodierte Proben hin, d.h. die Differenz in der Summe ist auf die nicht analysierten nichtmetallischen Elemente Sauerstoff, Kohlenstoff und Wasserstoff zurückzuführen.

Der Vergleich mit den früheren Analysen derselben Objekte zeigt, daß die Verteilung einiger Elemente in beiden Methoden nur grob übereinstimmen, während andere Elemente wie Antimon, Arsen und Silber große Abweichungen zeigen. Diese Abweichungen können zum einen in der sich seit 30 Jahren entscheidend weiterentwickelten Analysetechnik begründet sein (s.u.), zum anderen bietet auch die unterschiedliche Probenahme und -aufbereitung Ansatzpunkte für die beobachteten Differenzen. Dies wird auch daran deutlich, daß die höheren Werte weit weniger voneinander abweichen als die niedrigen Gehalte.

Die Emissionsspektralanalyse (OES) in der Form, wie sie in den klassischen Studien der Stuttgarter Gruppe über die Zusammensetzung prähistorischer Metallobjekte verwendet wurde, ist heute kaum noch in Gebrauch. Es werden heute Methoden wie ICP-OES(-MS), NAA (Neutronenaktivierungsanalyse), RFA (Röntgenfluoreszenzanalyse) und AAS (Atomabsorpsionsspektrometrie) angewandt, die eine Reihe von Vorteilen wie niedrigere Nachweisgrenzen, höhere Empfindlichkeiten sowie eine bessere Präzision und Richtigkeit ermöglichen.[16] Der methodische Unterschied zwischen OES und ICP-OES liegt darin, daß das erste Verfahren mit Funken- und Bogenanregung und Registrierung des

Inv.-Nr.	Cu (%)	Fe	Zn	Sn	As	Sb	Pb	Co	Ni	Ag	Se	Bi
MY 1703	98,7	95	8100	<5	<25	130	170	<2	2900	890	80	40
MY 1589	90,7	8000	<1	1700	21000	200	1200	40	10500	580	<20	50
MY 1325	96,1	2570	23	<55	860	4600	310	<5	<4	125	280	185
MY 1330	98,0	<3	23	<55	<60	775	68	<5	<4	360	305	140
MY 1332	99,2	<3	40	<55	<60	835	465	<5	<4	560	340	130
MY 1333	97,0	105	40	98	6040	7480	595	<5	<4	205	255	260
MY 1323	97,2	<3	12	<55	135	315	51	<5	73	405	255	99
MY 1329	97,3	<3	20	<55	<60	1220	49	<5	<4	460	275	145

Tabelle 3: Chemische Zusammensetzung der Metallobjekte von Mersin - Yumuktepe. Hauptbestandteil ist Kupfer (in Gewichtsprozent angegeben). Die Nebenkomponenten und Spurenelemente sind in ppm angegeben. Die Analyse wurde mit ICP-OES durchgeführt. Einige Elemente wie Te, Hg und P lagen unter der Nachweisgrenze (<10 ppm) und wurden deshalb in der Tabelle nicht aufgeführt. Au-Gehalte lassen sich mittels ICP-OES nicht mit der benötigten Nachweisstärke bestimmen (vergl. dazu Pernicka 1990).

Spektrums auf einem lichtempfindlichen Film betrieben wird, ICP-OES dagegen mit Plasmaanregung. Der für das Ergebnis ausschlaggebende Unterschied liegt allerdings darin, daß ICP-OES manche Elemente wie z.B. As, Fe, Ni, Pb, Sn und Zn präziser mißt.

Aus der Tabelle 3 geht hervor, daß sich die Spuren- und Nebenelementverteilung in den einzelnen Objekten deutlich voneinander unterscheidet: chemisch gleicht kein Objekt dem anderen. Die Nadel mit dem nägelförmigem Kopf (MY 1589) unterscheidet sich grundlegend von den restlichen Objekten dadurch, dass sie höhere Fe-, Sn-, As-, Pb- und Ni-Werte besitzt. Besonders augenfällig wird der Unterschied in der Elementverteilung der einzelnen Objekte in einem Histogramm (Abb. 5). Zink und Zinn sind jeweils in einem Objekt (MY 1703, MY 1589) in größeren Mengen enthalten. Sie sind in den restlichen Objekten nur als Spur nachzuweisen. Eisen ist in zwei Nadeln (MY 1589, MY 1325) mit 0,8 und 0,3 % gemessen, liegt in den restlichen Objekten in Spuren bzw. unter der Nachweisgrenze vor. Beim Nickel ist es ähnlich: er ist in der Nadel MY 1589 mit 1 % enthalten, in einer weiteren Nadel (MY 1703) etwa 0,3 %, in den restlichen Objekten liegren die Gehalte mit einer Ausnahme unter der Nachweisgrenze (<4 ppm). Arsen dagegen kann in vier Objekten gut nachgewiesen werden. Antimon, Blei, Silber, Sellen und Wismut ist in allen Objekten in unterschiedlichen Mengen nachgewiesen. Besonders zu erwähnen sind dabei die hohen Silbergehalte (0,01-0,09 %) in den untersuchten Objekten.

Die siderophilen und chalkophilen Elemente, die bei der Verhüttung das Kupfer begleiten, sind relativ hoch. Dieses Verteilungsmuster ist deutlich von dem des gediegenen Kupfer verschieden. Im Gegenteil sprechen die stark variierenden und teilweise im Prozentbereich liegenden Werte der Elemente wie z.B. As, Sn, Sb und Pb für eine Identifizierung als Kupfer, das durch Verhüttung gewonnen wurde. Dies wird besonders deutlich, wenn man die Elementverteilung in den Objekten mit denen von gediegenem Kupfer vergleicht (Tab. 4). Wie aus der Tabelle ersichtlich ist, liegen besonders die Antimonwerte in den Objekten von Mersin deutlich höher als in denen von gediegenem Kupfer.

Das gewonnene Ergebnis, daß die untersuchten Objekte aus erschmolzenem Kupfer hergestellt worden sind, wird durch die metallographische Untersuchung bestätigt. Die Anschliffbilder der untersuchten Objekte zeigen ein typisches Metallgefüge, das von erschmolzenem Kupfer bekannt ist. In dem Hüttenkupfer, welches nicht desoxydiert wurde, befindet sich stets noch Sauerstoff. Dieser bildet mit Kupfer die Ver-

	Mersin -	Gediegenes Kupfer	
	Yumuktepe	N. Amerika*	Anatolien**
Sn	<0.005 - 0.010	0.006	0.001
As	<0.006 - 0.604	0.074	0.020
Sb	0.032 - 0.748	0.0006	0.004
Fe	<0.001 - 0.257	0.099	0.012
Ni	<0.001 - 0.007	0.014	0.003
Ag	0.013 - 0.089	0.038	0.001

Tabelle 4: Verteilung einiger Elemente in den Metallobjekten von Mersin – Yumuktepe im Vergleich mit gediegenem Kupfer.

*: Rapp 1988;
**: Wagner et al. 1989, eigene unpublizierte Daten

bindung Cu_2O, Kupferoxydul (Abb. 6). Sie ist von hohen Temperaturen bis hinab zu 375 °C beständig und verbindet sich dann mit Kupfer zu CuO. Zwischen Kupfer und Cu_2O gibt es im flüssigen Zustand eine ausgedehnte Mischungslücke. Durch 0,39 % Sauerstoff bzw. 3,5 % Cu_2O wird der Schmelzpunkt des Kupfers von 1083 °C auf 1065 °C erniedrigt (Eutektikum).[17] Eine eutektische Legierung besteht aus einer Kupfergrundmasse, in die Cu_2O-Tröpfchen gleichermaßen eingelagert sind. Enthält das Kupfer weniger Sauerstoff, so besteht das Gefüge aus primären Kupferkristallen, die in das Eutektikum eingelagert sind.

Die untersuchten Proben von Mersin zeigen durchweg ein Gußgefüge, das auf eine untereutektische Kupfer-Sauerstoff-Legierung hinweist. Das Gefüge besteht aus primären Kupferkristallen, die in das (Cu + Cu_2O)-Eutektikum eingebettet sind. Das eutektische Teilgefüge besteht wiederum aus einer Kupfergrundmasse, in die Cu_2O-Kristalle in Tröpfchenform gleichmäßig verteilt sind (Abb. 7-11).

Man beobachtet außerdem, dass das „Netz" aus dem Eutektikum teilweise durch nachträgliche Deformation parallel zur Hauptverformungsrichtung langgestreckt ist (Abb. 7, 10). In geätztem Zustand zeigen die Proben Rekristallisationseffekte: Es entstehen neue Kristalle, die über die alten Kristalle hinweg wachsen. Diese Rekristallisation ist wiederum auf eine zusätzliche Warmverformung zurückzuführen. Die mechanischen Zwillinge in den Kristallen deuten auf eine mechanische Beanspruchung der Objekte (Abb. 8, 11).

Die oben beschriebenen Gefügebilder belegen eindeutig, dass die untersuchten Objekte durch Guß aus erschmolzenem Kupfer entstanden sind. Sie wurden zuerst in Form gegossen und dann geschmiedet, d.h. erhitzt und gehämmert. Durch diesen letzten Schritt konnte die Formgebung der Objekte optimiert werden. Als allerletzter Arbeitsschritt wurden sie mit einem harten Gegenstand gefeilt. Die Schneiden der beiden Meißeln wurden außerdem einseitig gedängelt.

Schlußfolgerungen: Entwicklung der Kupfermetallurgie in Anatolien und die Rolle der frühen Metallfunde von Mersin.

Wie die analytischen und metallographischen Untersuchungen eindeutig zeigen, wurden die Metallobjekte von Mersin - Yumuktepe aus erschmolzenem Kupfer durch Gießen hergestellt. Damit ist in Mersin vor gut 7 000 Jahren extraktive Metallurgie belegt.

Das Kupfer als Metall war den Siedlern von Anatolien seit 9. Jahrtausend v.Chr. bekannt. In einigen präkeramischen Siedlun-

gen tauchen kleine Objekte aus Kupfer im Fundbestand auf (vgl. dazu Abb. 1). Soweit untersucht, handelt es sich ausschließlich um gediegenes Kupfer, das teilweise warm verformt wurde.[18]

Die frühesten, derzeit bekannten Metallobjekte aus gediegenem Kupfer stammen aus Çayönü Tepesi, und es ist bemerkenswert, dass sie dort in großer Zahl (113 Stück) auftreten, obwohl in zeitgleichen Siedlungen in Ostanatolien kaum welche gefunden wurden. Nur aus Nevali Çori stammt eine sogenannte Schmetterlingsperle, die als zeitgleich mit den späteren präkeramischen Schichten von Çayönü angesehen wird. Diese Datierung beruht aber im wesentlichen auf den typologischen Merkmalen. Sie wird allerdings durch die Metallzusammensetzung, die typisch für verhüttetes Kupfer ist, nicht unterstützt.[19]

Unkalibrierte ^{14}C-Daten von Çayönü reichen von 7400 bis 6750 v. Chr. für die präkeramischen Siedlungsschichten.[20] Die erst seit kurzem mögliche dendrochronologische Kalibration solch hoher Alter weist somit den Beginn der Kupferverarbeitung an das Ende des 9. Jahrtausends v. Chr.[21]

Bisher wurde die Metallverarbeitung von Çayönü als weitgehend isolierte Erscheinung in ihrem näheren Umfeld betrachtet, wenn auch vereinzelte präkeramische und frühneolithische Metallfunde in Irak, Iran und in der Levante bekannt sind. Die jüngsten Grabungen auf dem Aşıklı Höyük, etwa 200 km südöstlich von Ankara, haben neue zahlreiche Belege für die frühe Verwendung von Kupfer geliefert. Es wurden bisher 45, teilweise gut erhaltene Perlen gefunden. Sie stammen aus der zweiten Kulturschicht, die nach kalibrierten Radiokarbondaten in die erste Hälfte des 8. Jahrtausends v. Chr. datiert wird und somit zeitlich mit den späteren präkeramischen Schichten von Çayönü überlappt und an diese anschließt.[22]

Die analytisch-metallographischen Untersuchungen belegen, daß die Perlen von Aşıklı aus gediegenem Kupfer hergestellt worden sind. In der Natur auftretende Kupferklumpen wurden zu Blech geschmiedet und dann zu einer Perle zusammengerollt. Um die Schmiedbarkeit zwischen einzelnen Verformungsschritten zu verbessern, wurde das Material erhitzt. Damit ist in Aşıklı Höyük ebenfalls die gezielte Anwendung des Feuers schon am Beginn der Metallbearbeitung im 8. Jahrtausend v. Chr. erwiesen.[23]

Unter den neolithischen Kupferfunden wurde dem Keulenkopf (ca. 6000 v.Chr.) von Can Hasan[24] eine besondere Bedeutung beigemessen, weil er wegen seiner Form als das früheste durch Guß hergestellte Kupferobjekt angesehen wurde.[25] Da das Metall wegen seiner hohen Reinheit für gediegenes Kupfer gehalten wurde, führte dieser Befund zu der Annahme, dass in der Kupfermetallurgie das Gießen vor dem Verhütten käme. Erst jüngst konnte dieses Objekt näher untersucht werden, und es stellte sich heraus, dass es nicht durch Guß, sondern durch Hämmern geformt wurde.[26]

Da die Verwendung von gediegenem Kupfer nicht mit schmelzmetallurgischen Vorgängen verbunden ist, zählt dieser erste Entwicklungsschritt noch nicht zum eigentlichen Beginn der extraktiven Metallurgie. Sie läßt sich erst durch das Auftreten von Verhüttungsschlacken eindeutig nachweisen. In diesem Zusammenhang liefern die Schlackenfunde von Çatal Höyük (Schicht VI, ca. 6.500 v.Chr.) eine kontroverse Diskussion: Neuninger et al. (1964) gehen davon aus, daß es sich dabei um Schlacken handelt, die „wahrscheinlich" aus der Kupferverhüttung stammen. Begründet wird dies mit dem Auftreten von Delafossit, von Schmelzschichten aus Cuprit, Tenorit und Limonitlagen, die die Schlackenkörnchen umranden.[27] Nach Hauptmann et al. (1993) wird solches Material als „verschlacktes Erz" bezeichnet. Die neuesten Untersuchungen an Funden von Çatal Höyük bestätigen diese Interpretation.[28] Sperl berichtet ebenfalls von einer Kupferperle, die ein typisches Gefüge für geschmolzenes Kupfer

besitzt. Demnach wäre der früheste Beleg für extraktive Metallurgie geliefert. Muhly (1989) geht allerdings davon aus, dass es sich bei dem Material aus Çatal Höyük um Raffinationsschlacken („Tiegelschlakken")[29], und nicht um Verhüttungsschlakken handelt. Ebenfalls Tylecote (1976) hielt es für unwahrscheinlich, daß hier Verhüttungsschlacken vorliegen, weil sie keine Eisensilikate enthalten. Zum anderen werden einige Proben als Erzrelikte angesprochen, die etwa als Reste der Schmuckherstellung gedeutet werden können. In der kontroversen Diskussion um die frühen Schlackenfunde aus Çatal Höyük weist Pernicka (1990) darauf hin, dass eine eindeutige Interpretation nicht möglich sei. Er sieht in diesen Funden „eher Zeugnisse der fortgesetzten Wärmebehandlung verschiedener Materialien", was schließlich als Beginn der extraktiven Metallurgie anzusehen wäre. Es ist aber doch sehr wahrscheinlich, dass diese Schlacken die ersten Belege einer Verhüttung von Kupfererzen in Tiegeln sind, denn das Material gleicht in seiner Zusammensetzung sehr den Schlacken der chalkolitischen Siedlungen von Norşuntepe, Abu Matar und Fenan.[30] Die experimentellen Arbeiten zeigen, dass die Verhüttung von oxidischen Kupfererzen in Tiegeln nicht schwierig ist.[31]

