

Hittites at Soli (Cilicia)

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"Of what is past, or is passing or to come."

W.B. Yeats

Soli Höyük lies on the western coast of Mersin some 11 km. far away from the city center, now just middle of the modern settlement. It is a medium size mound with 22 m. altitude and 300 m. diameter. The Roman theater leans on the western slope of the mound (fig.1) on one of the main routes leading from Cilicia, from north, east and west, to the Mediterranean Sea situated in a strategic position since Soli Höyük is just located on the border between Cilicia Pedias and Cilicia Trachaeia (*Strabo XIV. V. 1, 8*).

The aim of this paper is to display the Hittite presence at Soli and to contribute to the Late Bronze Age archaeology of the region, i.e., Kizzuwatna and its surroundings. This paper will try to give recent archaeological evidence (1999-2005) by combining it with historical and geographical issues. These arguments will be studied mainly by focusing on ceramic assemblages, bullae, stone findings and architectural remains.

However, before going through the archaeological materials, there are some questions related to location and historical geography to be discussed. Although much progress has been made in the recent years in the field of historical geography for the Cilicia, the toponymy of Soli in the Late Bronze Age is still a subject widely controversial. Moreover, there is also another problematic especially concerning the Cilician region; the toponymy cited in the Hittite sources does not overlap with the archaeological evidence yet. There are multifarious assumptions about the exact location and name of Soli in the Late Bronze Age. Firstly, as we stated in our article entitled "The Importance of Soli in the archaeology of Cilicia in the Second Millenium B.C."¹, there is a possibility that Soli (Cilicia) is located within the borders of the Kizzuwatna region in the geography of the Hittite period. Goetze makes it clear that the Kizzuwatna region's western border was the Lamos river². It is also possible that in the Neo-Babylonian Period, it was the border between Pirindu (Ass. *Hilakku*) and Hume (Ass. *Que*) regions³. The Lamos river is cited as the natural border between Cilicia Trachaeia and Cilicia Pedias in well known classical records such as in Strabo's *Geography* (XIV.V.1). Soli is also designated as the border between two districts; in this location, she must be close to Kizzuwatna's western neighborhood, the region of Tarhuntassa or placed just on the border. Correspondingly, Hawkins in his *Hieroglyphic Inscription Südburg*⁴ investigates "why a description of Tarhuntassa-Kizzuwatna frontier is omitted?" and he asserts that the border between Tarhuntassa and Kizzuwatna must have been through Bolkar

¹ "La Cilicie: Espaces et Pouvoirs Locaux". *Table Ronde Internationale, Istanbul, 2-5 Novembre 1999*. *Varia Anatolica* XIII, p.160.

² A. Goetze, *Kizzuwatna and the Problem of Hittite Geography*. New Haven 1940, p. 58

³ H. J. Houwink ten Cate, "The Bronze Tablet of Tudhaliyas IV and its Geographical and Historical Relations", *ZA NF* 82 (1992), p. 252.

⁴ J. D. Hawkins, *The Hieroglyphic Inscription of the Sacred Pool Complex at Hattusa (Südburg)*. (StBoT 3). Wiesbaden 1995, pp. 51-52.

Dağ⁵ down to the sea, somewhere west of Mersin. If we assume that this interpretation is correct, we may claim that Soli is situated on the frontier in the 2nd millennium B.C. Furthermore, Olmstead and Sommer stated in the beginning of the 20th century that Soli is the equivalent for Saliya⁶. According to Sunassura treaty, we may claim that Saliya is situated on the same longitude with Soli⁷. Besides, Forlanini and Freu put forward the hypothesis of the possibility of Soli being Ellipra by taking into account the list of the cities in KUB XX 52⁸: Kummana, Zunnahara, Adaniya, Tarsa and *Ellipra*⁹. Thus, in order to overcome the toponymy problem of Soli, much more textual material which will be complemented by archaeological evidence excavated at Soli is needed. To this end, the seal impression on a jar handle transcribed this year by Prof. Dr. Ali Dinçol might be of great importance, but unfortunately, the seal impression provided only the name of the local governor. I thank Belkis and Ali Dinçol for their valuable contributions¹⁰.

Soli was a very important harbor for both land and maritime commercial activity in the Kizzuwatna-Hittite territory. As is stated, in the Late Bronze Age, all the major Cilician ports, for example Ura and Lasti(?), had to provide not just simple anchorage but also docking and storage facilities for boats carrying up to 450 tons of grains¹¹. It is thought that Soli, similar to her neighbors, Tarsus (*Tarsa*) and Yumuktepe, Kazanlı and Tömük, whose names are still unknown, was most probably used as an active port since the 2nd millennium B.C due to their geographical positions close to mine reserves in Bolkar Dağ. Situated within the region of coastal towns of Kizzuwatna, these settlements were located along the fixed trading routes of ships coming from Cyprus, Ugarit and had a well organized trade network under the control of the Hittite Empire¹². Unfortunately, Hittite sources do not provide precise information on Hittite ports.

As far as the economic potential of the region is concerned, Cilicia was a part of a political system administrated from Central Anatolia. After the final annexation of

⁵ See for further discussion (*Zaparasna* or *Šarlaimmi* = Bolkar-Bulgar Dağ?) J. D. Hawkins, *Südburg*. p. 51; A. M. Dinçol - J. Yakar - B. Dinçol - A. Taffet, "The Borders of the Appanage Kingdom of Tarhuntassa", *Anatolica* XXVI (2000), p. 13; J. Yakar, "The Socio-Economic Organization of the Rural Sector in Kizzuwatna, An Archaeological Assessment", *Varia Anatolica* XIII, p. 41.

⁶ A. T. Olmstead, "Near-East Problems in the Second Pre-Christian Millenium", *The Journal of Egyptian Archaeology* VII (1922), p. 230 note 4; A. Goetze, *Kizzuwatna*, p. 58, note 225. However, according to general consensus, Saliya is located in the north of Taurus Mountains, probably in the mountainous area in Ereğli-İvriz regions or on the Bolkar Dağ. J. Börker-Klähn, "Grenzfälle: Sunassura und Sirkeli oder die Geschichte Kizzuwatnas", *UF* 28 (1996), p. 47 and see note 5.

⁷ A. Goetze, *Kizzuwatna*, p. 58; D. Hawkins, *Südburg*, p. 51.

⁸ A. Goetze, *Kizzuwatna*, p. 56.

⁹ See for further discussion R. Yağcı, "The Importance of Soli in the Archaeology of Cilicia in the Second Millenium B.C.", *Varia Anatolica* XIII, pp. 159-165, note 21. Many years ago, E. Laroche and A. Goetze associated Namrun (= Lampron) in the northern region of Mersin with ^{URU}*el-li-ip-ra* (Ass. *Illubru*), A. Ünal, "Çukurova'nın Antik Devirlerde Taşıdığı İsimler ile Fiziki ve Tarihi Coğrafyası", *Efsaneden Tarihe, Tarihten Bugüne Adana: Köprü Başı*. İstanbul 2000, p. 31.

