REPORT ON THE FIRST TWO SEASONS OF EXCAVATIONS AT BASṬA (1986-1987)

by

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Introduction

In early 1986 the Department of Antiquities of the Hashemite Kingdom of Jordan, the Institute of Archaeology and Anthropology of Yarmouk University, and the Institute of Near Eastern Archaeology of the Free University of Berlin (FRG) joined in setting up a project under the directorship of M. Muheisen and H.J. Nissen, aiming at the exploration and excavation of the Late Pre-Pottery Neolithic site below the modern village of Basṭa, south of Wadi Musa (Fig. 1). Immediate action was called for by the fast expansion of the village.

The site was first mentioned by Nelson Glueck (1934-35), and reported as Chalcolithic by Diana Kirkbride (1959). Its Neolithic character was recognized only by Dr. Ghazi Bisheh from the Department of Antiquities, and subsequently dated to the Late PPNB through a 1984 sounding in a building lot, by a member of our team (H.G. Gebel).

Though at first only preliminary work and soundings were intended, the 1986 season grew into a full-scale excavation as just prior to our arrival a construction site of close to 400 square metres had been cleared, cutting deeply into the early occupation layers. Although neither prepared nor fully equipped for that kind of work we were able to open an area of close to 200 square meters within the one month season.

As the site had shown its potential of yielding new material and insights into the context of a Neolithic village, plans were drawn up for a series of five more seasons, the first of which —the second season at Basṭa— was organized for the summer of 1987 and lasted from mid August to mid October.

With deep gratitude we acknowledge the generous support of Dr. Adnan Hadidi, Director General of the Department of Antiquities, of Dr. Moawiyah Ibrahim, Director of the Institute of Archaeology and Anthropology of Yarmouk University, and of the German Research Association as well as of the Free University of Berlin. Our most sincere thanks, however, must go to the members of the teams of the first two seasons who gave their best to achieve our common goals[1].

1. Besides the three authors, the following persons participated in both seasons: Suleiman Farajat, Inspector of Antiquities at Petra (department representative and site supervisor) Nabil Qadi (camp manager and site supervisor), Wajeeh Karasneh (site supervisor), Gerald Sperling (photographer) and Reinder Neef (palaeobotonist). In 1986 the team was completed by Ibrahim Zo'bi (site supervisor), Thomas Rüth (surveyer), Gunnar Lehmann M.A. and Roland Lamprichs (site supervisors). The core team was augmented in 1987 by: Zaydoun Za'id (architect), Abdel Rahim Hazim (site supervisor), Abdel Salam (site supervisor and draughtsman), Nikolaus Schlüter (dig technician and registrar), Lykke Leonardsen (registrar), Irmgard Raidt (draughtswoman), Bo Dahl Hermansen, Arno Kose (site supervisors). Part of the 1987 season we had the help of Daif Allah Obediat and Katherine Wright as site supervisors. Dr. Cornelia Becker (palaeo-zoology), Dr. Michael Schultz (Göttingen University, physical anthropology), Prof. Dr. H.J. Pachur and Michael Goschin (Free University of Berlin, geomorphology) and Margret Nissen (photographer). Last but not least, we greatly acknowledge the physical support of our cook, Adnan Falahat from Petra.

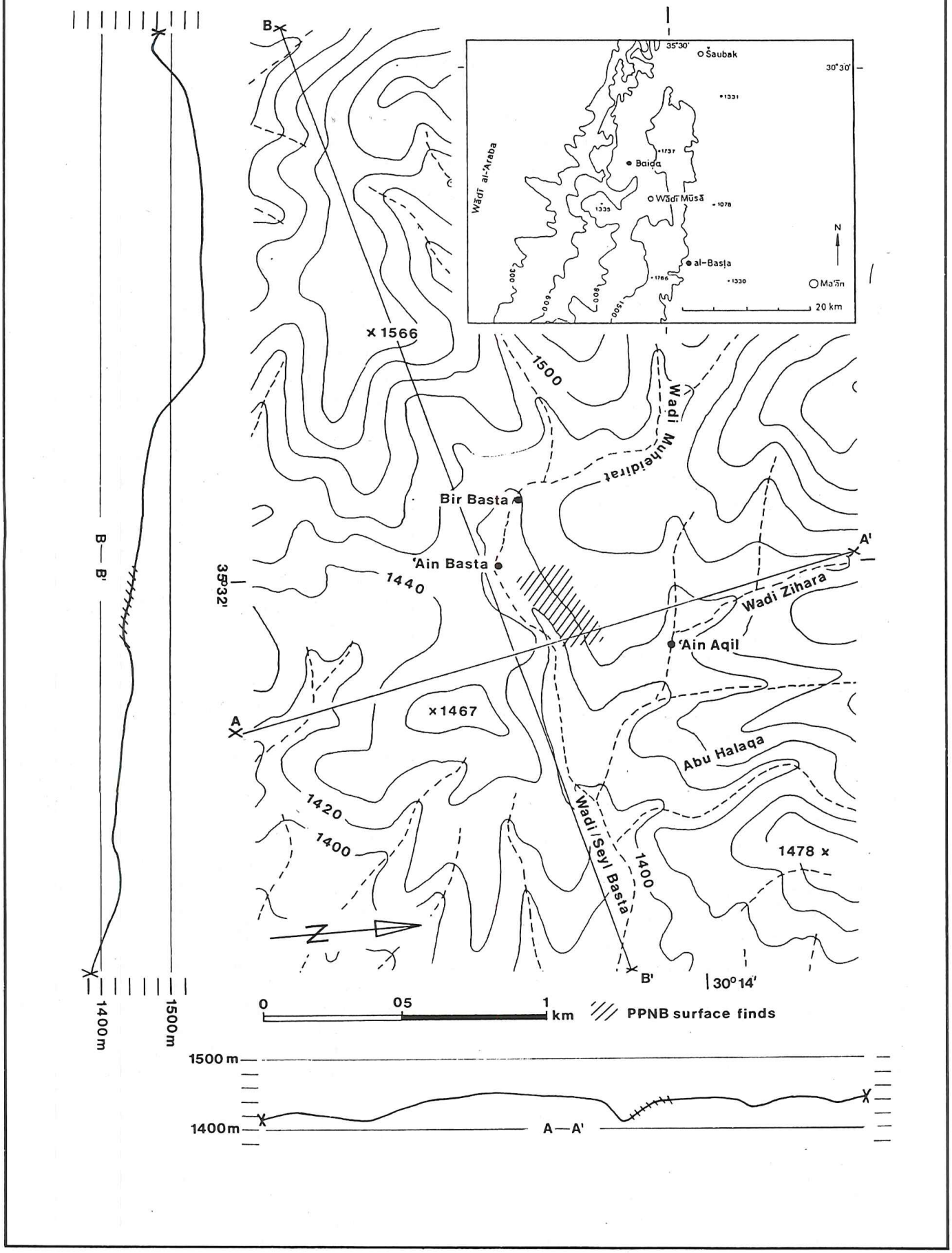

Fig. 1: Location and physical setting of the site of Basṭa.

After the second season at Baṣṭa, the potential of the site became more obvious. It is among the largest PPNB sites encountered so far in the southern Levant. Preservation and wealth of the various classes of artefacts and of the palaeobiological material seem to be as outstanding as that of the architectural remains. Apart from the flint, stone, plaster and mother-of-pearl industries also attested elsewhere, Baṣṭa yielded a considerable amount of clay objects, some burnt as in the case of figurine fragments, some only sun-dried as in the case of a large stationary vessel. This find, however, by no means argues against our dating of the site into the Pre-pottery phase, but like at 'Ain Ghazal (Rollefson *et al.* 1984) it could speak for a very late date within that horizon[2].

The architecture does not have exact counterparts in contemporary sites. The sub-floor "channel-system", for instance, is clearly different from similar structures at Munhatta (Perrot 1967), Çayönü (Braidwood, Çambel and Schirmer 1981), or Nevala Çori (Hauptmann, personal communication) in that the "channels" are closed off by the walls of the room. Other peculiar features include an excellent building technique using dressed stones, and a large well-planned structure consisting of rows of rooms around a central space.

The diet of the ancient inhabitants points to a steppe-like environment with its potential of hunting game like gazelle, onager, or wild sheep and goat, and of collecting arboreal fruits. Though finds of domesticated sheep/goat, or cattle and of domesticated two-row hulled barley, emmer wheat and field pea show the existence of food production, the main subsistence still seems to have come from hunting and gathering.