Indirekt kann die extraktive Metallurgie durch den Chemismus von Kupferobjekten belegt werden, die sich von gediegenem Kupfer unterscheiden. Erhöhte Werte an Spurenelementen, wie Antimon, Kobalt, Nickel, Blei und Arsen sind Hinweise auf die Einsetzung von erschmolzenem Kupfer.[32]

Die eindeutig aus erschmolzenem Kupfer hergestellte Objekte stammen nach den vorliegenden Untersuchungen aus Mersin XVI. Damit wird in Mersin zum ersten Mal die extraktive Metallurgie belegt. Mit den Funden von Mersin treten also zu den bisher bekannten Objekten aus gediegenem und „reinem" Kupfer die ersten Kupfermetalle mit höheren Gehalten an Begleitelementen auf. Dabei muss die Frage diskutiert werden, ob diese Objekte als „Legierung" zu bezeichnen sind. Nach moderner Definition sind die Legierungen absichtlich hergestellte metallische Gemische aus mindestens zwei Komponenten, von denen mindestens eine ein Metall ist. Bei den Funden von Mersin kann man von einer beabsichtigten Beimischung von bestimmten Komponenten wie Arsen oder Antimon nicht sprechen, da diese Elemente in den einzelnen Objekten sehr unterschiedlich verteilt sind. Es erweckt eher den Eindruck, dass diese Elemente nicht inventionell zugefügt worden sind, sondern auf einer Verunreinigung des verwendeten Erzes beruht. In einigen Objekten (z.B. MY 1589, 1333) sind mehrere Elemente in höheren Konzentrationen enthalten. Es ist unwahrscheinlich, dass diese Zusammensetzung absichtlich herbeigeführt wurde. Zudem handelt es sich um Elemente (mit einer Ausnahme, MY 1589), die in den Kupfererzen häufig anzutreffen sind und bei der Verhüttung zum größten Teil im Kupfer verbleiben würden. Nach Pernicka (1990) würde ein Anteil von As, Sb oder Ni unter 2 % die Eigenschaften von Kupfer nicht signifikant verändern.

Bei der Entwicklung der Metallurgie im ganzen Nahen Osten kommt den Funden von Mersin eine zusätzliche Rolle zu: es sind die ersten, eindeutig belegten, gegossenen Metallobjekte.* Dadurch wird die auch hier postulierte zweite Annahme bekräftigt, dass die Gußtechnik erst mit der Verhüttung einsetzt.[33]

Weitere Zeugnisse für die Verhüttung in Form von Schlacken werden etwa zeitgleich (ca. 5000 v.Chr.) aus Değirmentepe[34] berichtet, wenn man zunächst von Çatal Höyük absieht.[35] Später, ab der zweiten Hälfte des 5. Jahrtausends v. Chr. häufen sich die Belege der extraktiven Metallurgie:[36] Aus Değirmentepe[37] und Norşuntepe[38] werden nun, neben Schlacken, von Tiegelresten und Schmelzöfen berichtet. Aus dieser Zeit sind ebenfalls aus Mesopotamien und Iran metallurgische Funde bekannt wie z.B. aus Tal-i-Iblis[39], Seh Gabi[40] und Tepe Gabristan[41]. In Europa des ausgehenden 5. Jahrta-

* Dadurch wirddie auch einer postulierte zweite

usends dagegen war das Metall nur auf dem Balkan bekannt, und zwar fast ausschließlich als sehr reines Kupfer.[42]

Ausblick:

In dieser Arbeit konnten wichtige Schritte in der Entwicklung der frühen Metallurgie, nämlich Verhüttung und Gießen, in Mersin des ausgehenden 6. Jahrtausends belegt werden. Es ist hier noch einmal die Wichtigkeit der neolithischen Schlackenfunde von Çatal Höyük zu betonen. Es muß durch erneute Untersuchung der noch vorhandenen Schlacken geklärt werden, ob es sich dabei tatsächlich um Schlacken handelt, die aus der Verhüttung von Kupfererzen im Tiegel stammen.

Offen bleibt bei dieser Untersuchung die Frage nach der Herkunft der Erze. Die Antwort darauf muß also den zukünftigen Forschungen vorbehalten bleiben.

NOTLAR

1. Die Ausgrabungen im ersten Jahr wurden von M.V. Seton-Williams, J. Waechter, Garstang und J. Garstang durchgeführt. Bei den nachfolgenden Grabungen waren außerdem S. Lloyd, G.M. Fitzgerald, D. Marshall, A. Dun, L. Grant, R.D. Barnett, O.R. Gurney, M. Burkitt und Prinzessin Helene Yourievitch beteiligt. Ihnen sei dieser Aufsatz gewidmet.
2. J. Garstang, Prehistoric Mersin. Yümük Tepe in Southern Turkey, Oxford 1953. Das Buch enthält leider einige Fehler, und es ist nicht immer möglich die Fundzusammenhänge und den archäologischen Kontext nachzuvollziehen. Es ist andererseits zu betonen, dass das Mersin-Buch von Garstang trotz dieser Fehler die einzige wissenschaftliche Quelle für uns ist. Eine Zusammenfassung der Mersin-Stratigraphie wurde zuletzt in Reallexikon der Assyriologie und Vorderasiatischen Archäologie erschienen. Siehe dazu Esin 1994, 66-72
3. Die neuen Ausgrabungen werden von Prof. Dr. Veli Sevin (Istanbul) und Prof. Dr. Isabella Caneva (Rom) durchgeführt. Dabei wird die gesamte Siedlungsentwicklung vom frühen Neolithikum bis in die Eisenzeit untersucht.
4. Garstang 1953, s. 76, 137-140, Fig. 50, 80b, 85.
5. Esin 1969; Die Isotopenanalysen dazu wurden später von Gale et. al. (1985) durchgeführt, wobei über die Herkunft der frühen Metallfunde von Mersin keine Aussage gemacht werden konnte.
6. Die Metallfunde von Mersin wurden aufgrund einer Einladung von Prof. Dr. Veli Sevin (Istanbul) hin untersucht. Die Antikendirektion (Anıtlar ve Müzeler Genel Müdürlüğü) Ankara hat diese Untersuchungen genehmigt. Die Restaurierung und Beprobung der Objekte in Mersin wurde von der DFG finanziell unterstützt. Dafür sei allen Beteiligten gedankt.
7. Die untersuchten Objekte befinden sich im Museum von Mersin. Die Funde wurden bei der Probeentnahme vorher von meinem Kollegen H.J. Kunkel restauriert. Dafür möchte ich ihm herzlichst danken. Ich möchte mich außerdem bei dem Leiter und den Mitarbeitern des Museums Mersin bedanken, die mich bei meiner Arbeit im Museum freundlich unterstützt haben.
8. Vgl. dazu Garstang 1953, 108, 137, 139. Er berichtet von einem Stück Kupfer oder Erz, welches er im Flur des Gebäudes 184 gefunden habe („In the courtyard (numbered 179) was found a small piece of metal since identified as copper ore").Ein Teil der Kleinfunde von Mersin befinden sich im Museum von Adana. Für die Untersuchung wurden die Metall- und andere Kleinfunde nach Mersin gebracht. Bei der Durchsicht des Fundbestandes in Mersin konnten ein Meißel (MY 1562, ein Beil (MY 1334) und eine Nadel (MY 1325a) nicht gefunden werden. Vermutlich sind diese Objekte immer noch in Adana (?).
9. Siehe dazu Mellink 1992.
10. Mellink 1992
11. Sevin/Caneva 1996, 71-86.
12. Die hier beschriebenen Objekte wurden nach der Restaurierung erneut gezeichnet. Sie weichen ein wenig von den früheren Zeichnungen von Garstang (1953) und Schoop (1995) ab. Der letztere hat einige der Objekte ohne Maßstab abgebildet.
13. Esin 1969
14. Esin (1969) hat die Klazifizierung der Metallobjekte Anatoliens nach dem „Stuttgarter Stammbaum" durchgeführt. Sie unterscheidet insgesamt vier Entwicklungsstufen (IÜS I-IV): I. Stufe: Objekte aus gediegenem Kupfer; II. Stufe: neben dem gediegenem und „reinem" Kupfer, auch erschmolzenes Kupfer; III. Stufe: FBZ, die Zeit mit Bronzeherstellung Beginn der Metallindustrie, und IV. Stufe: weitere Entwicklung der Metallindustrie,Beginn der politischen Staaten. Für die Methodik der Klassifizierung siehe Junghans/Sangmeister/Schröder 1968.
15. Die polierten Anschliffe für die metallographische Untersuchung wurden von Andreas Ludwig angefertigt. Die chemische Analyse hat Wolfgang Steger durchgeführt. Beiden Kollegen danke ich für ihre aktive Unterstützung. MY 1331 konnte wegen dem starken Korrosionanteil in der Probe nicht analysiert werden. Die Angaben über die chemische Zusammensetzung dieser Nadel ist Esin (1969) zu entnehmen (Tab. 2).
16. Die verschiedenen Analyseverfahren, die bei der Analyse von archäologischen Objekten angewendet werden, sind von Pernicka (1990) besprochen. Für weitere Informationen wird darauf hingewiesen.
17. Vgl. dazu Schumann 1980, 492-494.
18. Yalçın 1998
19. Hauptmann et al. 1993
20. Özdoğan/Özdoğan 1999
21. Vergl. dazu Pernicka 1990
22. Esin 1993, 1995, 1999.
23. Yalçin/Pernicka 1999
24. French 1962
25. Esin 1976, Muhly 1989, Pernicka 1990
26. Yalçin 1998. Die anayltisch-metallographische Untersuchung des Keulenkopfes hat gezeigt, daß er aus gediegenem Kupfer geschmiedet wurde.
27. Die kleinen Schlackenkörner wurden von Neuninger et al. (1964) publiziert; aufgrund der außergewöhnlich frühen Zeitstellung und wegen des begrenzten Probenmaterials konnten die Autoren jedoch die Entstehung dieser Schlacken nicht befriedigend klären.
28. Sperl 1997.
29. Bei der Untersuchung alter Schlacken wurden bislang zwei Gruppen unterschieden: Verhüttungsschlacken (englisch: smelting slags) und Tiegelschlacken (englisch: melting/refining/casting slags). Nach dieser Unterscheidung stammen die Tiegelschlacken aus der Weiterverarbeitung. Tatsache ist, daß im Chalkolithikum die Erze in kleinen Mengen im Tiegel verhüttet wurden. Deshalb kann der Vorschlag, die Schlacken von Çatal Höyük von vornherein als Raffinationsschlacken zu interpretieren, und damit der Verarbeitung zu zuordnen, hier nicht unterstützt werden.
30. Yalçin et al. 1992; Hauptmann et al. 1993.
31. Siehe dazu Donnan 1973; Tylecote 1974, 1976; Gale et al. 1990.
32. Für weitere Erläuterungen siehe Pernicka 1990.
33. Im Gegensatz zu Wertime (1973) nehmen Forbes (1972) und Renfrew (1973) an, daß das Gießen erst nach der Verhüttung bekannt wurde.
34. Esin 1985.
35. Bei der Diskussion um die früheste Verhüttung von Kupfererzen ist die Frage nach den Schlackenfunden von Catal Höyük noch offen; die Schlacken sollten, falls noch vorhanden, erneut untersucht werden, um die Entwicklung der Metallurgie in Anatolien vollständig zu erfassen.
36. Hauptmann et al. 1993.
37. Esin 1985.
38. Zwicker 1980, Hauptmann 1982, Yalçın et.al.1992
39. Dougherty/Caldwell 1966.
40. Levine/Hamlin 1974
41. Majidzadeh 1979, 1989.
42. Die frühesten metallurgischen Funde in Europa wurden von Pernicka (1990) zusammengefaßt. Für weitere Details wird auf diese Arbeit verwiesen.

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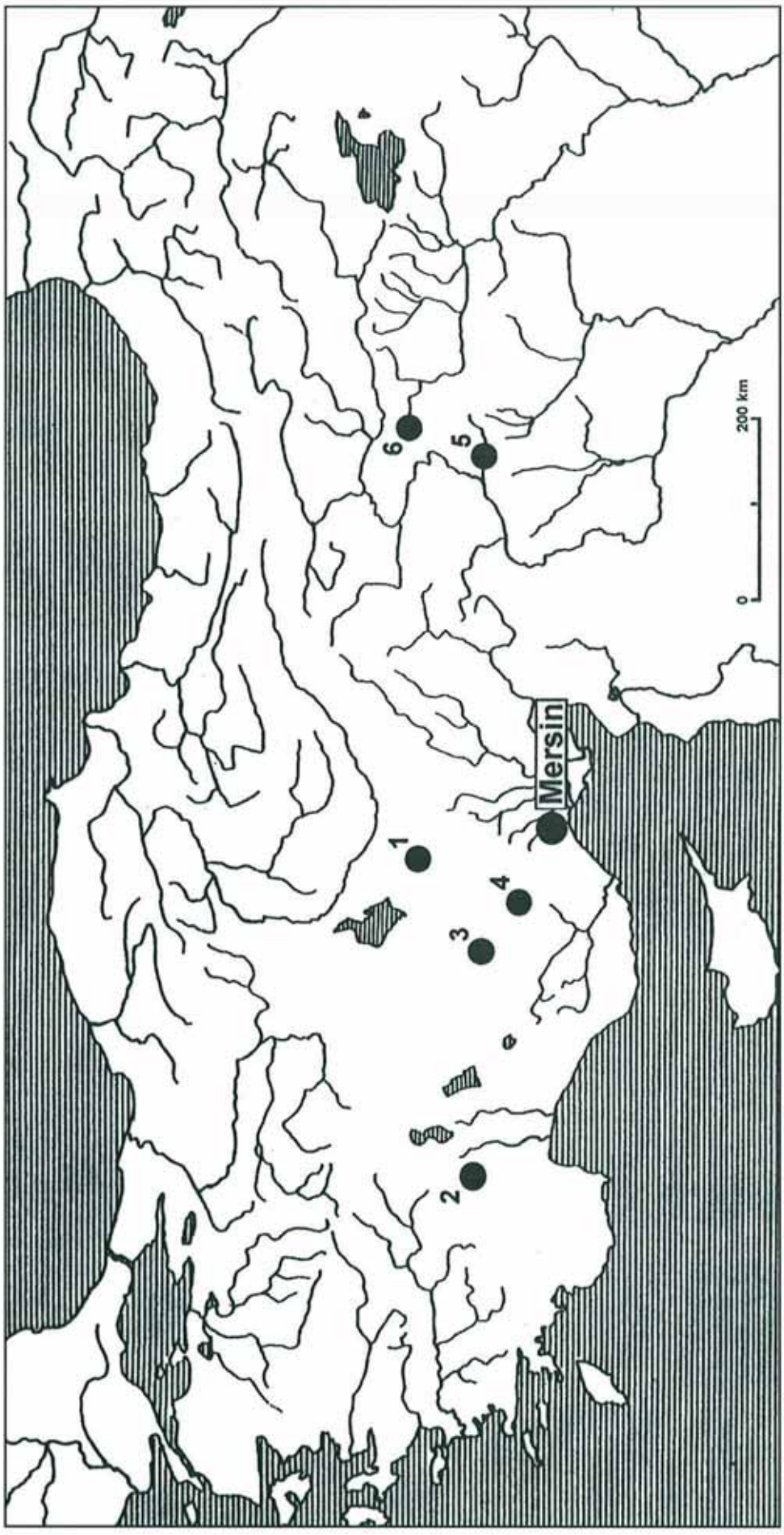

Abbildung 1: Frühen Kupferfunde in Anatolien.
1 Aşıklı Höyük, 2 Hacılar, 3 Çatal Höyük, 4 Can Hasan, 5 Nevali Cori,
6 Çayönü Tepesi.