¹⁰ See Appendix .

¹¹ J. Yakar, *Varia Anatolica* XIII, p. 42; A. Taffet, "The Likely Locations of Middle and Late Bronze Age Harbors in Cilicia, An Assessment Based on Levantine Models", *Varia Anatolica* XIII, p. 133.

¹² R. Yağcı, "The Kizzuwatna-Lukka Route in the Eastern Mediterranean Trade of the 2nd Millenium B.C.". *The IIIrd International Symposium on Lycia, 07-10 November 2005*. Antalya (forthcoming).

Kizzuwatna by the Hittite Empire during the Late Bronze Age, population and economic activity increased in the region due to the new state policy. Hittites began to establish their own system with all their institutions in the Kizzuwatna region in the LB II. For instance, in Tarsus, the remains of a large complex resembling a Hittite temple demonstrate the traces of such sovereignty. Moreover, the East House where official bullae are frequently found is another indicator of the presence of Hittite provincial official institutions¹³. There is greater possibility that similar kind of remains will also be excavated soon at Soli. The increase in population may be observed in the field surveys when the number of mounds in Cilicia Pedias is compared with that of the Middle Bronze Age. In addition to the mass-produced pottery which may be controlled by the state, metal ingots and herded animals, carpentry, leather working and felt-making were among important economic activities in the Late Bronze Age¹⁴. Soli Harbor was most probably important in the shipping of these invisible local products.

After a brief discussion on historical geography and toponymy of Soli, we may further go through archaeological evidence in order to study the material dated to the Hittite period. In this article, the presence of Hittites in Soli will be evaluated by the finds coming from E9, F9, G9 and G8 plan squares. Apart from the Hittite material studied in our article entitled "The Stratigraphy of Cyprus WS II & Mycenaean Cups in Soli Höyük Excavations"¹⁵, finds excavated between 2003 and 2005 are also included. Stamped seal impressions evince the Hittite stratigraphy at Soli. The stratigraphy is classified as follows: the Pre-Imperial Period (Middle Hittite Period), Imperial period and Post- Imperial period¹⁶. Although there is no written material from the post-Imperial period, Mycenaean IIIC ceramics¹⁷ highlights the dramatic turning point of the region without any connection to an architectural context which is most probably destroyed by succeeding layers in restricted sections. Seal impressions have a crucial role in dating and determining stratigraphy of the Pre-Imperial and Imperial periods.

The Hittite levels begin to appear by the first terrace. As far as the excavations in the mound are concerned, step trenches have been necessary in order to determine the stratigraphical data. E9 and F9 plan squares, situated in the eastern slope of the mound, were primarily excavated since these parts were less destroyed than the other sections (fig. 2).

E9 and F9 plan squares provided fruitful archaeological evidence on the Pre-Imperial and Imperial periods. The excavations were carried out on the eastern slope of the mound in order to unearth Hittite levels (fig. 3). Building remains belonging to the Pre-Imperial and Imperial periods have been unearthed during the excavations.

¹³ J. Yakar, *Varia Anatolica* XIII, pp. 42-43.

¹⁴ M.-H. Gates, "Potmarks at Kinet Höyük and Hittite Ceramic Industry", *Varia Anatolica* XIII, p. 43.

¹⁵ R. Yağcı, "The Stratigraphy of Cyprus WS II& Mycenaean Cups in Soli Höyük Excavations". *Identifying Changes: The Transition from Bronze to Iron Ages in Anatolia and its Neighbouring Regions. Proceedings of the International Workshop Istanbul, November 8-9, 2002*. Istanbul 2003, pp. 93-106.

¹⁶ According to the Chronology of Tarsus LB I: c.1650-1450 B.C., LB IIa: c. 1450-1225 B.C., LB IIb: c.1225-1100 B.C., H. Goldman, *Excavations at Gözlı Kule, Tarsus From the Neolithic through the Bronze Age*. Princeton, New Jersey 1956, p. 64

¹⁷ R. Yağcı, "Soli (Kilikia) Miken IIIC Kapları", *Studies in Honor of Çoşkun Özgünel* (forthcoming).

In the frontal view from the eastern side, two large architectural complex with an orientation from the east to the west related to the Imperial times stand. The right one in E9 is destroyed on a large scale. However, we may assert that these are cooking and grinding houses which were intersected. Both houses have ovens inside. 7 grinding stones and monochrome kitchen ware have been found around in E9. A monumental rectangular building seems to be much more important because it continues through the next plan squares such as G9 and G8. This building also has two ovens. 3 grinding stones and kitchen ware have been excavated in F9 and G9. Just under this Imperial building, fortification walls dated to the Pre-Imperial times which may be compared with the defensive system in Yumuktepe¹⁸ are unearthed. These fortification walls were built by large river stones and filled with smaller ones. Mudbrick walls are still visible on the corners although they were largely dissolved due to violent Roman debris. It may be claimed that these walls were erected (1500 B.C.) to protect the city from the attacks of Hurrians¹⁹ (fig. 4). In the VIIth level which has been uncovered at Yumuktepe (which is about 12 km. from Soli), the fortifications resemble the defense system at Boğazköy and show that it was, thus, an outpost. In this case these fortifications were reused along with the Hittite periods²⁰.

In the western part of G9, in G8, we came across with architectural walls belonging to the Archaic period and a Roman platform which destroyed archaic walls. First Hittite assets such as a huge pilgrim flask and a jug begin to appear in G8 (fig. 5).

The floor of a building partly burned belonging to the Pre-Imperial times adjoining to the north-eastern part of this monumental building has been found (fig. 6). In the eastern part of this floor below the northern foundation wall of the monumental building, a bulla on which the name (M)u-wa-zi²¹ is inscribed in HH was excavated within a thick ashy layer together with a Red Lustrous Wheel Made flask²² (fig. 7) which is partly burned. This flask type is comparable with those of Kinet Höyük and Kilisetepe²³ in the LBII. The bulla is dated to the end of the 16th century or to beginning of the 15th century B.C. The layer in which the bulla is found is located under an Imperial building within an ashy layer. This is regarded as *terminus post quem* of the Pre-Imperial times²⁴.

After having studied the architectural remains, archaeological finds may also be investigated. The ceramic finds can be compared to those excavated in Tarsus Ila, Kinet

¹⁸ The fortification walls in Yumuktepe in Level VII-V are dated to 1500-1200 B.C., J. Garstang, "Explorations in Mersin, The Neilson Expedition : Fifth Interim Report, Excavations at Mersin: 1938-39", *LAAA XXVI*, Nos. 3-4 (1940), p. 91, J. Garstang, *Prehistoric Mersin*. Oxford 1953, p. 235.