Course of Work

Having been confronted with the situation mentioned above, we had to change our plans for 1986 as all forces had to be concentrated on rescuing as much of the archaeological evidence as possible. Yet, the initial goals of collecting general information on the site, especially concerning location and probable size, could be reached. In addition to the excavation we were able to conduct an intensive survey of the entire area of the modern village: dating and kind of settlement were clarified by the excavation while information on the probable size was provided by the survey.

In the excavation, work was organized in 4x4 meter squares separated by 1m baulks. 13 of those could be opened fully or in part with the intention of reaching the first floor. In addition, stratigraphic information could be secured from the edges of the bulldozer pit as they exposed sections of up to 3m in depth. Most of the excavated material was sieved using 5mm and 2mm sieves.

Close to the end of the 1986 season it became apparent that more time was necessary to extract a minimal amount of information from the site of the building lot. We were able to secure the help of the authorities for keeping the site open for another year, before being returned to the owner. In addition, we were fortunate to get a different, undisturbed area within the modern village and well in the probable center of the ancient site, set aside for future excavations.

The second season lasted from August 17th to October 8th 1987, and consisted of work both in last year's building lot — now named Area A — and the area reserved for us, called Area B. Using the same system and taking advantage of the larger staff, work was conducted in 6 squares simultaneously, most of the time divided equally between Areas A and B. Special on-site information was secured by employing a hand-held drill in order to probe into the depth of the occupational layers. The

2. Two radiocarbon dates were processed so far from pistachio charcoal samples (W.G. Mook, Centrum voor Isotopen Onderzoek, Gröningen; R. Neef, pers. comm.):
1. 8380 +/- 100 BP (GrN-14537) from 500N/685E, 23.46-33m (cultural debris above bedrock).
2. 8155 +/- 50 BP (GrN-14538) from 500N/690E(D), Locus 7 (ashy lens in major building phase exposed).

results will have great impact on the planning of future work.

From the beginning of work in Baṣṭa, the opportunity which the almost totally abandoned but still intact old village of Baṣṭa had to offer for anthropological studies was recognized. As any such study has to begin with taking stock of the physical remains by way of a photographic record and an architectural survey, preliminary work started during the 1987 season with documenting the present status photographically.

Aspects of Physical and Geomorphological Setting (Contribution by H.J. Pachur)

Baṣṭa is situated at 30° 13′ 47″ N/35° 32′ 06″ E[3] at an altitude of 1460-1420m. The area is presently influenced by the Mediterranean zone, receiving up to 300mm annual rainfall most of which falls in winter, and is situated in an area dominated by lower Cretaceous limestones (Bender 1968).

Prevailing wind directions responsible for soil erosion are mainly from E and S, and occasionally from W. Rainfall is brought by winds from SW. Except for occasional hawthorn *(Cretaegus azarolus* and *Cretaegus cf. monogyna)* and wild fig, the agriculturally used surrounding land is treeless due to overgrazing and wood exploitation. Planted trees only exist in protected gardens.

As many as six climatic regions can be identified along a west-east transect between Wadi 'Arabah and Ma'an. Baṣṭa is located in Region III, described in Gebel, Muheisen and Nissen 1988.

The Lower Cretaceous limestone sequence, which is tilted in this area and dips at about 11° to the southwest, has thin alternating layers of massive dolomitic limestone and strata containing calcareous marl. Because of the dip, the hard and soft strata which would otherwise overlie each other are juxtaposed in a horizontal position. The result is a narrow petrographic alternation which erosion has emphasized, leaving the dolomitic-calcitic rock beds as pronounced ridges in contrast to the more easily erodible layers of marl. The earlier settlements are generally situated on the ridges, probably in order to preserve the valuable farmland that evolved on the less resistant beds.

The Baṣṭa A excavation site is located on the southwest slope of Wadi Baṣṭa on the edge of the ridges. Because of the topographic situation the site is located away from the fluvial deposits. For this reason slope-erosion-induced weathering and eluviation mechanisms and colluvial processes are the primary causes of detrital accumulation.

In the course of excavation in Area A it became evident that the surface of the solid limestone dips at about 2.5° parallel to the slope. This means that the walls on the eastern side were built directly on top of the rock. The limestone surface, already marked by solution cavities, was subsequently shaped by man.

In the first drilling (Fig. 4:1), the limestone was reached at a depth of 2.4m. We assume that it is overlain by a yellowish-brown weathering mantle, which is at least 0.45m thick and should be classified as the C-horizon of an anthropogenically disturbed soil which is about 0.6m thick and of colluvial origin. A further drilling (Fig. 4:2), 5.5m away from 1, reached the limestone top at a depth of 2.10m. Thus we have a shallowly undulating rock surface covered by a limestone-rich weathering mantle about 0.6m thick before a soil of unknown thickness was formed. Evidently the foundations were laid on top of the weathered limestone and its soil cover. This is unfavourable building ground which tends to subside due to the steep slope and to solution processes within the detritus.

As the traces of charcoal in the cores show, the foundations were laid on a soil already disturbed by man. Analysis of pistachio charcoal from the overlying layer has shown that the soil is older than 8155 ± 50 yrs BP (Gr N-14538).

3. Baṣṭa is located *ca.* 12 km linear distance SSE of Wadi Musa and can be reached by the Wadi Musa - Ma'an road. The Palestine Belt Grid reference is 960,0 N and 201,3 S.

In the following, the exposed material in the section above the uncovered walls is described (NW-Section of Area A; Pl. VIII). At those places where the detritus described below covers the walls, a tufaceous limestone (Pl. VIII:>) was formed, filling the cavities at the base. This is followed (Pl. VIII:a) by angular, partly well-sorted limestone debris containing coarse silty fines. In a dry state this 30cm thick debris layer is light grey in colour. The particles have an imbricated structure and there is less fine-grained material in this bed than in the following one. This layer is about 35-45cm thick (Pl. VIII:b). The detritus consists of coarse (longitudinal axis: up to 12cm in diameter) and angular limestone. The cavities are filled with equally angular, smaller debris. The fine matrix is slightly loamy and consolidated by precipitated porous calcite. The texture of this horizon points to mud-flow-like transport of the material, the matrix being the washed soil. It must be emphasized that at the side a wall juts out above this material, indicating that debris movement was influenced by the buildings, as is deduced from the slant of the detritus against the wall.

Above (Pl. VIII:a), over a thickness of 1.2m, the limestone detritus is generally finer (about 0.05m on the longitudinal axis) and bedded. The matrix consists of crumbly calcareous loam which, like the underlying layers, was later consolidated by fine calcic tufa. The surfaces of almost all the detritus particles are covered by a calcite layer up to 0.3mm thick. The bedded texture of the coarse material points to redeposition having occurred during sheet flood of slope wash. It should therefore be termed colluvium. The fine-grained material comes from upslope topsoil eroded by sheetfloods during winter storm rainfall. The coarse material, on the other hand, presents a problem since the slope is only short and flattens out distinctly further upslope. In my opinion this material was deposited on the slope by man and was redeposited by gravitational and colluvial transport: i.e. it is colluvium supplied by man. This view is supported by the occurrence of numerous flakes, bones, and pottery throughout the material. Scattered traces of charcoal also occur, as well as compact pieces, several millimeters in size. Since the detritus mainly consists of "normal" limestone and not of material especially suitable for toolmaking (although there are flint pebbles, which are particularly frequent in the above-mentioned compact limestone), the question arises why such a quantity of rock detritus should have been deposited on the slope. In order to answer this question, we have to consider the excavation site in the context of the general topography of the area.

The following remarks are based on observations made during fieldwork and drillings made above the excavation site. In the Basța area, the limestone bedrock is covered by a very stony, brown calcareous loam of the brunified terra fusca type, which has a partly colluvial character in the study area. Owing to the topography these soils may be eroded by water and/or wind. Both factors mean that the limestone detritus tends to collect on the soil surface. The limestone debris was and still is collected by farmers and deposited downslope, parallel to the slope, and in the middle of fields. This results in detritus strips, which are several metres wide and are a characteristic morphological feature of the present agricultural landscape.

Drillings outside the Basța site were made above the settlement in a stony field having the shape of an equilateral triangle (Area C) with sides about 100m long and a shallow concave surface sloping towards Area B (*cf.* Fig. 2). At the top end of the field boring was stopped after 1.5m without having reached the weathering horizon on top of the limestone bedrock, thus determining the minimum thickness of the stony soil. These deep soils are a suitable basis for agriculture. On the other hand, in slope locations they are susceptible to erosion. When the plant cover is removed they are also subject to deflation. Denudation and deflation lead to an increase in the number of stones on the surface of farmland soil.