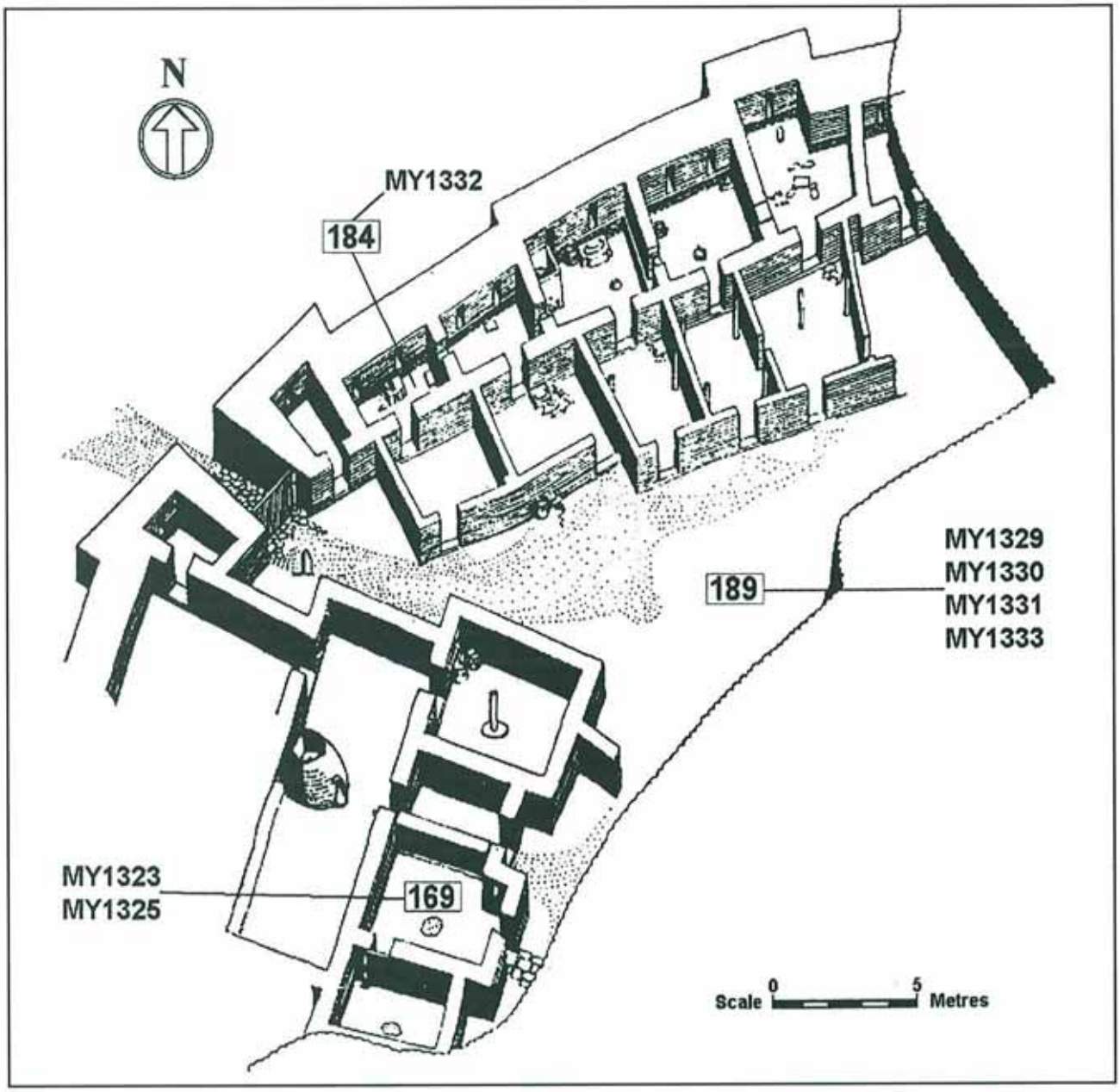

Abbildung 2: Mersin Yumuktepe, Kulturschicht XVI. Plan der „barrack rooms" mit Fundstellen von Metallobjekten (nach Garstang 1953, Fig. 79).

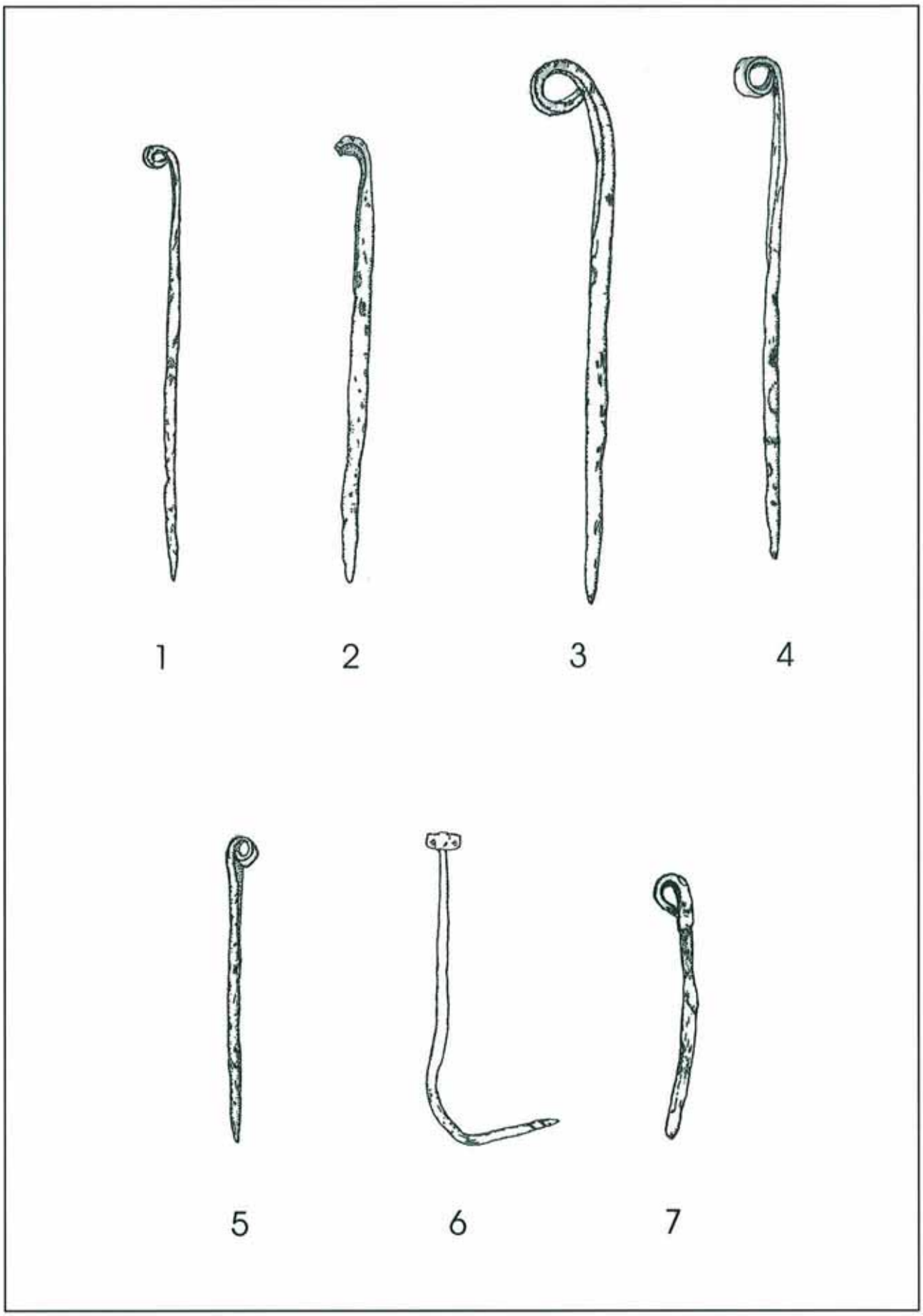

Abbildung 3: Frühe Metallfunde von Mersin – Yumuktepe
1-5: Nadeln mit eingerolltem Kopf (MY 1325, MY 1330, MY 1332, MY 1333, MY 1331);
6: Nadel mit nagelförmigem Kopf (MY 1589); 7: Nadel mit schleifenförmig gebogenem Kopf (MY 1703).

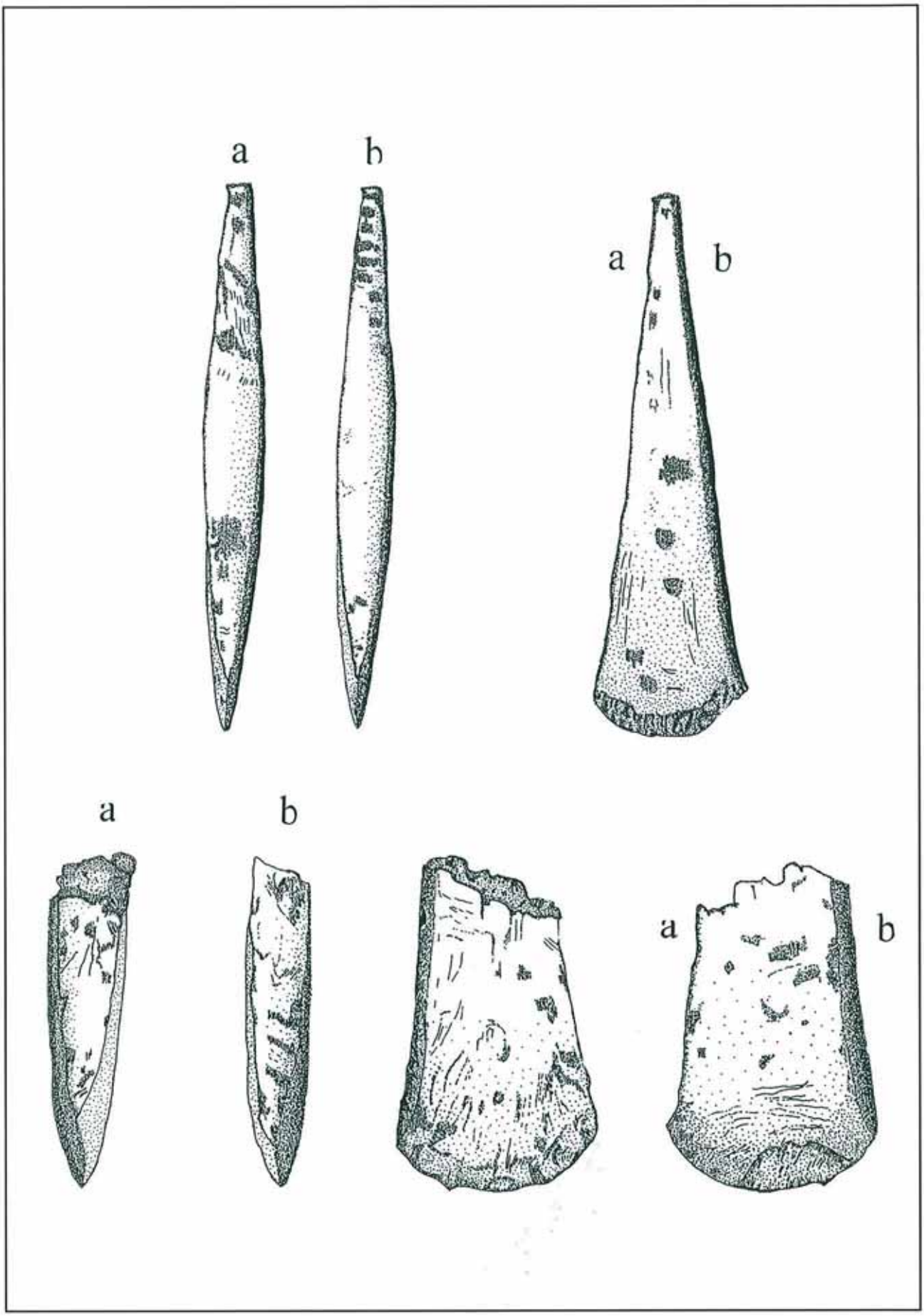

Abbildung 4: Frühesten Metallfunde von Mersin – Yumuktepe
Oben: MY 1329, länglicher Meißel in trapezoider Form (Länge: 112 mm)
Unten: MY 1323, Meißel mit abgebrochenem Nacken (erhaltene Länge: 68 mm)