¹⁹ This opinion aptly shows that Mitanni King Sutarna's vassal Alalah King Idrimi's campaigns against various coastal towns on the Gulf of Iskenderun, J. D. Bing, *A History of Cilicia during the Assyrian Period*. Ann Arbor, Michigan 1969, p. 24.

²⁰ J. Garstang, *LAAA XXVI* (1940), p. 91, J. Garstang, *Prehistoric Mersin*, p. 235.

²¹ A.M. & B. Dinçol, "Die hethitische Hieroglyphenbulle aus Soloi". *Antiquus Oriens. Mélanges offerts au Professeur René Lebrun I* (Eds. M. Mazoyer - O. Casabonne). Paris 2004, pp. 201-206.

²² For further discussion and bibliography see R. Yağcı, *Identifying Changes*, p. 95 .

²³ M.-H. Gates, *Varia Anatolica XIII*, p. 151, fig. 3, no: 15 (Period 14), N. Postgate, "Identifying the End of the Hittite Period", (NAHA) *Newsletter of Archaeology and History of Art* 4, (May 2005), p. 27.

²⁴ According to Tarsus Chronology, LB I: c.1650-1450 B.C. see H. Goldman, *Excavations at Gözlü Kule*, p. 64

Höyük Period 14 and 13, Kilise Tepe level III. The Soli ceramic assemblage consists of pieces which are well-known in the Hittite centers mentioned above²⁵.

Fragments of a lentoid flask with an incised and fenestrated stand²⁶ are excavated in E9 (fig. 8.1). This is a rather unusual and rare form with an international distribution and it is discussed by Eriksson in the context of RLWM ware²⁷. They were recorded at Tarsus, Kilisetepe, Ugarit and Cyprus in the LBA context. As an alternative suggestion we may consider other regions in Cilicia Tracheia (Ovacık, Anamur) in Anatolia or probably also in other regions²⁸ as possible production centers.

Soli F9 and G9 plan squares present a remarkable Hittite ceramic assemblage (fig. 9-14). These are sherds of open and close kitchen ware. 16 rims are found in F9 and 11 rims in G9. 3 buff ring and plain bases are excavated in G9 and 1 in F9. These are good illustrations of the LB II repertoire of Hittite-Kizzuwatna pottery types.

One of the most important finds is a plate which has potmarks on it (Fig. 15). In Kinet Höyük, many vessels are unearthed with over 20 different potmarks in household contexts in the LBII levels²⁹, these monochrome ceramics are called “drab ware”³⁰ and were mass produced in a limited range of shapes and they were widely distributed³¹. In the Soli case, one of the bases has also a potmark. This find reveals that these potmarks were used on both open and close wares (on the base) (fig.16). Potmarks resembling bird leg and its derivations are thought to be related to the industrial aspect of the pottery making. Their usages were parallel to the extension of the Hittite Empire in the 14th and 13th centuries. This pottery repertoire which is mass-produced and standardized is characterized by frequent single potmarks incised on vessels before firing. These kinds of pottery are frequently observed

²⁵ The stratigraphy of the Soli assemblage is thoroughly tabulated in R. Yağcı, *Identifying Changes*, p. 100.

²⁶ R. Yağcı, *Identifying Changes*, p. 101, fig. 2.

²⁷ K. O. Eriksson, “Red Lustrous Wheel-Made Ware”. *Studies Mediterranean Archaeology CIII*. Göteborg 1993, pp. 25ff, fig. 6, RLWM ware has a wide distribution in the East Mediterranean, most prominently in Cyprus and Syria; some of them are crudely made with added wash or paint. The pottery’s extraordinary features as well as the question of its origin have been discussed in the literature for many years. A comprehensive study of RLWM ware by Eriksson favors Cyprus as the sole production centre, K. O. Eriksson, *Studies Mediterranean Archaeology*, pp. 149-150.

²⁸ According to Eriksson, *Studies Mediterranean Archaeology CIII*, ware was produced in Anatolia in the LBA II and used from the period of Tuthaliya I until the fall of Hittite Empire, K. O. Eriksson, “Red Lustrous Wheelmade Ware: A Product of Late Bronze Age of Cyprus”. *Cypriot Ceramics: Reading the Prehistorical Record*. J.A. Barlow et. al. edd. University of Pennsylvania 1991: 90, D. Symington, “Hittites at Kilisetepe”, *Varia Anatolica XIII*, p. 170, note 11.

²⁹ Cf. M.-H. Gates, *Varia Anatolica XIII*, p. 154 fig. 6.

³⁰ M.-H. Gates, *Varia Anatolica XIII*, p. 141.

³¹ N. Postgate, (NAHA) *Newsletter of Archaeology and History of Art* 4, (May 2005), p. 26; M. Gates, “Bilkent Excavation at Kinet Höyük”, <http://www.bilkent.edu.tr/~arkeo/newsletter/newsle13.html>, 2006; R. G. Henrickson, “Hittite Pottery and Potters: The View from Late Bronze Age Gordion”. *Across the Anatolian Plateau: Readings in the Archaeology of Ancient Turkey*. (ASOR). 2002, pp. 125-126.

within the borders of the Hittite Empire³². The proportions of this plate make us think that it might be served as a plate for traditional families or as a scale of grains etc.

The pilgrim flask and the nipple based pitcher are also from the LBII repertoire (fig. 17). The pilgrim flask type³³ is common but the pitcher which is painted and decorated is rare. Small pilgrim flasks had short necks having single or double handles. Examples of small pilgrim flasks with a single handle are unearthed in Kilise Tepe, Maşat, however, our example at Soli with two handles and painted decorations of circles on the sides may be compared with examples at Lachish and Megiddo from LBII³⁴. The nipple based pitcher is a unique find³⁵.

Another characteristic pottery from the Hittite Period at Soli is the White Slip II assemblage³⁶. These sherds are excavated in the 14th and 13th centuries levels (fig 18-19). Besides Soli Höyük, WS II is also found in Yumuktepe, Gözlükule, Kinet Höyük³⁷ and Tarsus³⁸. New WS II fragments have excavating in each season (fig. 19c 1, 3).

The Egyptian scarabe (fig. 18) is dated to the period of Tuthmosis III (1479-1425 B.C.) must have been a souvenir which is reused in later times. But it is thought that the Egyptian scarabe is an indicator of the consolidated trade activities of the period of Tuthmosis III (1479-1425 B.C), the contemporary of Tuthalia I (1465-1440 B.C.) But it is most probably brought to Soli after 1425 B.C. according to the layer in which it is unearthed.

One of the most remarkable finds illustrating Hittite presence at Soli is this seal impression on the handle of a jar found in G9 within the great Imperial building context (fig. 20). This is a typical Hittite period production dated to the beginning of the 14th century B.C. The seal impression provided data on the name of the governor Targasna³⁹ who lived

³² At Gordion, Kuşaklı, Korucutepe, Tille, Maşat, Ortaköy, Alacahöyük, Boğazköy, Kilisetepe, Yumuktepe, Kinet Höyük, M.-H. Gates, *Varia Anatolica XIII*, pp. 138-39.