The significant role played by slope erosion is demonstrated by two further

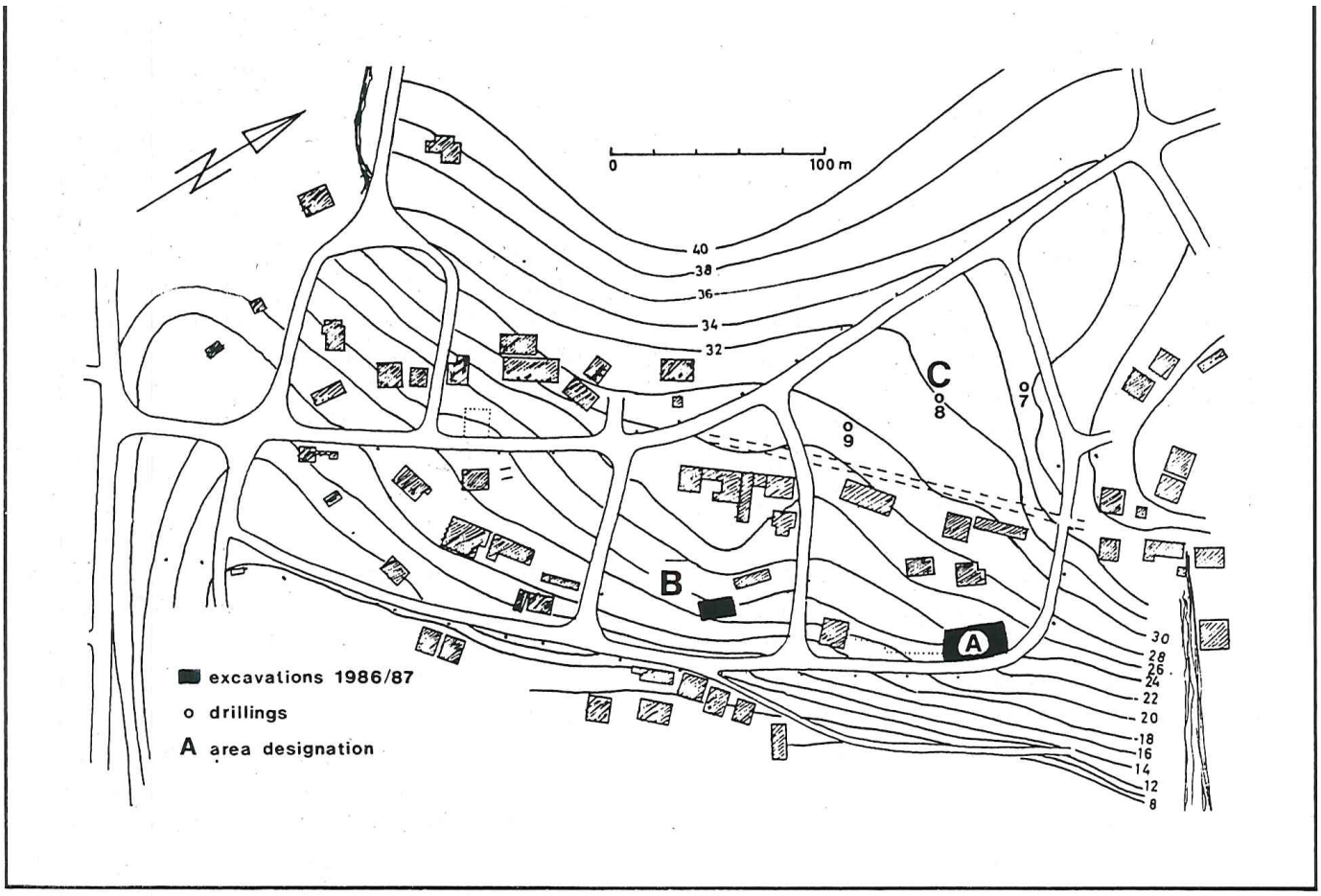

Fig. 2: Modern Basța and location of excavated areas.

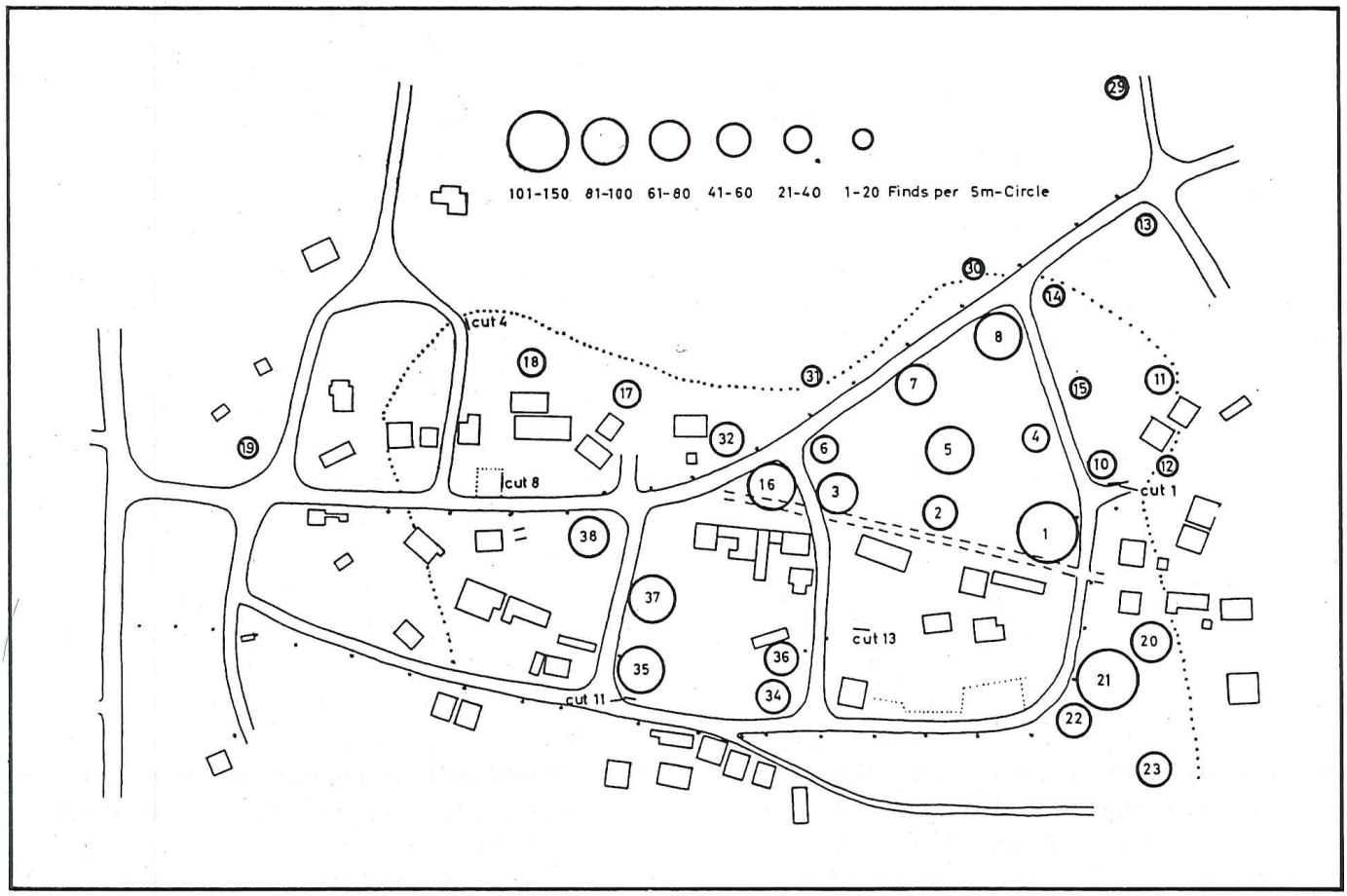

Fig. 3: Sampling units and find intensity of the intensive surface survey.