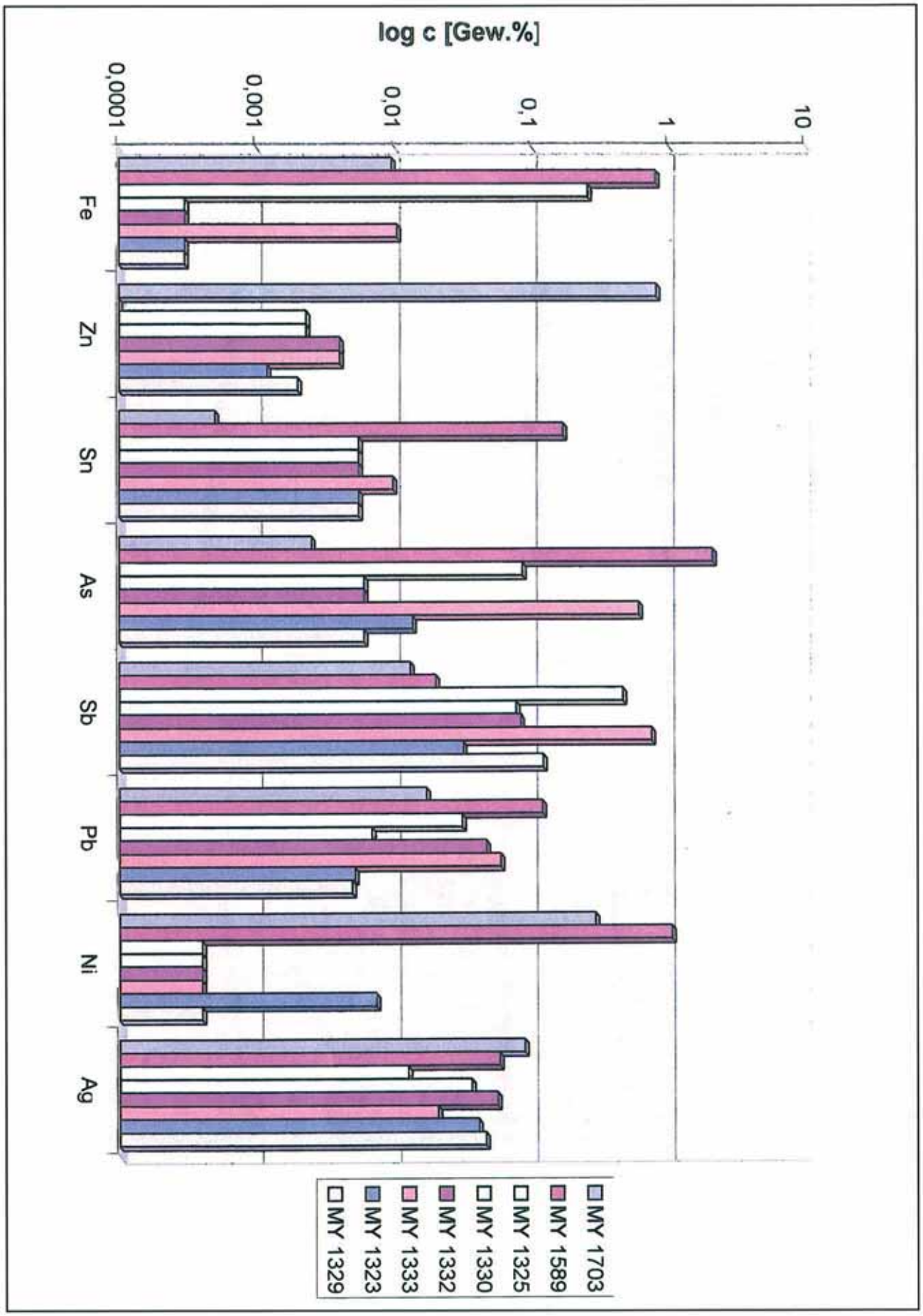

Abbildung 5: Verteilung einiger Elemente in den untersuchten Metallobjekten aus Mersin – Yumuktepe. Die heterogene Zusammensetzung der einzelnen Objekte wird in diesem Balkendiagramm ganz deutlich.

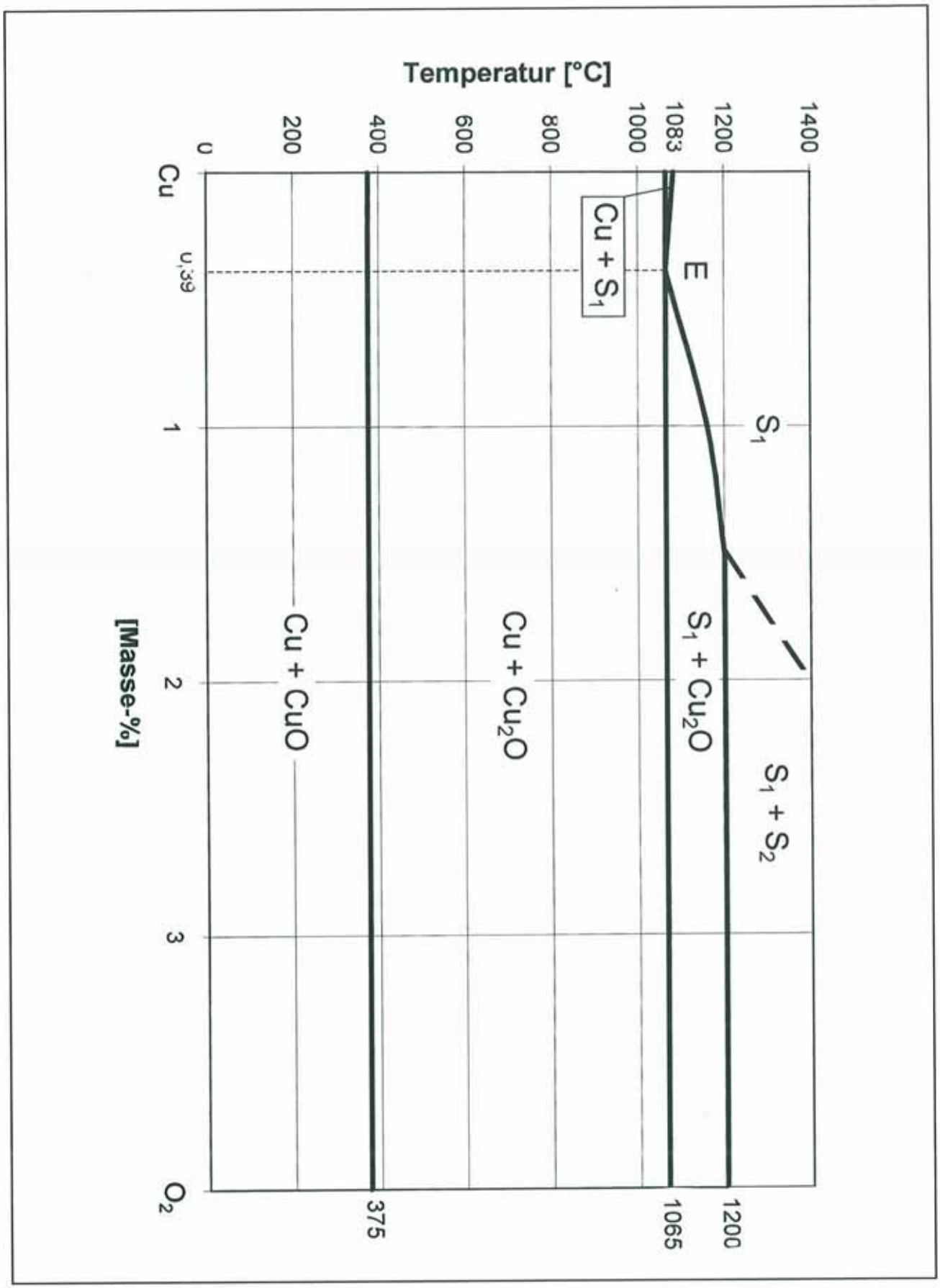

Abbildung 6: Das Zustandsschaubild Kupfer-Sauerstoff (aus Schumann 1980, Abb. 432). Zwischen Cu und Cu_2O existiert im flüssigen Zustand eine Mischungslücke, d.h. nur eine begrenzte Menge an Sauerstoff kann in flüssigem Kupfer gelöst werden. Im Eutektikum bilden sich aus dieser Schmelze dann Cu- und Cu_2O-Kristalle: Das Gefüge besteht dann aus einer Kupfergrundmasse, in der Cu_2O-kristalle in Tröpchenform gleichmäßig verteilt sind.

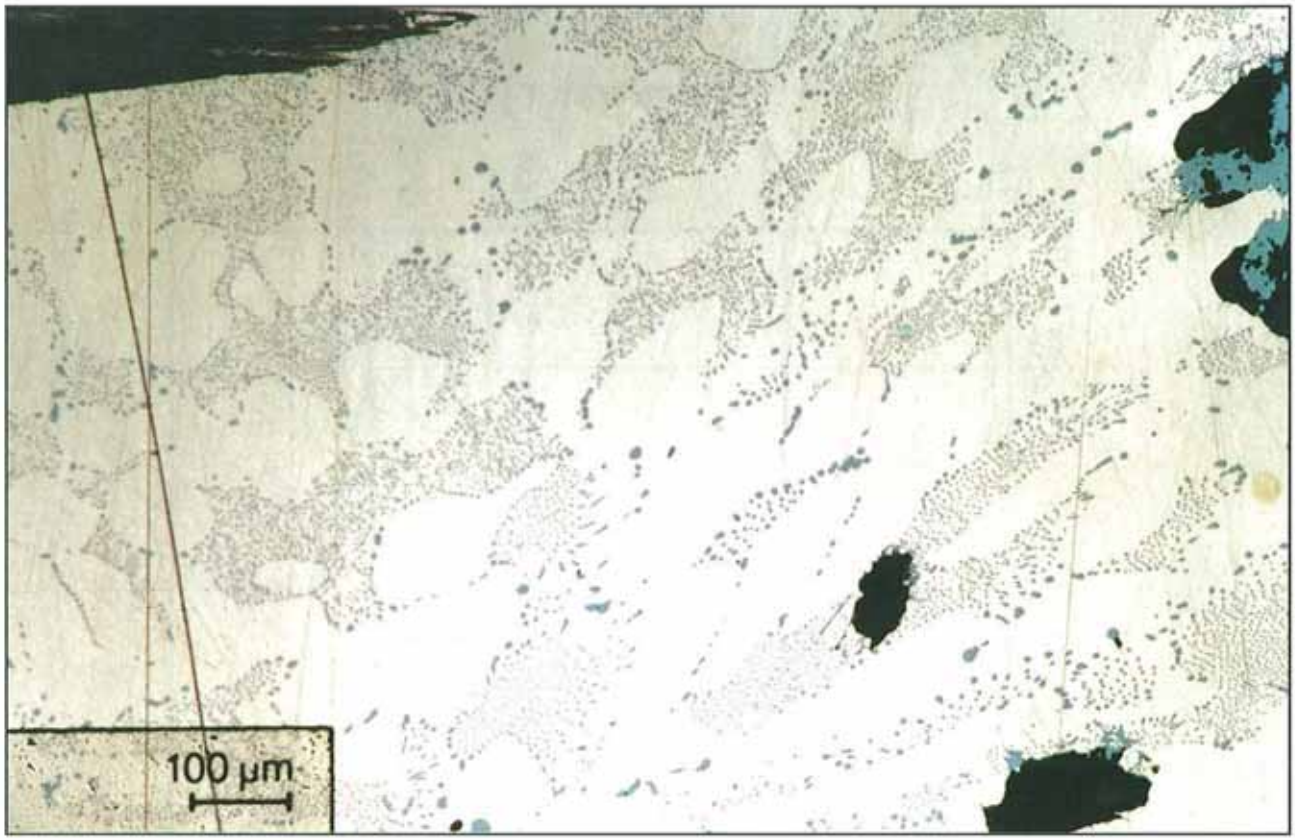

Abbildung 7: Mersin -Yumuktepe. MY 1332, Nadel mit eingerolltem Kopf. Untereutektisches Kupfer-Cu_2O-Gefüge mit 0,24 % Sauerstoff. Primäre Kupferkristalle mit dem (Cu + Cu_2O)-Eutektikum. Langstreckung des Eutektikums durch Schmieden. Ungeätzt.

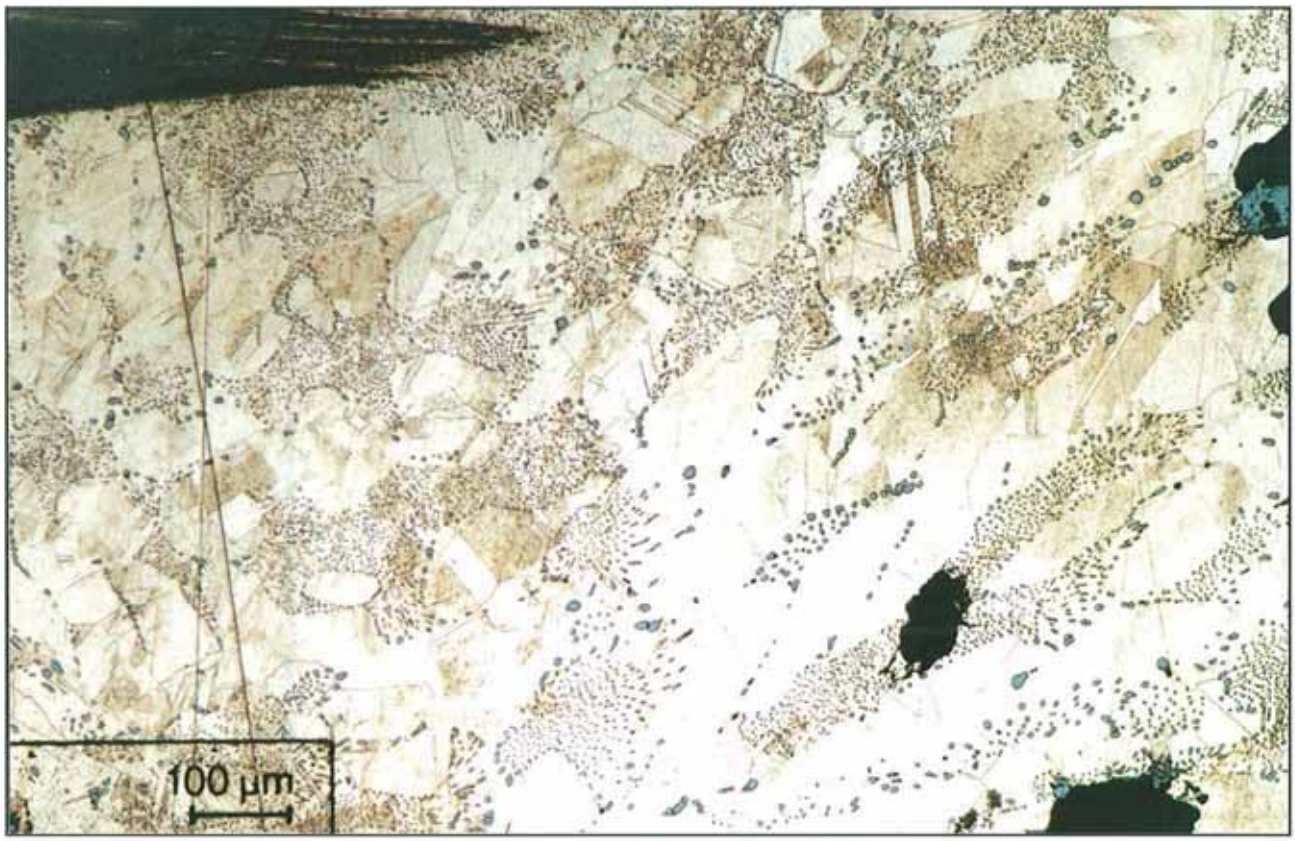

Abbildung 8: Mersin - Yumuktepe. MY 1332, Nadel mit eingerolltem Kopf. Gleicher Ausschnitt wie in Abb. 5 nach der Ätzung mit 3%iger NH_4OH + H_2O_2-Lösung. Das Mikrogefüge zeigt im geätzten Zustand Spuren der Temperung: Die beginnende Rekristallisation (Neubildung) deutet auf Erhitzung. Die neugebildeten Kristalle sind außerdem teilweise verzwillingt. Es sind sog. Druckzwillinge, die bei einer mechanischen Beanspruchung (z.B. Hämmern) des Kupfers entstehen können. Ätzung: NH_4OH-H_2O_2-Lösung, Auflicht.