³³ This form is common in Anatolia and the Middle East. In Cilicia, for example, D. Symington, *Varia Anatolica XIII*, p. 17, Level IIb-c; M.-H. Gates, *Varia Anatolica XIII*, fig. 5, no. 10, Late Bronze II, Periods 14-13. As a decoration, it is comparable with Ö. Bilgi, *M.Ö. II. Binyılında Anadolu'da Bulunmuş Matarla Biçimli Kaplar*. İstanbul 1982, Table 18; J. B. Pritchard, *The Cemetery at Tell Es-Sa'idiyeh, Jordan*. University of Pennsylvania. Philadelphia 1980, pp. 49-50.

³⁴ J. B. Pritchard, *The Cemetery at Tell Es-Sa'idiyeh*, pp. 49-50.

³⁵ Its decoration can be studied in comparison with a LBII Period 13 pitcher at Kinet Höyük, M.-H. Gates, *Varia Anatolica XIII*, p. 153, fig. 5, no. 9.

³⁶ R. Yağcı, "Beyaz Astarlı (*White Slip II*) Kapları ve İ.Ö. II. Binde Kıbrıs-Soli İlişkileri", Adalya VI, R. Yağcı, *Identifying Changes*, pp. 93-99, fig. 15-17.

³⁷ R. Yağcı, *Identifying Changes*, pp. 95-96, The fabric color of WS II can be divided into three groups: reddish brown, olive brown and light grey color. The majority of the sherds contain golden mica in the slip. This feature is attributed to the late phase of WS II by Popham, Kozal 2005: "Unpublished Middle and Late Cypriot Pottery from Tarsus-Gözlükule" Field seasons 2001-2003 of the Tarsus-Gözlükule, Interdisciplinary Research Project (ed. by A. Özyar), İstanbul 2005, pp. 135-144. Ege yayınları.

³⁸ WS II cups are also found in Tarsus in the LB II context, H. Goldman, *Excavations at Gözllü Kule*, p. 205 fig. 329.

³⁹ See Appendix. Stamp seal impressions with a hieroglyphic Hittite inscriptions can be seen on jar handles or rims in the Late Bronze Age as an indicator of the local governors, see R. Henrickson, *Across the Anatolian Plateau*, p. 124.

during the Imperial times. The name Targasna can be studied within the onomastics in the Western and Central Anatolia.

The 2005 excavation offered us two new Hittite pieces: a huge pilgrim flask and a one-handed jug which are found together in a context which is destroyed by the Early Geometric layer. The pilgrim flask and the juglet are dated to the 13th century B.C. and they are categorized as RLWM (fig. 5, fig. 21-23). Both have religious functions and they are thought to be used for libation. Their presence gives us insights into religious aspects of the building in which they have been found as it was case in Tarsus.

Moreover, 7 grinding stones are excavated in E9 and 3 of them in F9 (fig. 24). The one at the center in the first line may be seen as an exception since probable traces of metals are visible. When both architectural data and these grinding stones are combined, these buildings can be identified as industrial work places. Within this framework, it may be said that there were industrial (mining and ceramic workshops), civil and religious buildings at Soli in the Hittite period.

In conclusion, Soli which is located in a strategic position on the border line of two regions Kizzuwatna and Tarhuntassa was a crucial harbor city in the Pre-Imperial and Imperial times. It is thought that her importance augmented after the annexation by the Hittites under the reign of Tuthalia II/III (appr. 1400 B.C). The archaeological evidence of the Imperial period begins with the great building which is laid out in F9 and G9. RLWM ware, WSII, mass-produced “drab ware” with potmarks found in this context indicate us that Soli was part of a both centralized and local economy and meanwhile, it was located on an international trade and maritime route in LBII. The finds reveal the relationships of Soli with Central Anatolia, Cyprus and Egypt in the 15th and 13th centuries B.C.

The Muwazi bulla and its context, the fortification walls are of great importance to determine the Pre-Imperial stratigraphy as well as the governor Targasna seal impression on the jar handle provides the stratigraphy of the Imperial building, i.e., the beginning of 14th century, thus the annexation by the Hittites under Tuthalia II/III. We hope that data from written sources will overlap with the archaeological evidence in the near future. Since the excavation is limited to the step trenches and the layers were destroyed and partly penetrated by the later periods, architectural layers can not be completely unearthed. Soli is promising to offer new perspectives in the Kizzuwatna and Hittite archaeology in the next excavation seasons.