Table 1: Stratigraphy of Drilling 8 (a) and Drilling 9 (b).

a)	0- 90 cm		slightly loamy sand, A-B horizon of a brown calcareous loam
	90-233 cm		loamy, compact, light-brown sand (fine limestone detritus)
	233-245 cm		dark-grey, slightly loamy sand, A-horizon (?)
	245-300 cm		core loss
	300-350 cm		silty, light brown calcarenite, slightly loamy
	350-360 cm		charcoal particles throughout the mineral substrate
	360-390 cm		dark grey, slightly loamy sand, A-horizon (?), isolated traces of charcoal
	390-410		silty, slightly loamy calcarenite
Drilling stopped without reaching bedrock.			
b)	0-250 cm		calcarenite, brown to yellowish, stony. At 2.5 m: a 0.6 cm long flint chip
	250-610 cm	colluvium	loose calcarenite, trickles out of the corer. Little or no limestone detritus
	610-640 cm	soil horizon	compact, loamy calcarenite, the upper 10 cm are grey
	640-710 cm		loamy, weathered limestone, stony
	710-730 cm		slightly weathered limestone, clayey-loamy

cores taken along the line of slope (*cf.* Fig. 2; drillings 8 and 9, and Table 1). Considering the narrow cross-section of the corer, clear evidence of the colluvial nature of the soil is provided by the presence of charcoal and by the twofold horizon formation, a sign of pedogenesis. Since the bedding conditions preclude the possibility of natural coalification, the charcoal may be interpreted as evidence of human use of the area. We have therefore come to the conclusion that the coarse-grained material overlying the Basța A ruins are, in the main, bedrock fragments which were deposited on the slope and underwent quasi-natural erosion by storm rainfall and gravitational transport.

At Area B the texture and structure of the material covering the site are extremely homogeneous. Diagenetic consolidation occurred everywhere through the formation of calcic tufa bridges between the coarse-grained, colluvial material. In places the calcic tufa forms compact cavity precipitations, several cubic decimetres in size.

Whilst in some places at Area A the limestone bedrock or the overlying calcareous crusts formed the foundations of the walls of the buildings, at Area B drilling revealed only alluvial material. Presumably the buildings were erected on top of a layer of colluvium more than 3m thick.

The formation of a more-than-3-m-thick colluvium in the morphological situation described here can only be explained by a considerable man-made thinning-out of the vegetation. It may therefore be assumed that the area was used intensively, probably for agricultural purposes, before the buildings were erected and that this use resulted in considerable erosion of the soil. The chronology may become more precise by analysis of charcoal found in the catchment (*cf.* core 8 and 9) and by correlating the strata in the core samples with the horizons of Area B.

The Intensive Surface Survey of 1986 (Fig. 3).

The Neolithic settlement lies almost entirely under the modern village of Basța. As a matter of course, the areas under the modern structures and below the modern roads were inaccessible for archaeological investigation. Equally, areas between the houses, currently unused for recent activities, were nevertheless so much disturbed

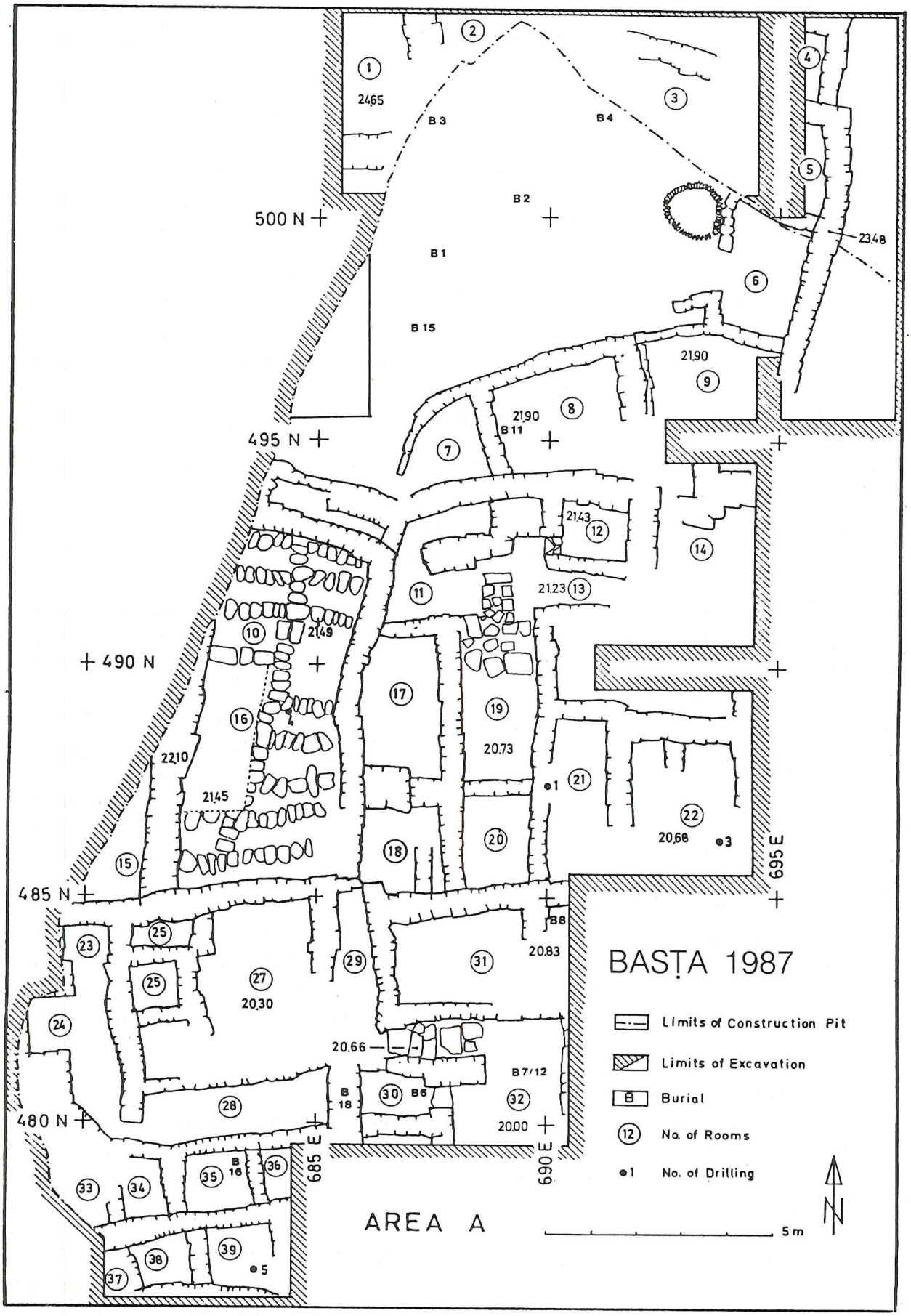

Fig. 4: General plan of Area A.

that no reliable information could be expected. It became obvious that a systematic random survey would result in many unsuitable areas selected for examination. Therefore it was decided to limit the survey to those areas which did not seem to have suffered from any modern disturbance, thus abandoning the idea of a systematic survey.

The surveyor provided the reference system for the surface collections. More or less evenly spread over the undisturbed areas, 38 points were fixed according to houses and poles of the power lines marked in the plan. An area of 5m in diameter around each point was strung out for total surface collection. As could be expected, the size of the collections varied considerably and it came as no surprise that while collections from a large coherent area were quite rich they tended to decrease in size considerably towards the edges of that area, suggesting that these areas may mark the margins of the ancient site.

Embankments of roads and occasional levelling operations provided additional information as sometimes the depth of the Neolithic accumulation became visible, sometimes even giving hints as to the depth of the cultural layers. Exposures along the Abu Danna road were of particular interest as at about 1m below the present surface, Cut 8 (Fig. 3) revealed a red-stained floor of *ca.* 2m length above what seemed to be sterile soil. There were no traces of any stone walls visible. Likewise, further to the north the cultural deposit seemed to be very shallow and only 20-40cm below the surface. As expected, Cut 11 in the central area exposed *ca.* 1.5m of occupational layers beneath an overburden of up to 1m, and reaching down into unexposed area. Cut 13 marks the spot of the original 1984 investigation of H.G. Gebel (Gebel and Starck 1985).

Obviously, the decision of what size surface collection indicates a spot being part of the formerly settled area had to remain arbitrary. Thus the line marking the limits of the ancient settlement cannot be more than an approximation of the probable minimum extent. Including even small collections, we would arrive at a maximum size of *ca.* 14 ha. More realistically, however, and just counting the larger collections, is a size of *ca.* 10 hectares.

Since the material is awaiting detailed analysis some remarks have to suffice. So far, the material seems to be very homogeneous, with a slight preponderance of cores and bifacial tools in the area we now call Area C (Collections 1-8). Furthermore, the range of the material exactly matches the material found in the excavation. Taking into consideration the limitation of using flint material for short-term dating, our findings nevertheless could indicate that the entire area of surface coverage was part of one contemporary settlement. Yet, this will have to be confirmed by future work.