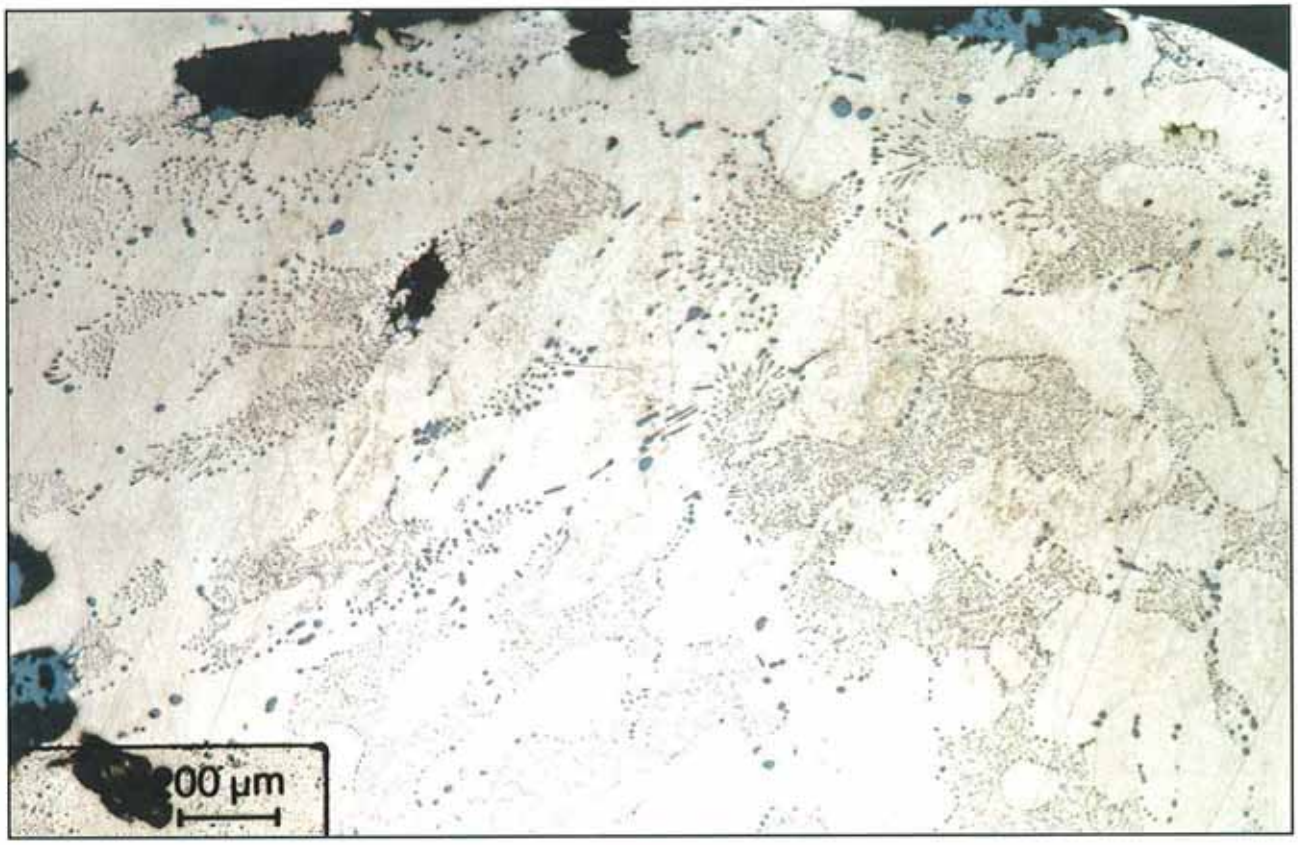

Abbildung 9: Mersin -Yumuktepe. MY 1323, Meißel.
Untereutektisches Kupfer-Cu_2O-Gefüge mit 0,20 % Sauerstoff. Primäre Kupferkristalle mit dem (Cu + Cu_2O)-Eutektikum. Ungeätzt.

Abbildung 10: Mersin -Yumuktepe. MY 1323, Meißel.
Ein anderer Ausschnitt der Probe MY 1323 zeigt ein untereutektisches Kupfer-Cu_2O-Gefüge mit 0,18 % Sauerstoff. Primäre Kupferkristalle mit dem (Cu + Cu_2O)-Eutektikum. Das Netz aus dem (Cu-Cu_2O)-Eutektikum ist langgestreckt. Die beginnende Rekristallisation (Neubildung) deutet auf Erhitzung. Die neugebildeten Kristalle sind ebenfalls verzwillingt (Vergl. Abb. 5). Ätzung: NH_4OH-H2O2-Lösung, Auflicht.

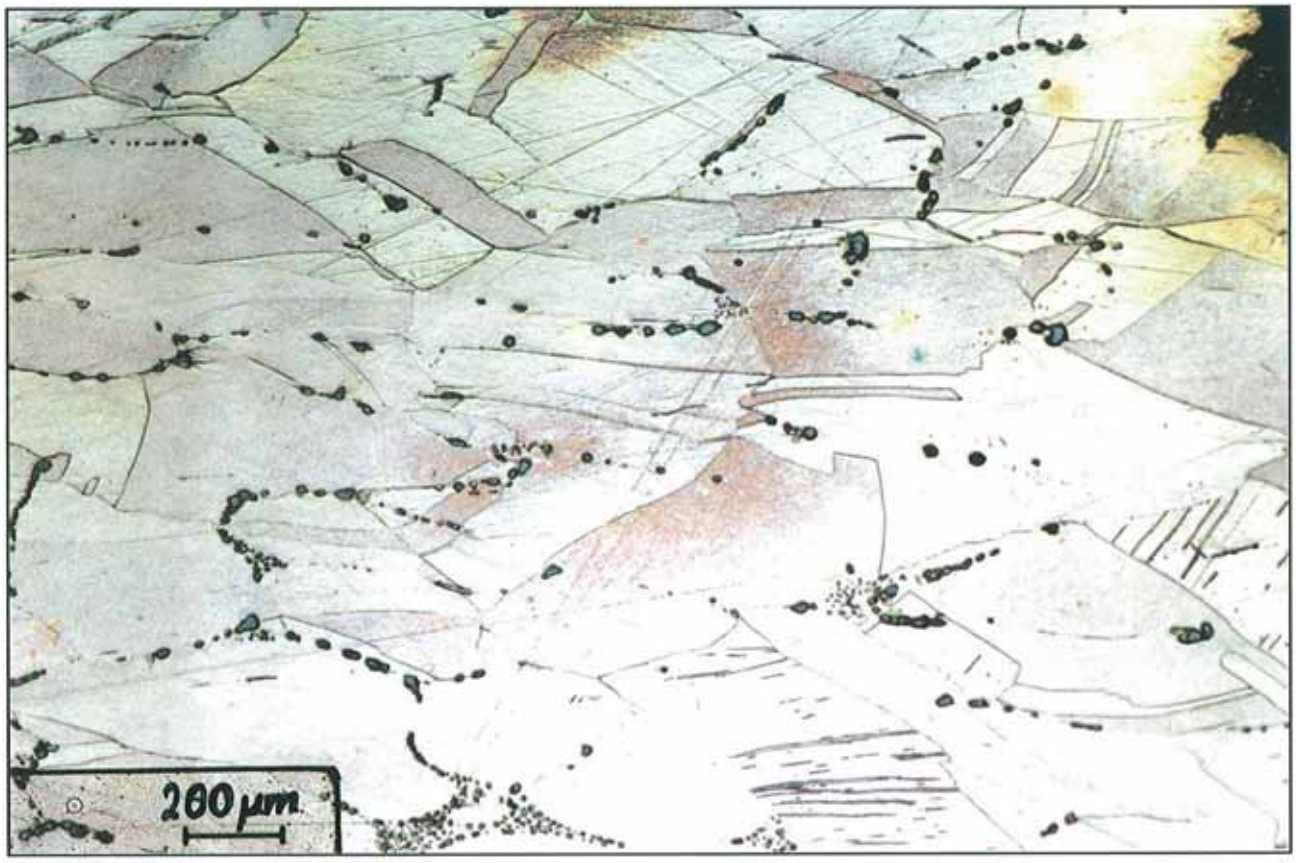

Abbildung 11: Mersin -Yumuktepe. MY 1332, Nadel mit eingerolltem Kopf.
Das Mikrogefüge des etwa 200 Fach vergrößerten Ausschnitts zeigt im geätzten Zustand deutliche Spuren der Temperung: Die fast vollkommene Rekristallisation (Neubildung) und die mechanischen Zwillinge deuten auf eine aktive Deformation: Die Nadel wurde erhitzt und gehämmert. Die Cu_2O-Tröpfchen sind schnurrig angeordnet. Die neugebildeten Kristalle sind über die alten Kristallgrenzen hinweg gewachsen. Ätzung: NH_4OH-H_2O_2-Lösung, Auflicht.

Baharın Müjdecisi: Çiğdem (*Crocus*) ya da AN.TAH.ŠUM$^{\cdot ŠAR}$ Hititler Devri Anadolu Florasına Küçük Bir Katkı

Harbinger of Spring: Crocus, "Çiğdem" or AN.TAH.ŠUM.^{ŠAR} a Small Contribution to the Anatolian Flora of the Hittite Period

Füsun ERTUĞ *

Anahtar Sözcükler: AN.TAH.ŠUM ^{ŠAR}, bahar bayramı, çiğdem, *Crocus*, etnoğrafya, Hititler.
Keywords: AN.TAH.ŠUM.^{ŠAR}, spring festivals, Çiğdem, *Crocus*, ethnography, Hittites.

The Sumerian word AN.TAH.ŠUM^{ŠAR} is known from several Hittite cuneiform texts as a bulbous plant. It took or perhaps gave its name to the spring festivals of the Hittites. The scientific identification of the plant AN.TAH.ŠUM^{ŠAR} is still debated and several plant names, such as Allium or Lilium, from various plant families, have been suggested.

It is known from the texts that the plant or its fruit is edible. During the 38 day Spring festival it was presented to the temple of the Gods in the capital of Hattussah, as well as in other Hittite towns. In Arinna, the plant was presented to the Sun Goddess. Deer were also important elements of this festival. In the inscriptions the number of bulbs were indicated from 3 to 12 or by the bunch, which the hieroglyphics represented with one finger and a mountain sign.

Ethnographic studies in modern Turkish villages suggest that Crocus, in Iridaceae family, with over 30 species in Turkey was the plant most likely represented by the Hittite hieroglyphics and Sumerian ideograms AN.TAH.ŠUM^{ŠAR}. The Crocus (commonly known as "çiğdem") is a well known edible bulbuous plant in Central and South Eastern Anatolia. It is one of the early flowering spring plants of high Anatolian plateau and contemporary villagers recognise it as a harbinger of the spring. In February and March when the Crocus blooms, the plant with its bright yellow flowers are collected by children who decorate dried branches with Crocus bulbs and flowers, and go in groups from house to house chanting a traditional Turkish quatrain about "çiğdem". They tell the villagers of the arrival of spring, and in their turn are given "bulghur" (cracked wheat) and fat, to cook the bulbs, which the children then eat.

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Anadolu'nun bitki zenginliğine yazılarıyla ilk tanıklık eden halklardan biri Hititlerdir. İ.Ö. 2.binyılda Anadolu'da Hint-Avrupa dillerinin en eskisi Hititçe'den başka yine aynı dil grubuna ait Luvi ve Pala dillerinin, ayrıca Hurrice, Hattice ve Akadça'nın yazı dili olarak kullanıldığı bilinmektedir (Seeher ve Baykal Seeher 1999:88).1906 yılından beri kazılmakta olan Hititlerin başkenti Boğazköy-Hattuşa'da ele geçen yaklaşık 25 bin çiviyazılı tablet[1] Hititlerin gündelik yaşamına, yasalarına, bayramlarına, tanrılarına ilişkin çok değerli bilgilerin yanı sıra pek çok bitki adını da içerir. Boğazköy metinlerindeki bitki adlarını araştıran Hayri Ertem Boğazköy Metinlerine Göre Hititler Devri Anadolu'sunun Florası (1987) adlı yapıtında birçok bitkiye Türkçe karşılık önermiş, anlamları henüz bilinemeyenlerin metinlerde nasıl kullanıldığını vererek çok değerli ipuçları sunmuştur. Diğer dilbilimci ve uzmanlar da bu konuda önemli katkılarda bulunmuşlardır. Burada Anadolu'da halkın halen kullandığı bitkilerden ve bunların kullanım biçiminden yola çıkarak (etnobotanik) Hititlerin çok önemli bir bayramına da adını veren AN.TAH.ŠUM-^{ŠAR} bitkisinin tanımlanmasına katkıda bulunulması amaçlanmıştır.

Hitit Metinlerinde AN.TAH.ŠUM.^{ŠAR}

Sümerce AN.TAH.ŠUM^{ŠAR} sözcüğü anlamları henüz münakaşalı veya bilinmeyen bitkiler arasında yer almaktadır (Ertem 1987: 34-39). Bu bitkinin dikkat çekici yanı Hititlerin ilkbaharda çeşitli tanrılar için düzenledikleri bayramlardan biriyle ve soğanlı bir bitki adı ile ilişkili olmasıdır (Ar 1943:57; Darga 1976:55,72; Erkut 1998:189). Metinlerde 'ot', 'sebze' grubu altında geçen bitkinin sonundaki **–ŠAR** eki nedeniyle bir soğan olduğu düşünülmektedir (Ehelolf ve Hoffner önerileri için bkz: Erkut 1998:189-190). Bitkinin figüratif ifadesinde dağ ve parmak şekilleri yer almaktadır ve bitkinin kendisi ya da meyvası, ya da ondan yapılan yemek yenmekte, ayrıca ilkbahar bayramında tanrılara sunulmaktadır. Hititlerin 35 ya da 38 gün süren AN.TAH.ŠUM-^{ŠAR} ilkbahar bayramında başkent Hattuşa'nın yanı sıra başka kentlerde de kutlamalar yapılır (Güterbock 1960:87-88). Hattuşa'da tanrı Zababa tapınağı ile yine bu kent yakınlarındaki orman tanrısı Lama'ya ait tapınakların (Ar 1943:58) yanısıra özellikle 8. ve 9. günlerde bu bayrama adını veren bitkinin Arinna kentinde güneş tanrıçasına sunulduğu bilinmektedir (Güterbock 1960: 85; Erkut 1998:192).

Bu bitkiyle ilgili ölçü birimi olarak 3'ten 12'ye kadar sayılar ve demet kullanılmaktadır. Diğer bazı bitkilerle birlikte hastalıkların tedavisinde ilaç olarak kullanıldığı da belirtilmektedir. Geyik de bu bayramda önemli bir yer tutar ve bayramın 32 ve 34. günlerinde dağda geyiğe içki sunulmaktadır (Erkut 1998:193). Erkut, Arinna kentinin Alacahöyük olabileceğini ileri sürerek bu kentin ortostatlarında geyiklerle birlikte görülen bitkinin AN.TAH.ŠUM^{ŠAR} olabileceğini belirtmektedir (Resim 3, 4).