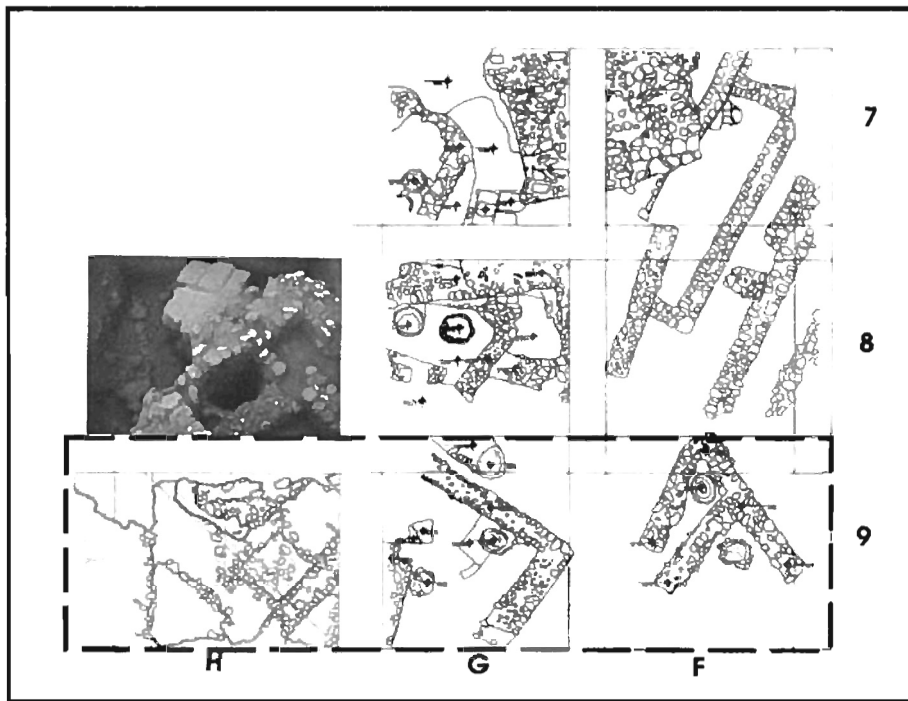


Fig. 3

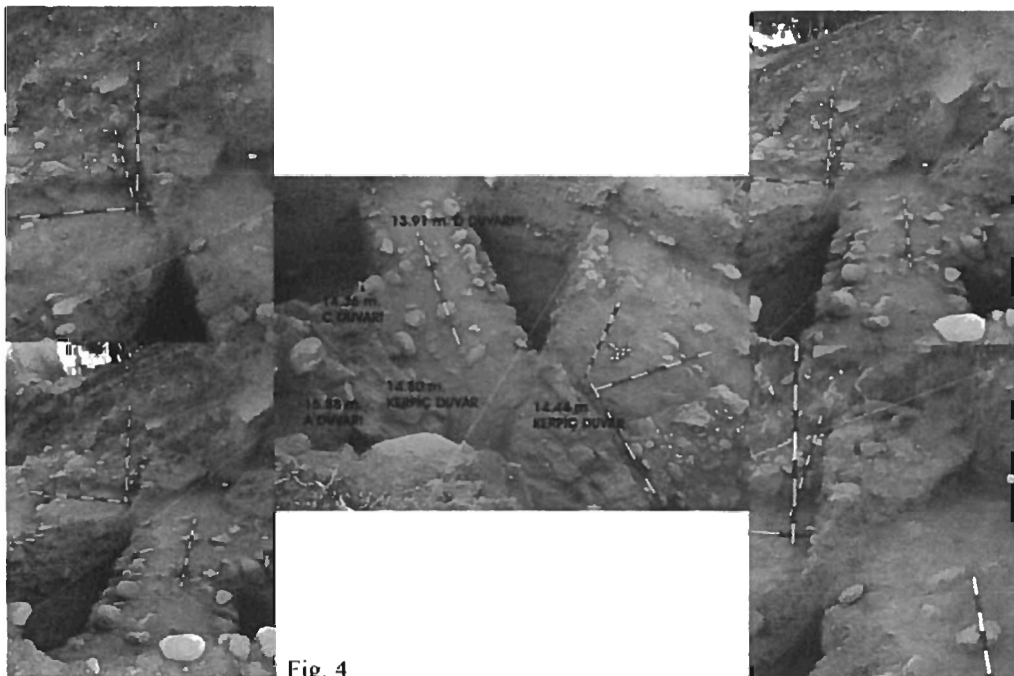


Fig. 4



Fig. 5



Fig. 6

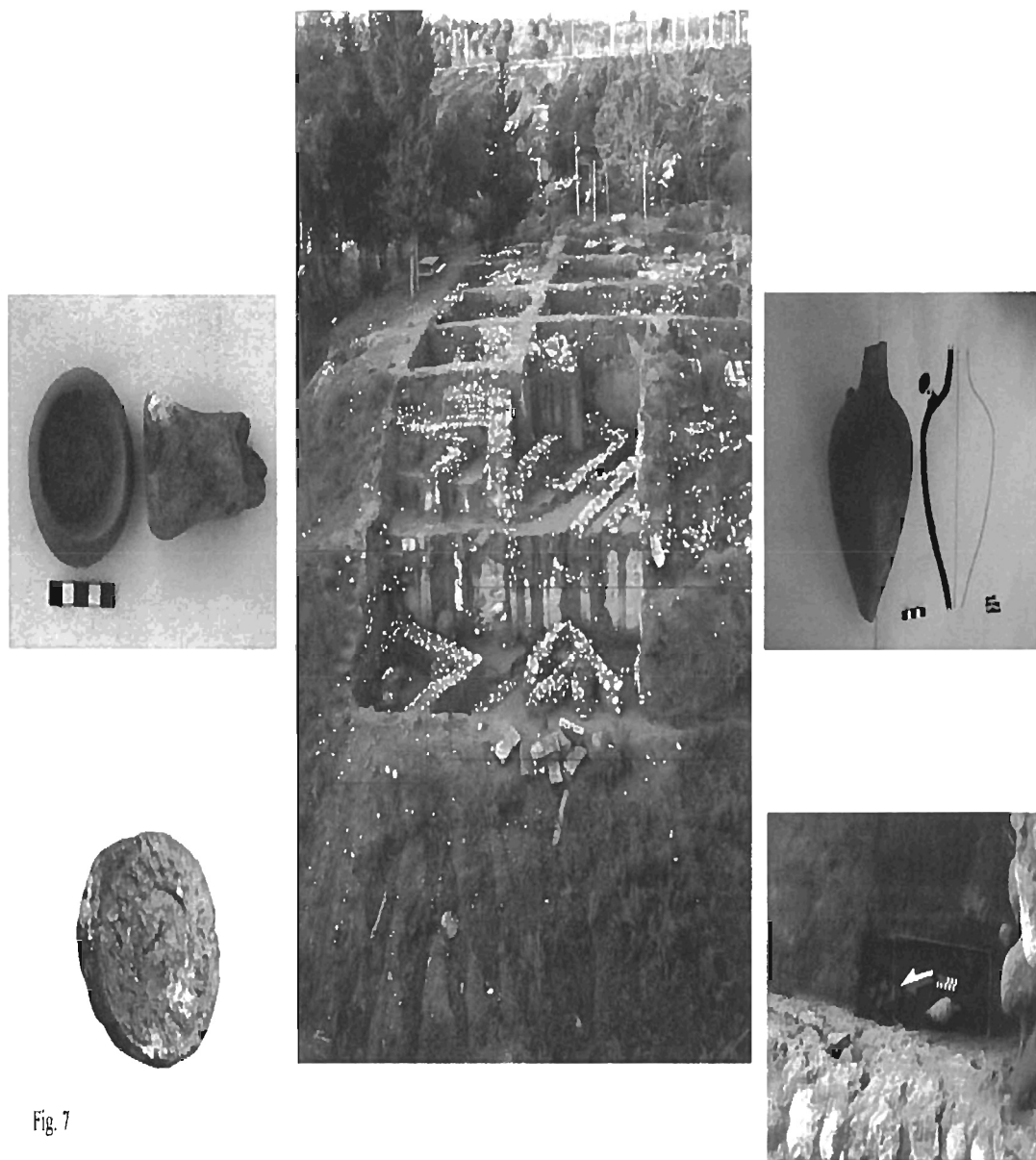


Fig. 7

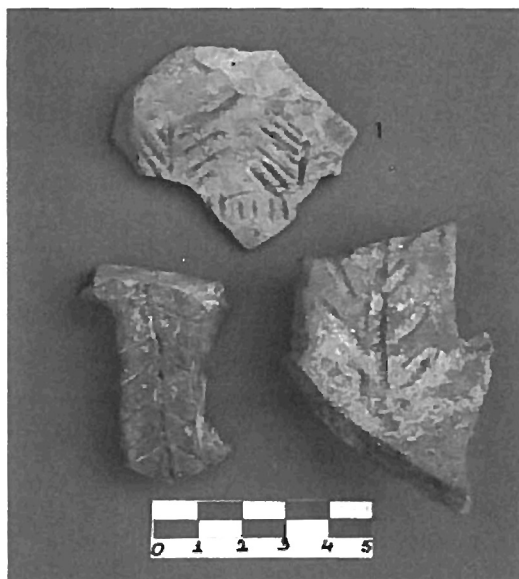