Architecture and Stratigraphy

These remarks are based on the cuts produced by the bulldozer in Area A, the results of the excavations in Areas A and B, and on the drillings mentioned earlier. Since the slope situation and the possible course of accumulation have been detailed above, we need only recall that the early settlement lay on a slope bordering the wadi. Apparently, the original surface used by the early settlers consisted of a thick layer of the decayed debris of the soft limestone bedrock. This layer was found already at a depth of only 2.2m below the modern surface in the northwestern corner of what became Area A, and thus was reaching into the level exposed by the bulldozer. Since further to the south architecture started to appear at the same level, we hoped to get some indication of the relation between this layer of decayed bedrock and the first architecture. Yet, unfortunately, too much was already destroyed to present unequivocal information. It must, therefore, remain open whether we can generalize the evidence of the sections and assume that the architecture started only at the point where we actually found it, or whether traces of the architecture were removed during the preparation of the building ground. The significance of this question will be discussed

in the context of the burials. In any case, where we do have architecture, the walls are founded on top of the grey layer mentioned above. This was confirmed not only in two cases by actual excavation but also by the drillings operated at various points in Area A.

While in Area A we have at least some information on the original surface and its relation to the early settlement, we totally lack such information for Area B. As will be discussed later, there we seem to be in an area of heavier later accumulation and of less inclination of the original surface, leaving no chance of exposing the bedrock, or the zone of contact. Two attempts of drilling taken down from the lowest point reached in Square 395N/600E in Area B did not provide a full answer: in both cases the drill was stopped suddenly at a depth of 3m below the floor of our excavation, not yielding any trace of either the decayed layer, or of the soft limestone. In all probability, the end was prompted by large stones, perhaps a wall, indicating that we did not reach the bottom of the occupational layers. We thus have to account for a total depth of occupational debris of more than 2m in Area A, and more than 3m in Area B below the levels reached in 1987.

The building technique was nearly identical in both areas of excavation (Fig. 8 and Pls. II and IV). Though the early builders took advantage of the fact that the local limestone flaked off in layers of equal thickness thus providing easy building material, the slabs nevertheless were dressed in most cases to form almost rectangular boulders. With some exceptions they were laid in lime-mortar. In addition, the joins in most cases were quoined with thin flat stones.

Area A. Though the object of a more detailed description in the section on the burials, the situation in the northwestern corner of Area A has to be discussed here. Numerous pits and shallow depressions dug into the layer of decayed limestone and the bedrock give this area a very rugged appearance. Though some contained burials, these pits do not seem to have been dug originally for that purpose but for the extraction of building material. The first sign of human activity was a thick greyish layer with a heavy admixture of ashes, animal bones, flint tools and debitage. It was this layer which contained a number of burials, the pits of which occasionally reached down into the layer of decayed limestone. This grey layer was itself dug into at several points to provide holes for fireplaces, or else for an unknown purpose. One of these larger pits was found to be filled with material containing more flint material than loose soil. The large amount of debitage, and especially that of cores, suggests that this might have been the litter of a workshop.

Looking at the architecture of Area A, the most striking feature is the lack of any spaces which would qualify as communication ways, and the impossibility to differentiate larger units from one another. Though doors occasionally exist, they never link up to connect larger units. It is true that in some cases the walls are preserved only to a height that may have left no traces of a door. In other cases, however, walls are preserved to a considerable height with still no traces of passages, which left us puzzled, at first. The new evidence of Area B, on the other hand, where the passages from one room into another started only at a height of 60cm and more above floor level, indicate that those traces could be lost even if the walls were preserved to a height of 40 or 50 cm.

Three points will be presented here: the building with the "channel" system and the area to the south of it; whether or not there is evidence for temporal differentiation in the architecture; and the evidence for building on terraces.

Certainly, the most interesting architectural feature is presented by room (10)/(16) and its sub-floor structures. This room already proved to be special by its size, as at 4.5 x 9m it obviously is the largest in our context. There is a differentiation between the northern and southern parts of this room, where the floor is different both in level and construction, but this seems to be an internal differentiation rather than a separation of the space into two rooms as the parts are connected in more than one aspect. On the one hand, the east wall

continues without any differentation, and on the other, both parts are strongly connected to the same sub-floor structure. The division is marked by some large slabs connecting the west and east walls like a threshold, exceeding the floor level of the southern part by 10-15 cms while being flush with the floor level in the northern part.

Using the term "floor" may in fact conceal the issue as only the southern part is covered by a good earth floor of tamped earth over a layer of sharp-edged rubble stones, whereas the northern part was covered only by a much thicker layer of those stones without any traces of levelling or smoothing off by means of an earth floor. It is true that from looking at the part of the bulldozer section directly above, it seems that this area may have been disturbed later on even though this implies that at least some traces of an earthen floor ought to be detectable, if it ever existed.

Both parts, the thin layer of those stones in the southern part, and the packing in the northern part, rested on the same structure. After removing the small stones, rows of large slabs appeared in parallel rows in a W-E direction (Fig. 5) connected to each other by a central row running roughly N-S. The spaces between these slabs continued to be filled with the smaller rubble. Both, slabs and adjoining small rubble, were removed revealing a system of "channels" which turned out to have been covered by the slabs, and which had been created by walls occupying the intervening spaces. The "channels" were *ca.* 20 cms wide and *ca.* 40 cms deep. They were still partly empty, and partly filled with very fine soil which obviously had gradually penetrated through the fine mesh of the stone and floor cover. Nothing was found inside, although the soil was subjected to sieving (2mm mesh) and flotation. A number of land snails *(Cecilioides acicula,* O.F. Müller 1974) are apparently of post-occupational origin[4]. While the sides of the "channels" were not plastered or treated in any way —the walls were void of any mortar— the floors were smoothed to the point that we had the impression of them being dark stained. The floors throughout the system were at exactly the same height.

Any explanation has to consider one basic fact. In the case of the walls enclosing the room to the north, east and south, the "channels" run up to them, never penetrating them. It is therefore extremely difficult to accept any explanation which is based on notions like drainage or ventilation as they would require openings to the outside. One incertainty remains as the western wall tells a different story. Though at first this wall seemed to be as good a limit as the other walls, it differed in that we had only part of it exposed in the excavation area, the northern part seemed to disappear into the long bulldozer section. Yet, the main difference was that, when probed by a meter-stick, the "channels" proved to continue in a westerly direction far beyond the projected line of the western wall. The same was found when in 1987 parts of that "channel" system were uncovered below room (16) where the western wall was still preserved to some height. Again, the "channels" proved to reach below and beyond the face of the wall. Unfortunately, this problem cannot be solved because of the impossibility of excavating the area behind the bulldozer section.

In the existing walls of the room (10)/(16) there was no sign of an entrance, though the destruction of the east wall close to the southeast corner may point to an original opening in that part. Apparently, that part of the wall had already collapsed during the period of use, and was repaired by stacking up small, undressed, irregular stones which had disintegrated into a heap of stones.

While to the north the room seems to

4. Identifications were made by W. Raehle, Institut für Biologie III, Tübingen University. The species found in the cavities of the structure is known for living in subterranean environments and for digging to depths of 2 m. It prefers calcareous, dry-warm, and treeless environments and is often found in cave sediments.