Yorumlar

Ertem, Thompson ve Güterbock'un bu bitki adına karşılık olarak önerdiği 'mercimek' teklifine katılmadığı gibi, Cornelius'un getirdiği 'safran' teklifine de çivi yazılı kaynaklarda 'safran' için başka idyogramın bulunması nedeniyle karşı çıkar ve bu bitkiyi büyükçe meyvalı, saplı bir bitki olarak tanımlar. Erkut, Liliaceae familyasından [2] zambak, geyik körmeni gibi olasılıkla *Allium* ya da *Lilium* cinslerine ait bir tür olabileceğini ileri sürer. Darga, soru işaretiyle *Crocus*'u önermekteyse de Sivas'ta pişirilen ekmeklere katılan soğanlı bir bitki olan "körümen"i [3] örnek vermektedir (1976:55).

Etnobotanik çalışmaları bize bu tanımların tümüne uyan, soğanları ilkbaharın erken dönemlerinde toplanarak yenen, yemeklere, pilava, tatlıya katılan Anadolu'nun yaygın bitkisi **Çiğdem**'i işaret etmektedir (Resim 1,2). ***Crocus*** Iridaceae familyasındandır [4] ve Türkiye'de 30'u aşkın türü bulunur (Davis1984:C.VIII:413; Baytop ve Matthew 1984: 29). Bu türler arasında bulunan ve Safranbolu bölgesinde üretimi de yapılan *Crocus sativus*, Safran çiğdemi adıyla bili-

nir ve çiçek stigmalarından çok eskiden beri tedavi edici, boyar madde ve koku verici olan safran elde edilir (Baytop 1984:360, Lyle-Kalças 1974:22). Ancak metinlerde adı geçen sözcüğün Anadolu'nun birçok yöresinde ilkbaharda çiçek açan ve toplanıp yenen diğer *Crocus* türlerine ait olması çok büyük olasılıktır. Hititlerin ana yerleşim merkezlerinden Orta Anadolu'da bugün de birçoğu endemik olan çiğdem yumrularının toplanması, çiğ olarak yenmesi ya da yemek olarak pişirilmesi devam etmektedir.

Etnobotanik veriler

Anadolu'nun bazı bölgelerinde ilkbaharın gelişinin çocuklar tarafından "Çiğdem pilavı" pişirilerek kutlandığı bilinmektedir. Orta Anadolu'da Ankara çiğdemi olarak adlandırılan *Crocus ancyrensis* çiçekleri açınca, çocuklar bu bitkinin yumrularını toplar ve maniler söyleyerek, evleri kapı kapı dolaşır. Her eve bir demet çiğdem çiçeği vererek karşılığında pilav yapmak için yağ, bulgur, tuz gibi şeyler alır ve topladıkları bulgura, çiğdem yumrularını katarak bir pilav hazırlarlar ve hep birlikte eğlenerek yerler (Baytop 1984:205;1994:72). Baytop bir de Amasya manisi örneği verir:

"Çiğdem çiçecük
Ebem küçücük
Verenin oğlu olsun,
Vermeyenin kızı olsun"

Sivas'ın Çepni Köyü'nde 'Hatapıya' denilen baharı karşılama törenlerinde, karların erimeye başlamasıyla birlikte, çocuklar sivri uçlu sopalarla topraktan çıkardıkları 'kılavuz' çiçeklerini bir iğde çalısına takarak mahallede dolaşır ve hep birlikte maniler söyleyerek her evden un, bulgur, yağ toplarlar (Yalçın 1978:20). Bu toplananlarla çörek ve pilav pişiririlir ve tüm çocuklar birlikte yerler. Bu güne özgü maniler Amasya manisine çok benzer:

" Ha tapıya tapıya,
Kılavuz geldi kapıya.
Çok verenin oğlu olur,
Az verenin kızı olur.
Aman anne, canım anne,
Dışarıya bir çık hele,
Sakın bahşişi az verme..
Müjdeciye hareket,
Evin dolsun bereket..."

Aksaray'ın doğusunda Melendiz ırmağı civarında yeralan köylerde 1994-95 yılında yapılan etnobotanik araştırmasında yöreye özgü *Crocus ancyrensis* (Herbert) Maw türünün 'Kırmızı Çiğdem' adıyla bilindiği ve ilkbaharda yaygın olarak toplandığı gözlenmiştir. Denizden yüksekliği 1100-1200 m olan bu platoda Şubat ayı ortalarından Mart sonuna dek parlak sarı çiçekler açan çiğdem yumruları özellikle çocuklar tarafından toplanır, eve getirilir (Resim 5). Çiğdem yumrularının çıkarılmasında sopaya geçirilmiş sivri bir demir uçtan ibaret 'Karlanguç' denen bir alet kullanılır (Resim 6). Yaklaşık 1,5-2 cm uzunlukta ve dış yüzleri kahverengi, kafesimsi bir kabukla sarılı olan yumruların yenen iç kısmı beyazdır. Kabuklar elle kolayca soyulur ve taze badem tadındaki yumrular çiğ olarak yenir. Çiğdem çiçeklerinin de bazı kişilerce yenildiği görülmüştür. Nisan ayında çiğdemin çiçekleri ve yeşil yaprakları kuruduğunda bulunması daha zor olmakla birlikte bu evrede yumrular irileştiğinden çobanlar ya da çocuklarca toplanır. Bu ayda çiğdem yumrularına 'Kıvırma' adı verilir ve bu yumrularla 'Düğ' denilen sütlaç benzeri sütlü bir tatlı pişirilir (Ertuğ-Yaraş 1997:144).

Niğde'nin 25 km kuzeyinde yeralan Misli adlı (yeni adı: Konaklı) Rum köyünde 1920'lerdeki yaşamı derleyen Kostaki (1977:523) *Crocus*'un Türkçe Çiğdem adıyla anıldığını söyler. Denizden 1350 m yükseklikte yeralan bu köyde her nişanlı delikanlının baharda Üçkapulu dağına çıkıp nişanlısı için 60-70 çiğdem yumrusu toplayıp getirmesi bir gelenektir [5].

Yozgat folklorunda da karın kalkmaya başladığı Mart başlangıcında çocukların çiğdem ve aligülü (ya da aliöksüz) [6] yumrularını 'kusküç' sopalarıyla dağlardan tepelerden topladıktan sonra iğde dallarına geçirerek köy içinde dolaştırdığı, yağ ve bul-

gur toplanarak, yumrular ve yaprakların da katıldığı bir pilav pişirilerek yenildiği belirtilmektedir (Uslu 1998:30). Çocukların bu çiğdem dolaştırması sırasında kız ve erkek çocukların evin beklentilerine uygun maniler söylediği ve kendilerine yağ ve bulgur verenlere birer demet çiğdem verdikleri de vurgulanmaktadır.

Güneydoğu Anadolu'da özellikle Gaziantep yöresinde ilkbaharda *Crocus cancellatus* türünün yumrularının demetler halinde pazarlarda satıldığı da kaydedilmiştir (Baytop 1984:205). Tokuz, *Gaziantep Yemekleri* adlı kitabında (1996:124-125) 'Çiğdem Pilavı' tarifini verir. İki büyük top (demet) çiğdemin yağda kavrulduktan sonra et, tuz, karabiber ve salça karıştırılarak pişirildiğini, sonra pirincinin ve suyunun eklendiğini belirtir. *Gaziantep Tatlıları* (Tokuz 1995: 73) yayınında da 'Çiğdem ile Sütlü' tarifi yer alır ki, bu kez 8 demet çiğdem yumrusu soyulduktan sonra havanda dövülerek ezilir ve kaynayan süte atılarak pişirilir ve üzerine şeker eklendikten sonra sıcak sıcak yenir demektedir.

Doğu Anadolu'da kayalık yerlerde ve 2300 m.ye dek step bölgelerinde yetişen ve 'Safran' olarak adlandırılan *Crocus pallasii* Goldb. türünün yumrularının da çiğ olarak yenildiği belirtilmektedir (Öztürk ve Özçelik 1991:182).

Çiğdem, baharın habercisi olarak halk edebiyatına da girmiştir: Pir Sultan Abdal ya da onun geleneğinden bir halk türküsünde şöyle bir dörtlük yer alır (Eyüboğlu 1982:39):

"El ettiler turnalara kazlara
Dağlar yeşillendi döndü yazlara
Çiğdemler takınsın söylen kızlara
Niçin gitmez Yıldız Dağı dumanın"

Sonuç

Orta Anadolu'da Aksaray, Niğde ve Yozgat'ta ve Güneydoğu Anadolu'da Gaziantep yöresinde ve Doğu Anadolu'da ilkbaharın erken aylarında yüksek yaylalarda yaygın olarak görülen çiğdemin, Hititlerin AN.TAH.ŠUM^{ŠAR} olarak adlandırdığı, dağ ve parmak şekilleriyle betimledikleri ve tanedemet ile saydıkları, yumrulu bitki olması büyük bir olasılıktır. Şubat ve Mart'ta Orta Anadolu'nun zorlu kış koşulları sürerken, kimi kez karlar arasından sapsarı çiçekleriyle baş veren çiğdemler kadar ilkbaharın gelişini müjdeleyen bir başka bitki bulmak zordur.

Kış boyunca karbonhidrat ağırlıklı beslenen Anadolu köylüsüne taze bir tat sunan çiğdem'lerin boy atması baharın sembolü olarak da kutsanmış olmalıdır. Çiğdem yumrularının Anadolu'nun birçok bölgesinde ilkbaharda toplanarak çiğ ya da pişirilmiş olarak tüketilmesi, bunun özellikle çocuklarca bir şenliğe dönüştürmesi Hititlerin ilkbahar bayramı kutlamalarının bir devamı olabilir.

Anadolu'da bugüne dek gerçekleştirilen kazılarda ele geçen karbonize olmuş bitki kalıntıları arasında yumrulara çok az rastlanmış ve çoğu tanımlanamamıştır. Yeşil yapraklı bitkilerle, sert kabukları, çekirdekleri olmayan meyva ya da yumruların bulunması oldukça zor olmakla birlikte yeni geliştirilen tekniklerle kimi tanımlamalar yapılabilmektedir[7]. Boğazköy- Hattuşa, Kuşaklı ve Ortaköy gibi Hitit merkezlerinde gerçekleştirilen yeni kazılarda ele geçecek bitki kalıntılarının incelenmesi de metinlerde yeralan AN.TAH.ŠUM^{ŠAR} sözcüğünün çiğdem olarak yorumlanıp yorumlanamayacağına ilişkin yeni kanıtlar getirebilir.

Teşekkür

Metnin manuscript'ini okuyup değerlendiren ve Erkut'un son yayınını ileten Prof. Aygül Süel'e, Giuterbock makalesini anımsatan hocam Prof. Muhibbe Darga'ya, Dr. Mihriban Özbaşaran'a , Misti yayınının ilgili bölümlerinin fotokopisini ileten Anthi Karra'ya, kitabın yabani bitkilerle ilgili bölümünü Yunanca'dan Türkçe'ye çeviren Sultan Abacı'ya , Uslu'nun makalesini sağlayan ve bu konuda da yardımlarını esirgemeyen Sn. Müjgan Üçer'e ve *Gaziantep Yemekleri* ve *Gaziantep Tatlıları* adlı yayınları sağlayan arkeolog Rıfat Ergeç'e içtenlikle teşekkür ederim.

NOTLAR

1. 1970'lere dek Boğazköy (Hattuşa), çivi yazılı tabletlerin toplu olarak bulunduğu tek yerleşim olmasına karşın daha sonra Tokat'ta Maşat Höyük'te (Tabigga), Çorum'da Ortaköy'de (Şapinuva) ve Sivas'ta Kuşaklı'da (Sarissa) büyük arşivler ele geçmiştir.

2. Erkut, Liliaceae familyasında 250 cins ve 3700 tür bitki bulunduğunu belirtmektedir. Ancak Türkiye florasında bu familya 35 cins ve 118'i endemik olan 388 doğal türle temsil edilmektedir (Davis 1988:C.X:497).

3. "Körmen" yabani bir soğan türü (*Allium rotundum* L.) olup Sivas'ta çorbalarda kullanılır (Üçer 1992).

4. Iridaceae familyası, Türkiye florasında 6 cins ve 36'sı endemik olan 84 doğal türle temsil edilir. Bu familyada yer alan Crocus cinsi, 18'i endemik toplam 32 türle tanınır (Davis 1988:C.X:497).

5. Kostaki'nin Misti adlı Yunanca yayını 1920'lerde Anadolu köy yaşamına ilişkin en kapsamlı monografilerden biri olmasına karşın halen dilimize çevrilmemiş olması büyük bir eksikliktir.

6. Aligülü yada alioksüz denen ve açık eflatun renginde, uzun saplı, topcuklu yabani çiçek olarak verilen tarife göre ilkbaharda açan eflatun çiçekli bir tür çiğdem (e.g. *Crocus biflorus* Miller ya da *Crocus danfordiae* Maw) ya da Navruz olarak da bilinen bir Iris türü olabilir. Aksaray'da Şubat ortalarından başlayarak karlar arasından beyaz çiçekleriyle ilk başveren *Colchicum triphyllum* G.Kunze türüne Öksüz çiğdem adı verilir. Bu tür çiğdeme benzemesine ve yumrulu olmasına karşın yenilmez. Genellikle çiğdemler açtığında iki tür birlikte de görülür.

7. Örneğin Çatalhöyük'te 1997-98'de çalışmalarında bitki yüzdürülmesi (flotation) sonucu çok sayıda yumru ele geçmiştir. Bunların yenilebilen *Phragmites australis* (Kamış) yumruları olduğu düşünülmektedir (Julie Near ile görüşme, Temmuz 1998).