Fig. 8

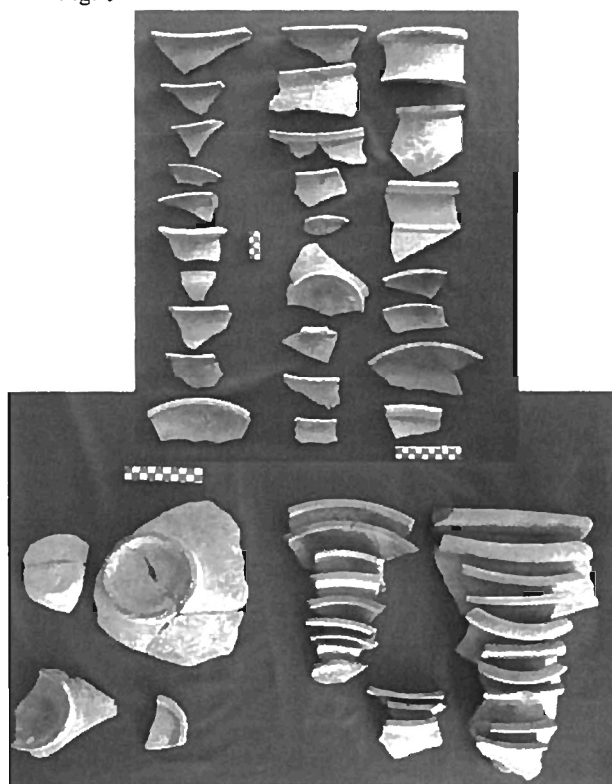
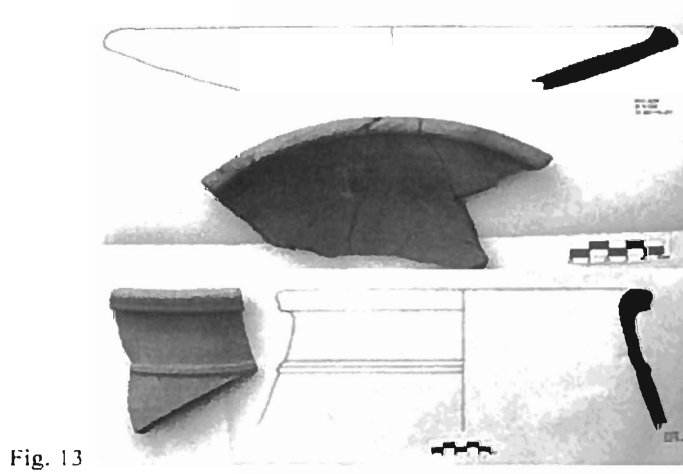
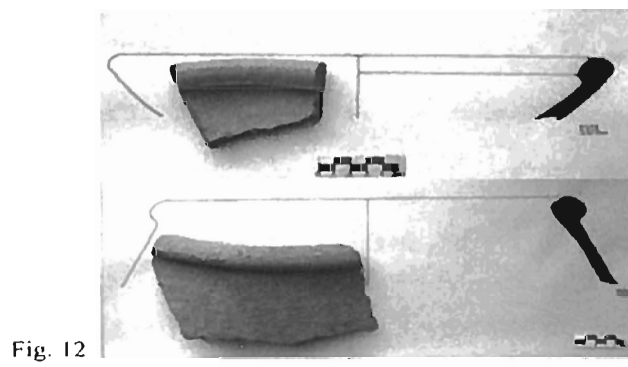
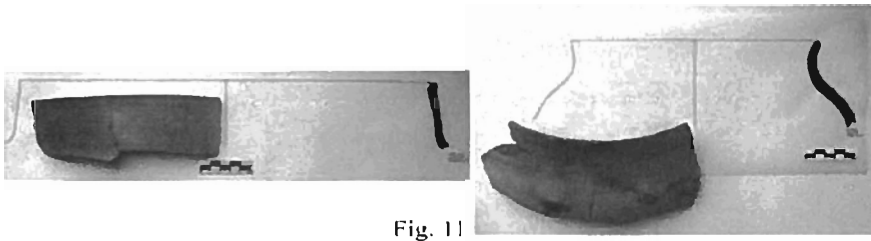
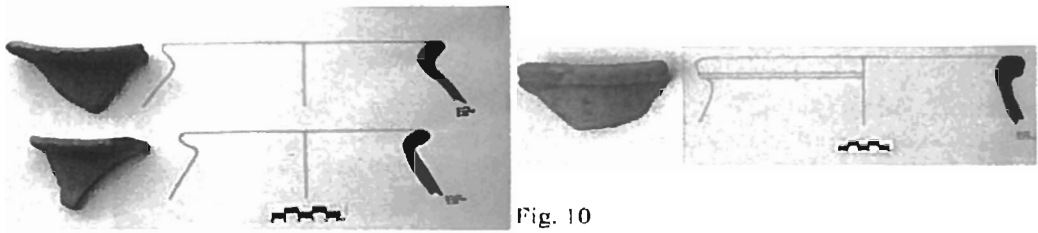