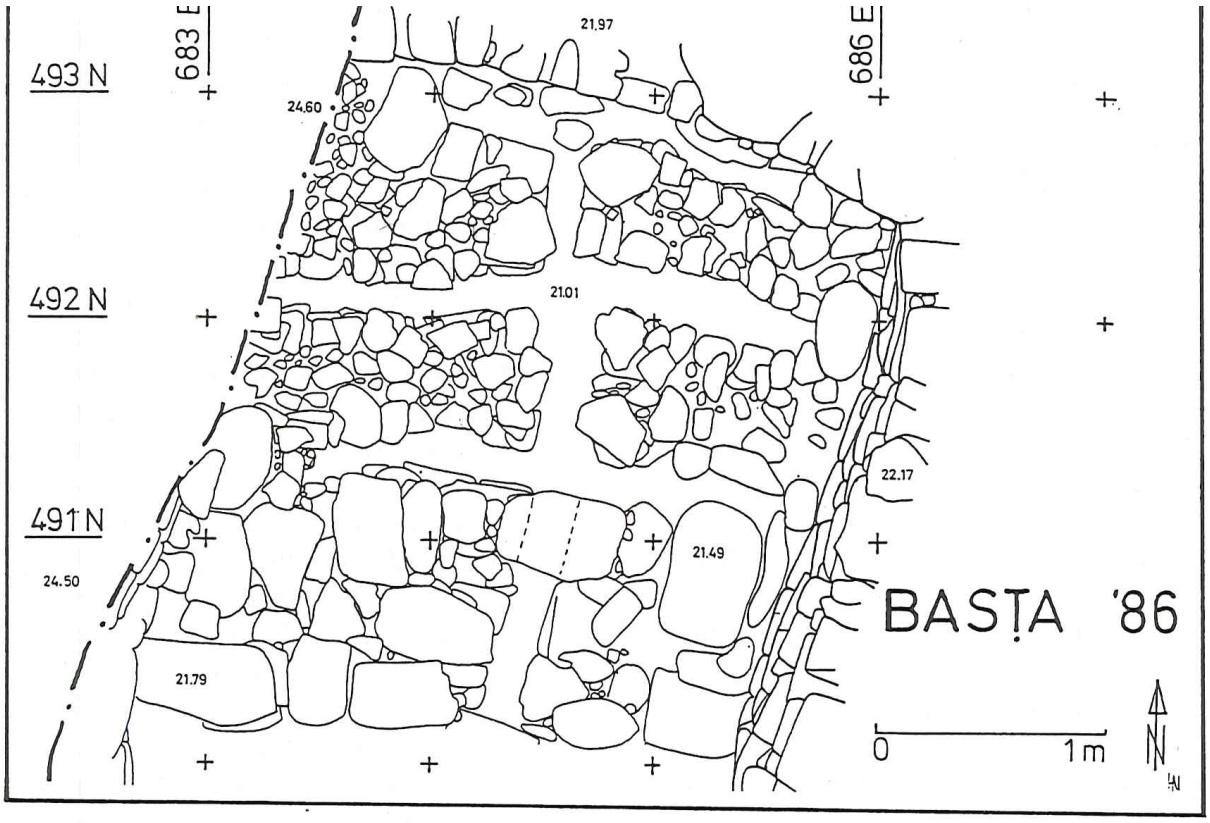

Fig. 5: Detailed plan of Room A10/16.

border on a terrace limiting the open area in the northwestern corner of Area A, it stood in direct connection to structures both to the east and south. Not only were there no intervening spaces but in most cases the walls either continued, or were bonded in, and thus prove to have been built at the same time. This way, most of the walls uncovered in Area A seem to constitute one building unit, with no internal structuring, or coherence becoming overt.

Of particular interest are the structures in the south and southeast as they bear on the problem of terracing. The south wall of the large room (16) serves at the same time as the north wall of the space to the south (27), the floor of which, however, is lower by 1.15m. Had the central "channel" below the large room penetrated that wall it would have created a hole above the floor of the southern room. The south wall of that room (27) was razed almost to its lowest course making it difficult to understand the situation. Obviously, the western part of that space was occupied by three small chambers, the southernmost of which is almost totally obliterated while the other two are still preserved up to 1.4m in height. Here, passages remain from the larger space into those cubicles, in one case with the lintel still *in situ*.

Owing to a deep disturbance, the situation is not at all clear in the eastern part of room (27). There, a wall seems to cut off a narrow corridor (28) which may have had some connection with the complex to the north. This is particularly frustrating since further to the east we came across a flight of five steps made of huge slabs, going down 90 cms to the lower floor of room (32). Of that floor, only a small part could be recovered as this area was almost totally withdrawn from further investigation because of the multiple burial discussed below. We therefore cannot go beyond the observation that floors at different levels, i.e. of rooms (27/28) and (32), are shown to be contemporary.

Turning to the question of temporal differentiation it has to suffice here to say that while we have evidence for changes and alterations like the insertion of walls, or the addition of a floor within the same confines of a room, we have only one piece

of evidence for a change of a magnitude that justifies talking of a different building period. This, in fact, applies only to some shallow traces of walls in rooms (18) and (19/20); there it is the wall seemingly dividing (19) from (20) beneath the main structures, obviously not following the lay-out of these structures. This means that almost all architecture excavated in Area A dates roughly from one period.

It is true, however, that traces of remodelling, particularly of secondary floors, have suffered most, both from directly post-habitation destruction as well as from the bulldozer activities. This is particularly unfortunate in the case of the multiple burial found in room (32) as it clearly lies above the floor connected by the staircase to the main (upper level) floors of room (32); yet, it cannot be decided whether the burial was sunk in from the secondary floor of that room, separated from the lower one by a distance of 80 cm; or whether it was put in after the abandonment and final destruction of the buildings.

Again, only a few cases shall be cited for the assertion that the early settlement was built on and following a slope. Two points have been mentioned already, as certainly the existence of a staircase linking two floors at different levels should be regarded as firm evidence. The second point was the observation of floors at different levels of two adjacent rooms using the same wall. In addition, the situation north of room (10) shows that the ground for this building has been cut into the slope.

A different mode of construction is shown by the situation in the northeastern corner of Area A where the N-S wall in squares 505-500N/695E links up the structures of rooms (4), (5) and (6), creeping up the slope towards the north but not using any terracing.

All this evidence points to the fact that in its latest phase uncovered by us, the setting of the ancient village followed a line of slope similar to today's, and we may infer from the observation of the sloping bedrock in the northwestern corner of Area A that the slope may have even been steeper in the time of the earliest occupation of the site.

Not much is to be said about the original furnishing of the rooms. Only in room (9) were two grinding slabs found on the floor *in situ,* with the runners leaning against them. Two of the stone vessels on Fig. 13 (1 and 2) were found inside room (12) (Pl. V,1), but although in a seemingly undisturbed situation they nevertheless were contained in loose soil about 15cm above the floor. The plate shown in Fig. 15:3 was found on the floor of room (35) but it is probably linked to the burial found on the floor there.

Area B. Like Area A this area had also suffered considerably from destruction of the buildings, and from heavy pitting and stone robbing which must have occurred not much later than the abandonment of the site. As no recent disturbance has taken place here, however, those parts spared from the ancient destruction were left standing almost to their original height. Although this was true only for a minor part of the total area uncovered in Area B, we nevertheless were presented with valuable information as some walls stood to a height of 1.9 metres above floor-level. Unfortunately, within a distance of a few meters to the southwest, later pits had destroyed the walls down to their lowest courses, or even beyond, leaving no traces at all. Inspite of this situation the plan of the original building can be restored with a high degree of certainty. This is due to the special lay-out of the buildings in Area B, as opposed to those of Area A.

Even a brief look at the plan (Figs. 6 and 7) reveals that we are dealing with a ground plan of such regularity that it obviously had been master-minded beforehand. In Squares 400-395N/600-605E of Area B a room of 6 x 3.5 meters is surrounded on three sides by rows of small-sized rooms connected with the large room by way of low narrow passages, the sill of which starts only at a height of approximately 60 cm above the ground. In those parts found still standing to a height of 1.6-1.9m above floor level, only the roof may be missing which once had been supported by massive pillars attached to the inner walls of the larger room. This