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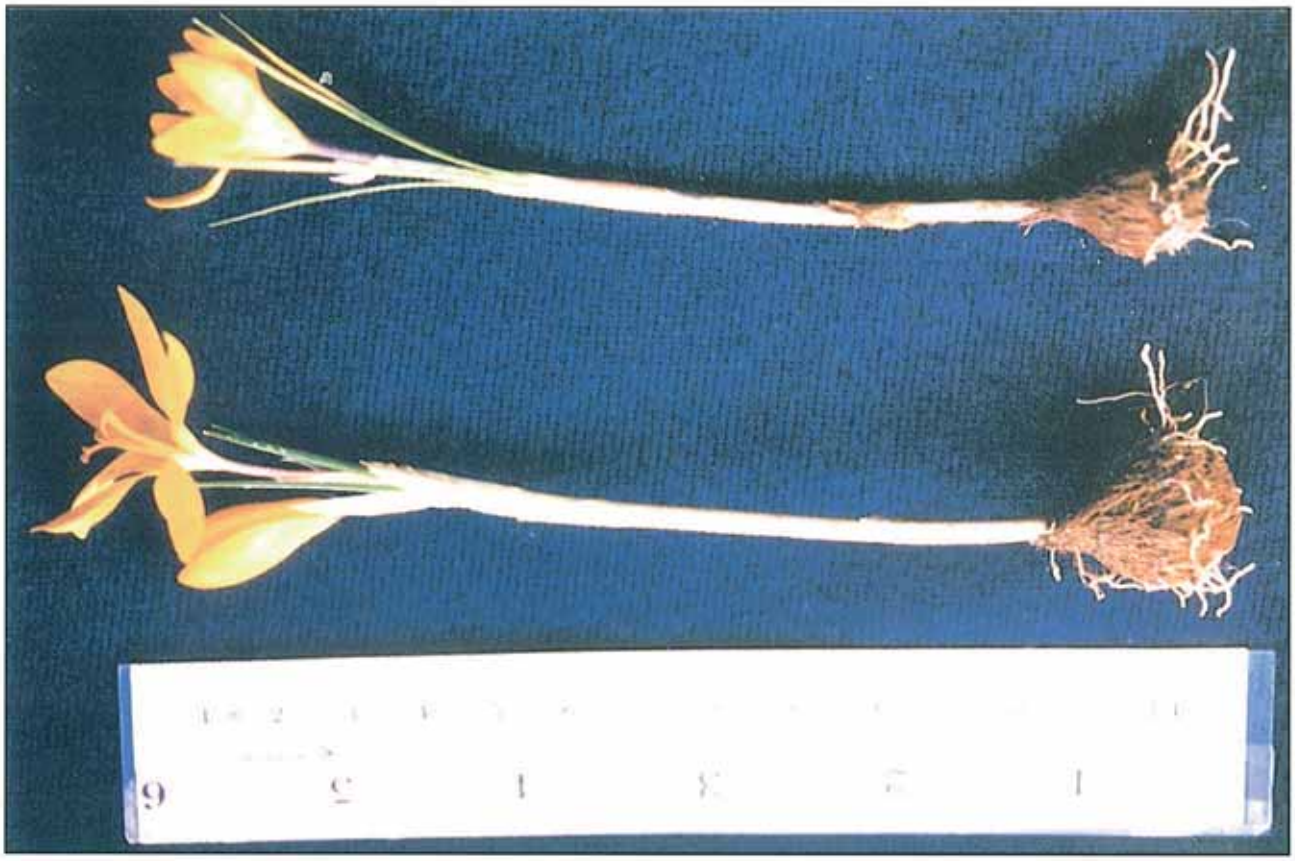


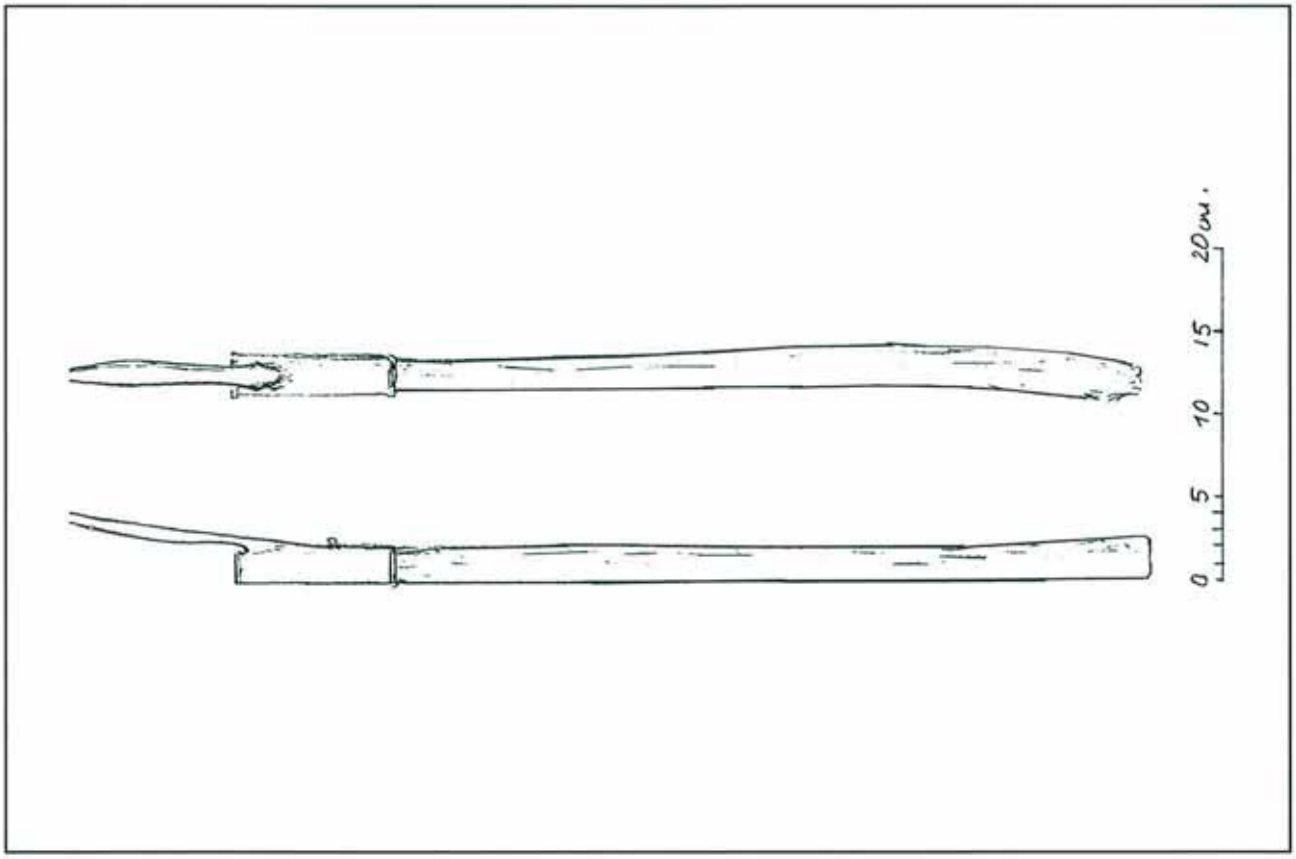
Resim 1: Orta Anadolu'da Aksaray ilinde toplanıp yenen Çiğdem (*Crocus ancyrensis* (Herbert) Maw)

Resim 2: Çiğdem çiçeklerinden bir demet

Resim 3: Alacahöyük ortostatlarında yer alan geyikli av sahneleri- Ankara Anadolu Medeniyetleri Müzesi (Kaynak: Akurgal, E. ve M. Hirmer 1961 *Die Kunst Der Hethiter*. Hirmer Verlag, München, Pl.94,96)

Resim 4: Alacahöyük ortostatlarından detay. Sağ köşede çiğdem figürü.

Resim 5: Aksaray Kızılkaya'da bir oğlan çocuğunun topladığı çiğdemleri yemek üzere ayıklaması.



Resim 6: Karlanguç adı verilen ve yumrulu bitkileri topraktan çıkartmaya yarayan gereç.
(Çizim: Ayşe Haznedar Özkan)

Kyrene Sikkeleri Üzerinde Betimlenen Silphion Bitkisi Işığında Antik Çağda Doğum Kontrolü

Birth Control in Ancient Times in Light of the Silphion Plant on Kyrenian Coins

(Bazı değişiklerle yeniden düzenlenerek basıma hazırlanmıştır)

Mustafa ŞAHİN*

Anahtar Sözcükler: Doğum kontrolü, Kyrene, Silphion, sikke
Keywords: Birth control, Kyrene, Silphion, coin

In ancient times, the Silphion plant was only grown alons the Libyan coast and its export to the other parts of the Asia Minor and of the Mediterranean was the main source of Kyrene's wealth. According to tablets found at the Knossos by Sir A. Ewans, the plant was already known long before 7th century B.C.; its is mentioned that the Therans went to Kyrene probably to obtain the silphion plant.

Silphion was occasionnaly used as a symbol on theArchaic and Classical coins of Kyrene. This depiction of the plant disappears by the Hellenistic period. Nowadays, Silphion plant is used for cooking and as a medicine to prevent cold. However, on the Kyrenean coins, Silphion is depicted with an unclothed women sitting near the plant or with a women holding her hand on her sexual organ. Both of these representations indicates that the plant is related particularly with the women. Another evidence are the terracotta female figurines holding in one hand a silphion plant and in the other a sickle. As we know both from written sources, as well as from archaeological finds, birth control practice was know through antiquity.

The colonisation movements had resulted an increase in population . The use of Silphion as a means for birth control begun probably at this time and continued up to the Hellenistic period.

By the beginning of the 20th century, historians have accepted that the birth control was already known in ancient times and the Silphion was used instead of superstitious methods as spells. The practice of birth control disappears under monotheic religion during the Middle Ages, only to reappeare at present with the uncontrolled increase in the population.

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Bugün ki Bingazi dolaylarında (Libya) yer alan Kyrene, İ. Ö. 630 civarında Thera'dan hareket eden Dor'lar tarafından kurulmuş bir kıyı kentidir[1]. Kıtanın içlerinden gelen kervan yolunun denize ulaştığı noktada olması, küçük baş hayvan ve at yetiştirilmesi, özellikle de salt bu topraklarda üretilebildiği rivayet edilen[2] Silphion bitkisinin ihracatı Kyrene'nin gücünü oluşturan unsurlar olmuştur[3]. Bu nedenle Kuzey Afrika'nın Naukratis'den sonra gelen en önemli kenti olarak kabul edilmiştir[4]. İ.Ö. 6. yüzyılın ortalarına tarihlenen ve Kyrene kralı Arkesilas'ı ihracat esnasında gösteren vazo resmi, ticaretin ulaştığı boyutu göstermesi açısından oldukça ilgi çekicidir (Res. 1)[5].

Ancak, bu çalışmada üzerinde durulmak istenilen asıl konu, kentte yapılan ticaretten çok, bir grup Kyrene sikkesi üzerinde betimlenmiş olan Silphion bitkisidir. Çünkü, bir zamanlar Anadolu'da dahil olmak üzere tüm Akdeniz ülkelerine ihraç edilen Silphion'un hangi amaçla sikkelerin üzerinde bulunduğu ve en önemliside bir bitkinin neden antik çağda kent sembolü olacak kadar sempati görmüş olduğu üzerindeki savlarda bugüne kadar bir birlik sağlanamamıştır.

Kyrene, İ.Ö. 6. yüzyılın 2. yarısından itibaren, çoğunluğu propaganda amaçlı olan, Attik ağırlığında tetradrahmi darp eder. Silphion bitkisi, bu erken örneklerden başlayarak sikkelerin ön yüzünde kullanılan bir kent sembolü olmuştur[6] . Bu da bitkinin bu tarihlerde Kyrene için çok önemli olduğu konusunda ipuçları vermektedir. İlk sikkelerde, olasılıkla daha kolay işlenen ve yuvarlak resim alanına yerleştirilebilen bir motif olması nedeni ile, bitkinin sadece meyvesi görülmektedir[7]. Kısa bir süre sonra ise artık tüm detayları ile betimlenmeye başlanır (Res. 2-5). Bu konuda E. S. G. Robinson kapsamlı bir araştırma yapmış ve sikkeleri, Silphion'un tiplerine göre başlıca üç gruba ayırmıştır[8]. İlk gruptaki sikkelerde, bitkinin tüm bölümleri doğal yapılmıştır: kalın ve güçlü bir kök, geniş yapraklar, merkezde küçük tomurcuklar ve kenardaki yapraklarda açan küçük çiçekler halindedir. İkinci gruptakilerde bitki cansız ve çok katı simetrik yapraklardan oluşmaktadır. Son tipte ise bitki tamamen stilize ve basit işçiliklidir[9]. Klasik dönemle birlikte Kyrene sikkeleri üzerinde Silphion'un hakimiyeti azalarak ikinci plana atılmış ve değişik tipler de görülmeye başlamıştır. Hellenistik dönem sikkelerinde ise bitkinin tamamen ortadan kalktığı görülmektedir[10].

Grekçe "silphion", latince "silphium" adı ile bilinen bitki, Ferula ailesinin bir üyesi olup, genellikle dev dere otu olarak tanınır[11]. Küçük yaprak ve sarı çiçeklerden oluşmaktadır[12]. Theophrastus ve Plinius'a göre, bitkinin büyük ve kalın kökü, uzun gövdesi ve kerevize benzeyen yaprakları vardır[13]. Barka[14] ve Kyrene'de[15] bulunmuş olan ve üzerinde silphion'un yanında bir ceylan bulunan tetradrachmilere göre, Silphion orta büyüklükte bir bitki olmalıdır. Rivayete göre antik çağda salt Libya kıyılarında yetiştirilebilmiş olan[16] Silphion, ne yazık ki günümüzde yok olan bitkiler arasında yer almaktadır. Ancak antik kaynaklardaki tanımları ve Kyrene sikkeleri üzerindeki görüntüsü ile Silphion[17], *Ferula communis* adı altında[18] Ege ve Akdeniz bölgesinde varlığını halâ sürdürüyor olmalıdır (Renkli resim 1)[19].

Thera'dan göç eden Dor'lar tesadüfen mi Libya sahillerine yerleştiler sorusu halâ tartışılmaktadır. Çünkü, yukarıda da değinildiği gibi, Silphion antik çağda sadece bu topraklarda yetişmiştir ve bu da belli bir dönem Kyrene şehrinin zenginliğinin asıl kaynağı olmuştur. Sir A. Evans, Knossos'da yaptığı kazılar esnasında bulunan bazı tabletlerin üzerinde[20] silphion'a çok benzeyen semboller olduğunu açıklamış ve bitkinin Kyrene'den Girit adasına getirildiğini ve burada üretildiğini savlamıştır[21]. Bu durumu arkeolojik veriler de kanıtlamaktadır. Minos uygarlığına ait Girit adasındaki değişik mezarlarda bulunan mühür yüzük taşları üzerindeki betimler bu bağlamda dikkat çekicidir[22]. Bu yüzük taşlarından bazılarının üzerinde sunak veya bir saksının içinden yükselen uzun gövdeli ve dallarında tomurcuk şeklinde meyveleri olan bitkiler

bulunmaktadır[23]. Bu bitkinin hemen önünde çıplak ya da yarı çıplak[24] kadınlar yer alır. Kadınlardan bazıları söz konusu bitki ile yakından ilgilenmektedirler. Bunlar el devinimlerine göre ya bitkinin bakımını yapmaktadırlar ya da bitkinin olgunlaşan meyvelerini toplamak istemektedirler.