Fig. 9



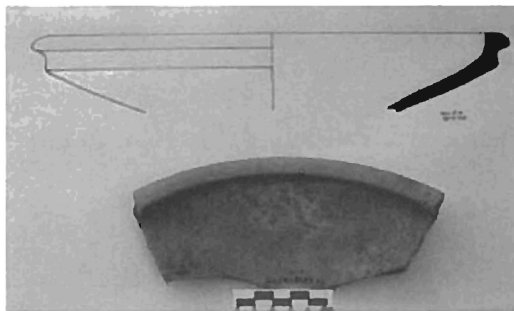


Fig. 14

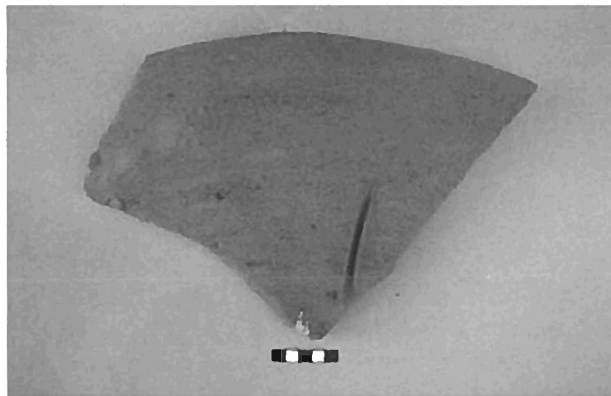


Fig. 15

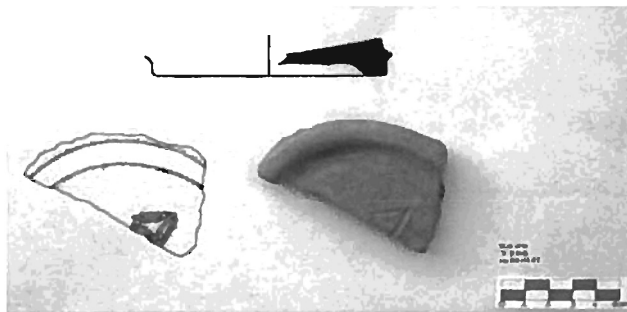


Fig. 16

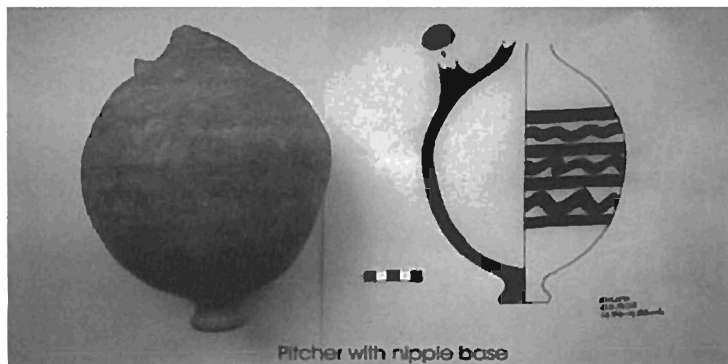


Fig. 17

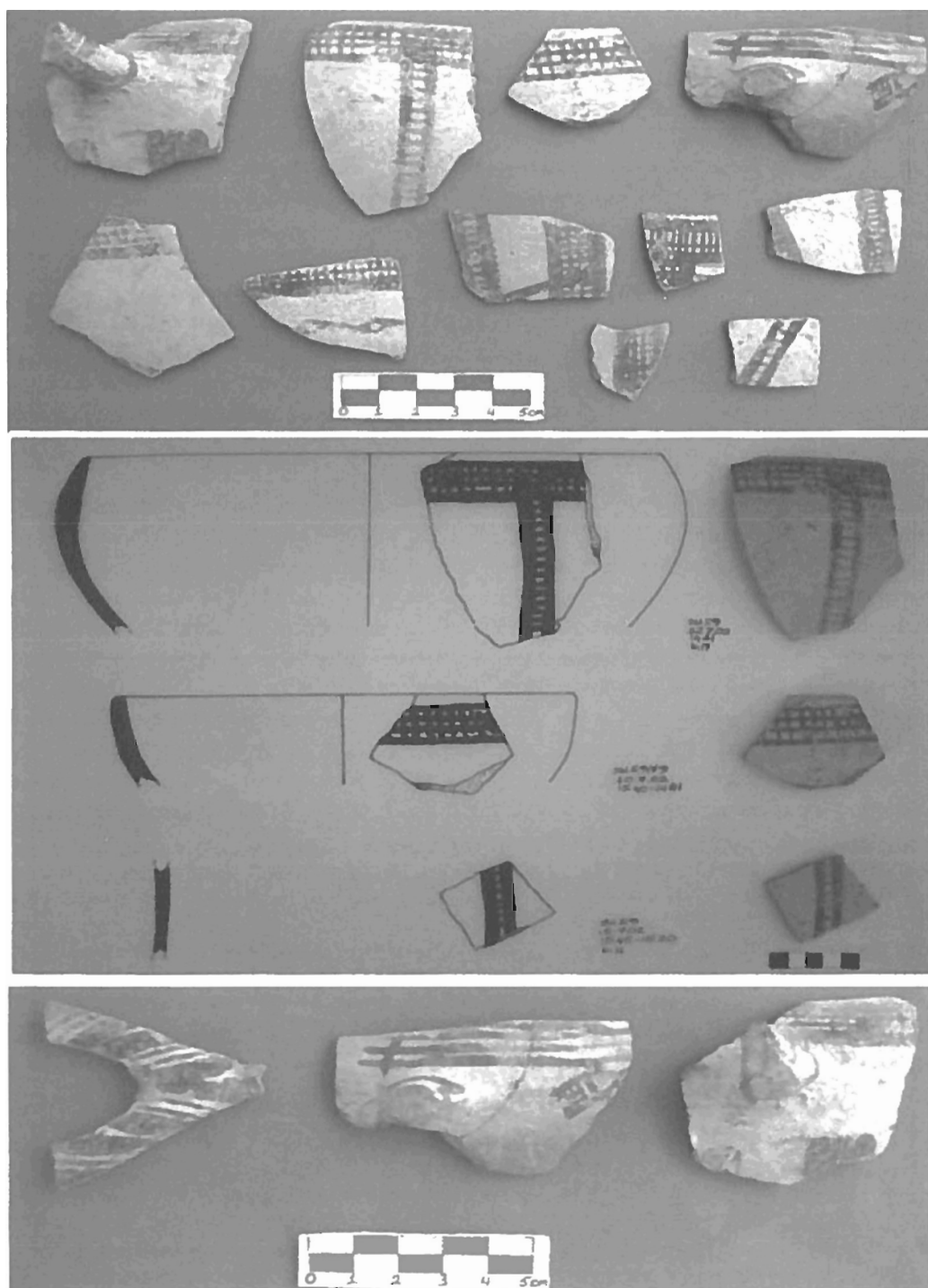