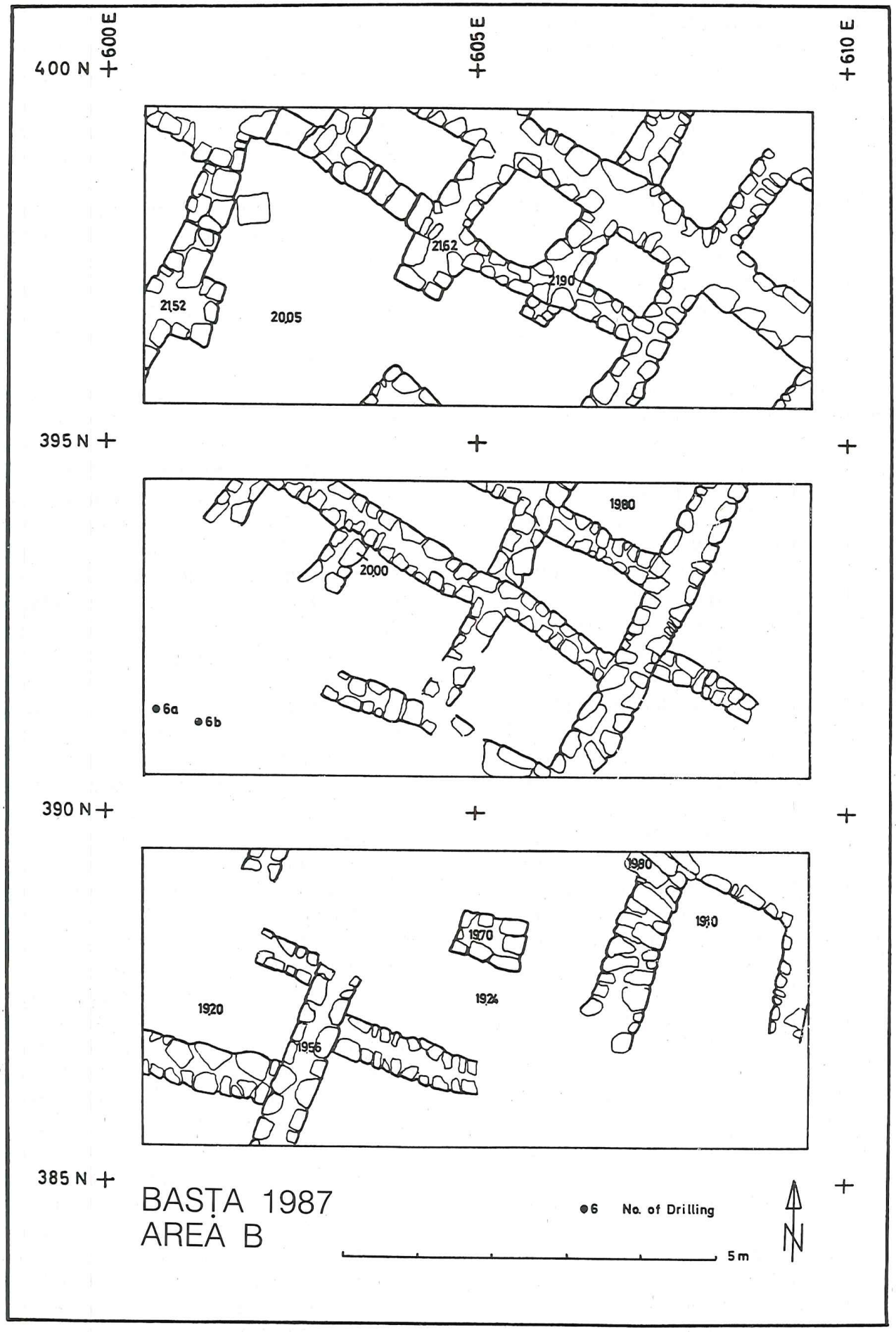

Fig. 6: General plan of Area B.

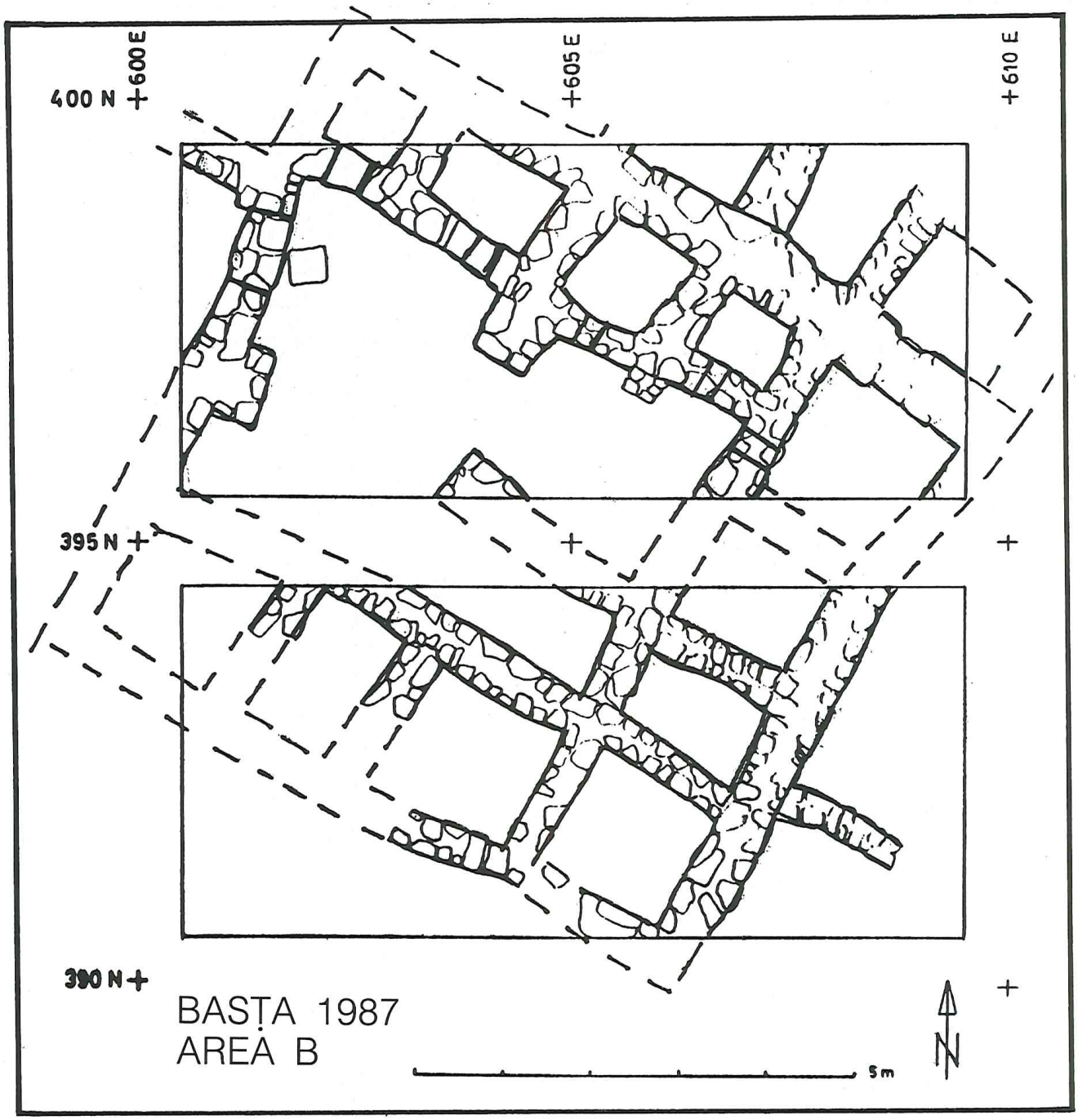

Fig. 7: Reconstructed plan of building in Squares 395-400N/600-605E.

state of preservation has left three of the passages preserved completely, including the entire frame plus some additional wall above the lintels (Fig. 8b). The main entrance into the middle room from the northwest, with a width of 80 cm, also had its sill 60cm above the floor (Fig. 8b). Unfortunately, the point was too close to the edge of the excavation to give us a clue to the further context.

On, or close to the floors of both the larger and the small rooms, nothing was found which could not have been part of the fill, with two exceptions. Next to what may be the end of a long protruding wall, or a free standing pillar, many fragments of coarse, burnt, heavily straw tempered clay were found in an area of 0.7 square metres lying in two layers on top of each other, above a heavily burnt floor of some kind of installation. Possibly, these were the remains of an oven the shape of which was totally obliterated. Adjacent to it, the floor was stained with ashes. This installation was apparently founded on a bed consisting of three large shoulder blades of *Bos* sp./onager(?) slid together and resting on sandy material. Next to that same pillar we