Mühür yüzükler üzerinde yer alan bitki gövdesi, dalları ve tomurcuk şeklindeki meyveleri ile Kyrene sikkeler üzerinde bulunan Silphion'a çok yakın benzerlik göstermektedir (Res. 3-5). Bu nedenle mühür yüzükler üzerinde bulunan ve bugüne kadar kesin tanımlanmamış bitkileri biz Silphion olarak adlandırmak istiyoruz. Ayrıca, Silphion olarak isimlendirdiğimiz bitkinin, kompozisyonda yer alan diğer bitkilerden farklı olarak çerçeve içine alınmış olması, saksı veya sunak gibi bir nesnenin içerisinde bulunduğunu kanıtlamaktadır[25]. Sağda yer alanın gövdesi üzerinde girlanda benzer askıların olması bu köşeli bölümlerin kesinlikle bitkiye ait olmadığını göstermektedir[26]. Diğer bir anlatımla bitkinin doğrudan toprakla ilişkisi bulunmamaktadır. Bu durum bitkinin ya kutsallığını, ya da özel bir saksı içerisinde yetiştirildiğini göstermektedir. Bizce burada bitkinin toprakla ilişkisinin kesildiği, diğer bir anlatımla saksı gibi bir koruyucunun içerisinde yetiştirildiği özellikle anlatılmak istenmektedir. Bu durum ise Evans'ın ada dışından bir bitkinin getirilerek burada yetiştirilmiş olduğu savını haklı çıkarmaktadır.

Ayrıca yarı veya tamamen çıplak, dolgun göğüs ve kalçalı kadınların bitki ile doğrudan ilgilenir şekilde kompozisyonda bulunması[27], Kyrene sikkelerinde olduğu gibi (Res. 6), bitkinin kadının cinselliği ile doğrudan ilintili olduğunu göstermektedir.

Erken dönemlerde Silphion'un bilindiğine diğer bir kanıt ise, Minos yüzüklerine göre daha geç bir tarihe ait olan Miken sanatının altından yapılmış mühür yüzük taşlarıdır. Mykenai'de bulunmuş olan bir yüzük taşı üzerinde Minos'dakileri anımsatır şekilde bir betim yer almaktadır[28]. Burada sol köşede yine bir sunak veya saksı içerisinde kalın gövdeli ve iri meyveli bir bitki, gövdesinden tutarak ortada duran kadına doğru bitkiyi yatıran bir delikanlı ve sağ köşede yer alan sunak üzerine eğilmiş bir diğer kadın betimlenmiştir. Bitki gövde ve meyveleri ile Kyrene sikkeleri üzerinde bulunan Silphion'a benzemektedir. Delikanlının, arkasındaki kadına bakması ve elleri ile bitkiyi kadına doğru eğmesi, erkeğin burada kadınlara meyvelerin toplanması konusunda yardım etmek için bulunduğunu akla getirmektedir. Diğer bir anlatımla bitki yine kadınlarla ilintili bir kompozisyonda karşımıza çıkmaktadır.

Yine aynı şekilde Mykenai'de bulunmuş bir diğer yüzük taşı üzerinde kalın gövdesi ve ucunda iyice olgunlaşmış meyveleri bulunan bir bitki, bu bitkiye yaslanan bir kadın ve bu kadının önünde bakışımlı olarak ona dua eder şekilde betimlenmiş birisi küçük üç kadın yer almaktadır[29]. Yine Kyrene sikkeleri üzerindeki betimlerle karşılaştırarak, özellikle de kalın gövde ve meyveler arasındaki benzerliklerden hareketle, buradaki bitkinin de Silphion olduğunu savlamak istiyoruz[30]. Kompozisyonda yine salt kadınların yer alması, ayrıca iri göğüs ve oldukça geniş kalçası ile de diğerlerinden ayrılan bir kadının sırtını bitkiye yaslamış şekilde betimlenmiş olması, bizce bitkinin kadınlar ile olan ilintisini vurgulamak içindir[31].

Bu anlatılanlara göre, bitki çok daha erken tarihlerde Ege bölgesinde yakından bilinmektedir ve kadınlarla ilişkili bir amaç doğrultusunda kullanılmış olmalıdır. Bu sonuç ise, E. Fabbricotti'nin de düşündüğü gibi[32] Thera'dan Libya'ya göç eden insanlara rehberlik eden Korobios'un, bitkinin değerini önceden bildiğini ve bu göçü bilinçli olarak gerçekleştirmiş olduğunu göstermektedir.

Kyrene'nin zenginliğinin asıl kaynağı olan ve Plinius'un, "Silphion ağırlığı kadar gümüşten daha değerlidir" dediği[33] Silphion, antik çağda neden çok rağbet görmüş ve kıymetli bir bitki olmuştur? Cevap bitkinin antik çağdaki kullanım amacıyla doğ-

dan kalkmıştır. Bu gelişim seyri ise, kolonizasyon hareketlerinin nedenlerinden birisi olarak öne sürülen aşırı nüfus artışı savını bir kez daha haklı çıkartmaktadır.

Birçok 20. yüzyıl tarihçisi, antik çağda kadınların büyüye inandıklarını, doğum kontrolünde batıl şeyler kullandıklarını belirtmişlerdir[61]. Bu çalışmada kısaca da olsa değinildiği gibi bu kanı doğru değildir. Antik çağ kadını bilinçli doğum kontrolü yapmıştır ve çeşitli bitkiler ile yapılan doğum kontrolü, günümüzde kırsal bölgelerde nadir de olsa hala varlığını devam ettirmektedir.

Antik kaynaklarda sözü edilen bitkiler ile yapılan modern laboratuar deneyleri, klasik ilaçların çok etkili olduklarını göstermiş ve antik çağda kadınların daha iyi korundukları ortaya çıkmıştır[62]. Antik çağın doğum kontrol bilgileri Orta Çağ'da tek tanrılı dinlerin baskısı ile ortadan kalkmış, günümüzde ise nüfusun yine kontrolsüz artmaya başlaması ile tekrar önem kazanmaya başlamıştır.

NOTLAR

Kaynak ve fotoğraflarla araştırmamıza katkıda bulunan Sn. D. Backendorf'a (Frankfurt) çok teşekkür ederim.

1. Herodot IV, 154 vd. Geniş bilgi için bkz. O. Murray, 1982, 149 vd.
2. Plinius NH XIX, 40.
3. P.R. Franke- M. Hirmer, 1972, 158.
4. P.R. Franke- M. Hirmer, 1972, 161
5. F. Chamoux, 1985, 168; J. Boardman, vd, 1992, 101, lev.XII.
6. A. Laronde, 1996, res.1 vd.
7. E. Fabricotti, 1993, 28, res.1.
8. E. S. G. Robinson, 1927, 251 vd.
9. E. Fabricotti, 1993, 28, res. 2-4. Bol örnek için özellikle bkz. A. Laronde, 157 vd.
10. E. Fabricotti, 1993, 27.
11. RE III A, 1927, 103,108 vd.
12. J.M. Riddle, J.W. Estes, J.C. Russell, 1994,30.
13. Theophrastus, Historia Plantarum VI, 10; Plinius, NH XIX,40 .
14. E.S.G. Robinson, 1927, n.30b, lev.XXXVI,36; E. Fabricotti, 1993,27,res.5.
15. E.S.G. Robinson, 1927, n. 2a,lev.I, 8 ve n.92, lev.XI,10; A. Davesne, 1986, 202, res.8; A. Laronde, 1996, 158, res.6b.
16. "Hatırladığım kadarı ile silphion sadece Kyrene'de yetiştiriliyordu" demekle Plinius bu rivayeti doğrulamaktadır: Plinius, NH XIX,40. Bitkinin ekili olduğu tarlaların sınırlarını ise Herodot çizmektedir (Herodot IV, 169): "K. Afrika kıyılarında Menelaos limanından başlar, Platea adasından Syrtis'e kadar kıyıya paralel uzanır, yaklaşık 125 mil uzunluğunda 35 mil genişliğinde bir alanı kapsar". Silphion, Suriye ve Yunanistan kıyılarında da yetiştirilmeye çalışılmışsa da fazla başarılı olmamıştır, bkz. J.M. Riddle, J.W. Estes, J.C. Russell, 1994, 30. Bunun yanı sıra, bitkinin Orta Asya'da da yetiştirilmiş olduğundan da bahsedilmektedir. Ancak bu sav fazla taraftar bulmamıştır, bkz. RE III A, 1(1927),107 vd.
17. Plinius, NH XIX,39; RE IIIA, 1(1927),104; E. Fabricotti, 1993, 27.
18. H. Peşmen, 1972, 60 vd.
19. Ferula ailesine ait günümüzde Anadolu'da 17 tür saptanmıştır (H. Peşmen, 1972,440). Örneğin bir türü kuru gövdesinin baston olarak kullanılmış olmasından dolayı Silifke yöresinde "asa otu" olarak bilinmektedir (T. Baytop, 1994). Ayrıca, 'çakşır otu' adıyla tanınan türlerden bazılarının yaprakları yenilebilmekte veya doğu Anadolu'da olduğu gibi otlu peynire katılmaktadır. Bu bitki hakkında ayrıca bkz.P. ve I. Schönfelder, 1987,90.

Bu bitki ayrıca antik çağın mitoloji ve kült törenlerinde de karşımıza çıkmaktadır. Örneğin söylenceye göre Prometheus ateşi bu bitkinin gövdesinin içerisinde saklayarak gökyüzünden çalıp yeryüzüne indirmiştir. Zira, bu bitkinin gövdesinin içinde ateş yandığında dış gövde tutuşmamaktadır. Bu özelliğinden dolayı Akdeniz'li gemicilerin bir kısmı rüzgarlı havalarda pipolarını halen bu sapın içerisine koydukları közle yakmaktadırlar (H. Baumann, 1996).

Bu bitki Dionysos kült törenlerinde ise Dionysos'un veya Satyr ve Menad'ların elinde, uç bölümünde kuru tohum kozalağı bulunur şekilde görülmektedir (H. Peşmen,1972,61; E. Simon, 1985,res.254 vd.) .

Bu konuda göndermiş olduğu ayrıntılı bilgiler ile yardımlarından dolayı Sayın Dr. F. Ertuğ'a burada bir defa daha teşekkür etmek istiyorum.

20. A. Evans, 1921, 284; E. Fabricotti, ,29, res. 6-7.
21. A. Evans, 1921, 54 n.6 ve II; E. Fabricotti, 1993, 28.
22. C. Zervos, 1956, res. 628 vd.; S. Marinatos, 1959, lev.111 üst.
23. C. Zervos, 1956, res 628 ve 631; S. Marinatos, 1959,lev.111 üst: alt sağ v e sol.
24. Minos sanatına ait olarak günümüze ulaşan eserlere göre, kadınlar katkat volonlu bir etek, bir önlük ve göğüsleri açıkta bırakan bir korsaj giymektedirler, örneğin Yılanlı Tanrıça: S. Marinatos, 1959, res.70, renkli res. XXIV. Ancak mühürlü yüzükler üzerinde korsaj seçilememektedir. Bundan dolayı figürleri yarı çıplak olarak nitelemek istemekteyiz.
25. Örneğin C. Zervos 1956, res. 631 de ortadaki kadının ayaklarının önünde, herhangi bir şekilde koruma altına alınmamış bir kır bitkisi yer almaktadır.
26. C. Zervos, 1956, res. 628 ve 631; S. Marinatos, 1959, lev. 111 üst: alt sağ ve sol.
27. C. Zervos, 1956, res. 628 ve 631; S. Marinatos, 1959, lev. 111 üst
28. S. Marinatos, 1959, lev. 206: üstten ikinci sıra sağdaki resim.
29. S. Marinatos, 1959, lev. 207 alt.
30. Bu konuda R. Kandeler de bizimle aynı kanıdadır. Daha ayrıntılı bilgi için bkz. R.Kandeler, 1998, 297 vd.
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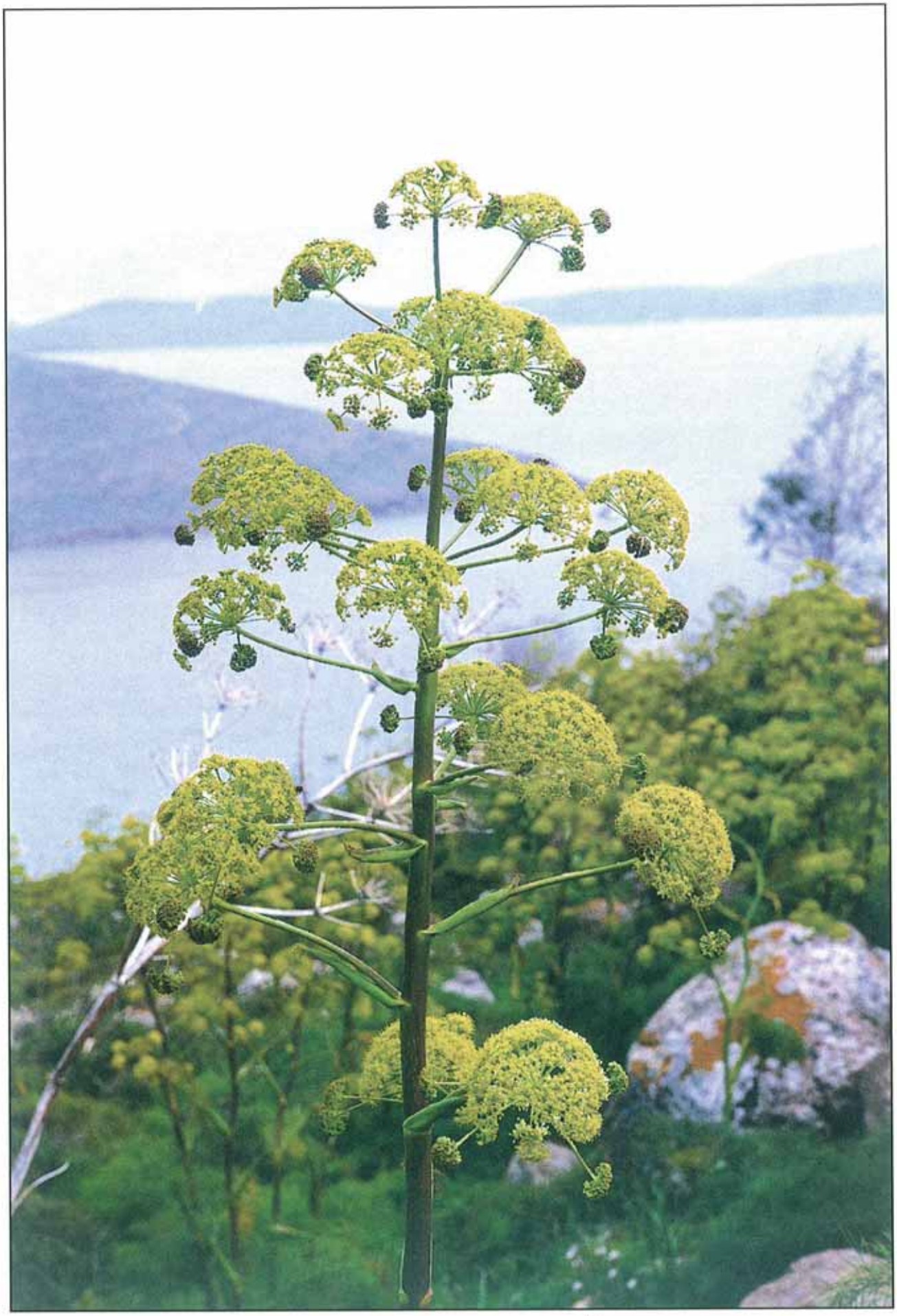

Renkli Resim 1: Bodrum'dan Silphion'a benzer bitki. Foto CHR. Özfan Konya

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