Fig. 18



Fig. 19

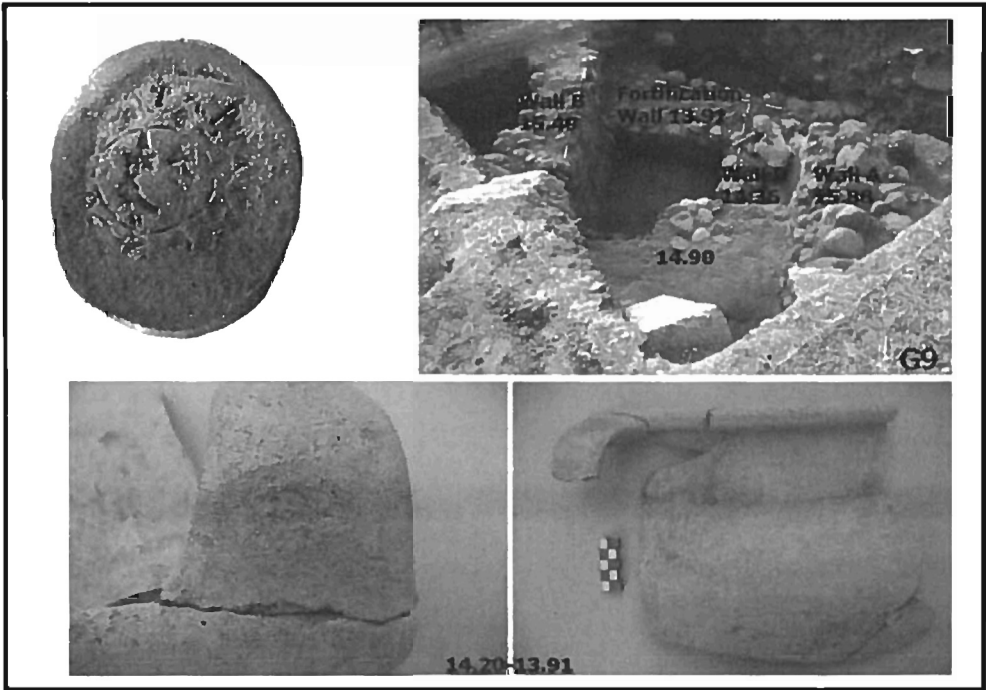


Fig. 20



Fig. 21

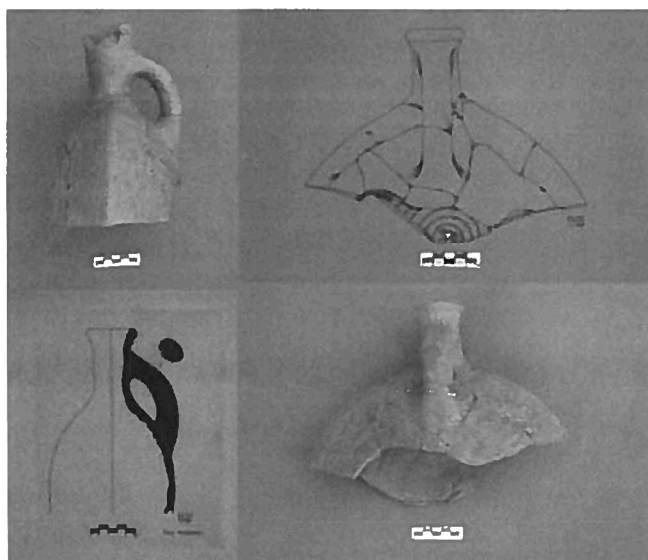


Fig. 22

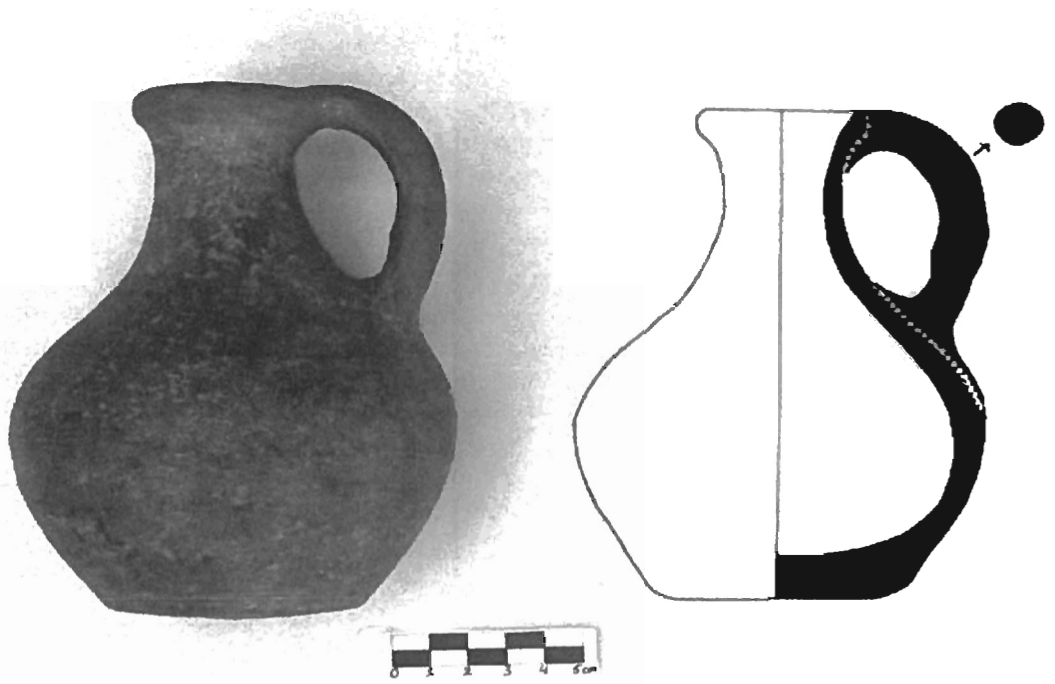


Fig. 23

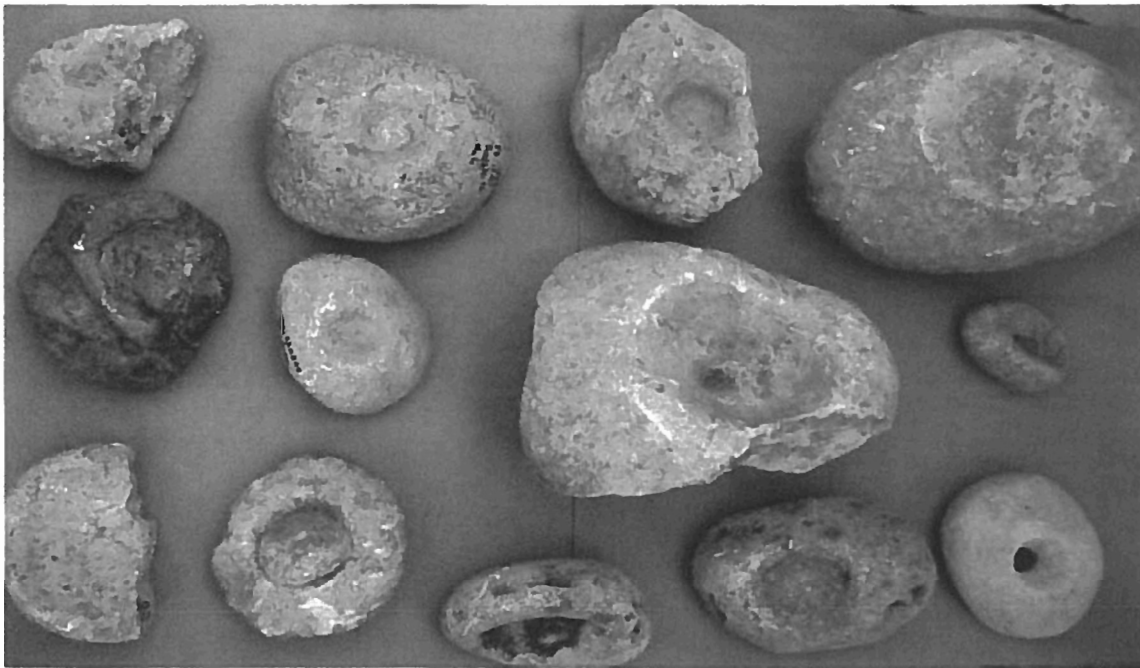


Fig. 24