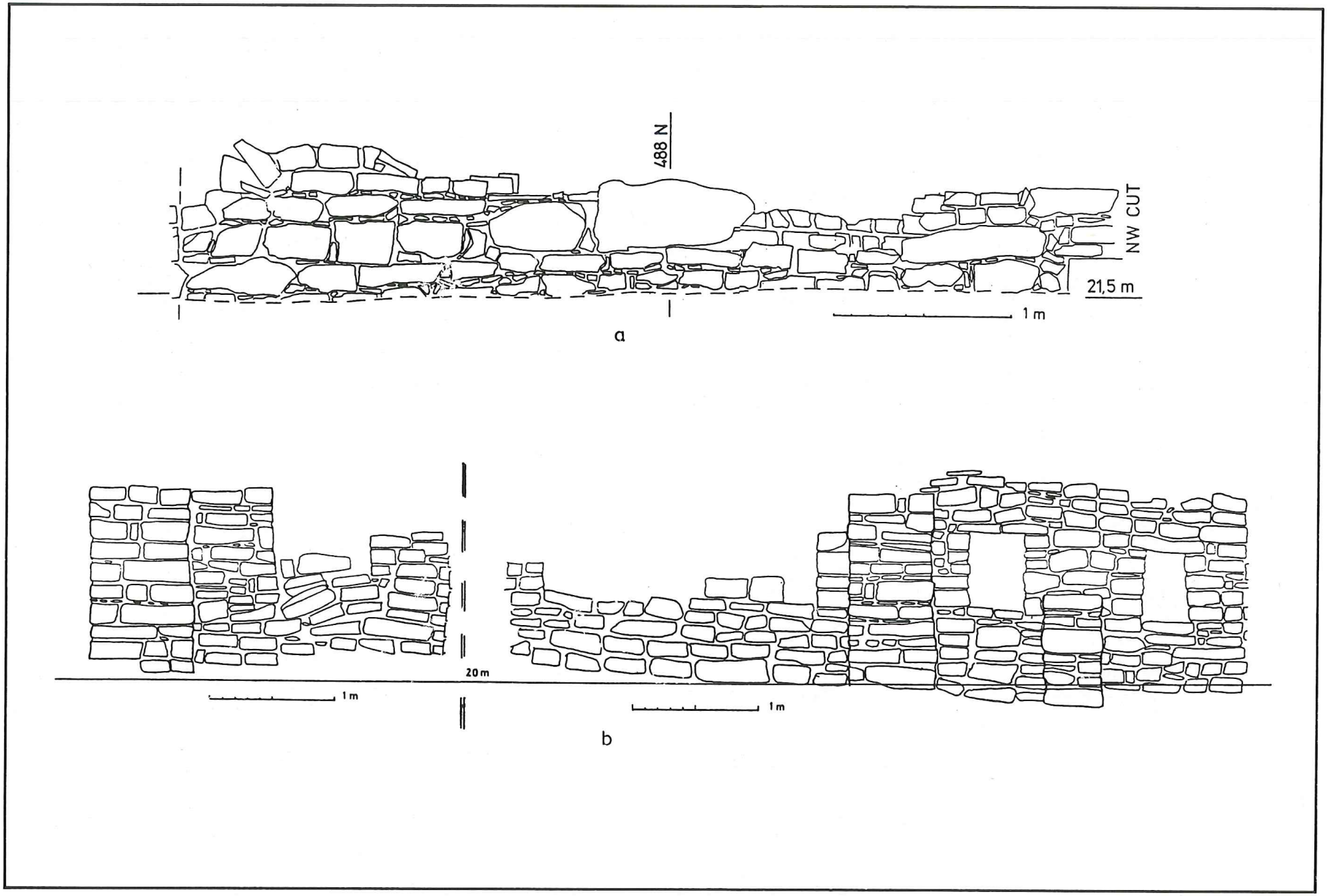

Fig. 8: Elevations of walls in Areas A and B.

found a stationary vessel on the floor, of unfired clay (Pl. V,2 and 3). While the lower part was preserved completely, just enough remained of the neck and rim to reconstruct its shape. Surprisingly, with a bottle-neck and thickened rim this is a true pottery form rather than a mere imitation of the shape of stone vessels, though there is no doubt as to the entire complex still belonging to the prepottery phase. Although nothing proves the function of the building, these features argue strongly in favour of a normal domestic complex.

Much less preserved than the complex mentioned so far were the remains of another one immediately to the south. Of what we have so far the most interesting feature is a free standing pillar in what again seems to be a larger central room.

Burials and Depositions of Human Remains (Fig. 4; Pl. VI,1,2 and 3)

Except for one burial and some scattered remains in Area B[5], all human remains were encountered in Area A.

The findings of human remains in Area A will require a different terminology than usually applied for the description of PPNB burials. But before turning to the findings themselves, their stratigraphical position should be discussed:

From the evidence of two partly preserved, articulated burials (B1 and B3; Fig. 4) and one complete burial (B2) in the northwesternmost corner of the building plot (Square 505N/685E) we expect to have uncovered here a burial ground earlier than the first surrounding architecture. The skeleton of Burial 3 (c. 502.5N/688E) had been placed directly on the yellowish decomposition product of the underlying bedrock strata. Burials 1 and 3 and the many scattered human bones were embedded in the succeeding layers of ashes, artefacts, animal bones and building debris and were partly disturbed by later pits and levelling-out activities. It was almost impossible in this highly disturbed horizon of interfering debris layers, pits and burials to trace the outlines of burial pits. Stratigraphical evidence proved that the cultural debris in which the burials rest was deposited earlier than the northern walls of Rooms 7 and 8, e.g. the remains of the child Burial 11 partly rest below the western wall of Room 8. Remains of disturbed burials were packed into a bedrock cavity at 502.27N/690.74E (B4). The majority of disturbed burials and intentional re-depositions of human bones were found in clear stratigraphical relation to the architectural remains in the southern part of Area A. They were either found on floors (e.g. the skull deposit B8 = Pl. VI,1), in the fill of rooms (e.g. B6, B7/12 = Pl. VI,3) or even in the top of a ruined wall (B18 = Pl. VI,2). Furthermore, many scatters of human remains were uncovered in the room fills, and it is hoped that they can be partly attributed to the disturbed burials through anthropological analysis.

All this stratigraphical evidence suggests that the unoccupied and/or ruined buildings of the village were used as a burial ground. In most cases the loose matrix of the fill, missing or badly preserved floors or surfaces did not allow the identification of whether the human remains were buried in the fill or whether they were covered by fill. In a strict sense, for some findings (e.g. the collective burial B7/12 or the skull deposit B8 on the plaster floor) it cannot even be stated whether they were covered after their deposition. Burials, disturbances of graves, redepositions of human remains, repeated filling and levelling were the interfering activities in the rooms which make us reluctant to report real subfloor burials. However, stratigraphical evidence and associated finds show that they certainly belong to the late PPNB occupation of the site.

Except for Burial 2 (Gebel, Muheisen and Nissen 1988: Pl. 2.1), no complete articulated burials were encountered. Although several skeletons are complete,

5. A burial (B19) was uncovered in the fill at 392.20N/606E and a skull without postcranial bones was found in the ruined top of a wall west of it.

articulated or had the skull missing. A common feature in Area A is isolated skulls in protected secondary settings, mostly with stones around them or being placed near walls. From the evidence of B2 we might speculate that a proportion of the disturbed burials was in complete articulation with the skull, but the intensive use of the ground often destroyed such evidence. Grave goods may accompany articulated burials. The frequent ornaments in the debris layers and fills which contain scattered human bones may derive mostly from disturbed burials.

Evidence from the NE- and NW-Sections in Squares 500-505N/690E hinted at more burials in the debris accumulations below the uppermost occupation excavated in 505N/685-690E (Rooms 1-3).

In the following, several of the better preserved burials and secondary depositions wil be described:

Burial 1 was found with the cranium missing, possibly displaced by a later pit. The body was laid down in a tightly constricted position on its left side with its backbone extremely bent. One of the elbows rests between and the other below the contracted legs, the hands (disturbed) may have been placed in front of the face, as it is rather common amongst PPNB burials. A row of *Nerita* sp. shells was found in the wrist area.

The odd position of Burial 2 (Gebel, Muheisen and Nissen 1988: Pl. 2.1) is — according to our knowledge— not reported elsewhere. The corpse was laid down in a kneeling position with the face pointing downwards and the soles of the feet directed upwards. The difference in level between the soles and the lower resting face is about 15 cm. The legs and upper arms run tightly parallel with the body and the forearms rest below the chest.

The collective Burial 7/12 (Pl. VI,3) contains at least 3 individuals, which were laid down in Room 32 (incompletely excavated). Some bones were not found in anatomically correct position and one individual has old bone fractures. Several bones were found red-stained, e.g. an isolated hand. Individual 3 partly rested common orientation or position of the corpses.

The skull deposit B8 (incompletely excavated because of baulk; Pl. VI,1) contained one complete and one, possibly two fragmented skulls and a few postcranial bones. The bones were laid down directly on a plaster floor. The skull deposit B6 contained two crania set upright on their mandibules.

Human Skeletal Remains (Pl. VII,1,2 and 3) (Contribution by M. Schultz)

This report is concerned with human remains excavated during the early part of the 1987 campaign. Remains excavated in 1986 will be dealt with in an interim report to follow.

The state of preservation of the human remains is generally good. In particular, the internal bone structure is in excellent condition, which is of importance in the histological examination. Twelve of the twenty-five individuals excavated are children (i.e. 48%). This would appear to be a normal distribution for infant mortality in Neolithic times. The complete age distribution is as follows:

— two fetuses or newborn individuals
— three individuals of infans I (at least one year old at the time of death)
— six individuals of transitional age of infans I and II
— one individual of infans II.

In general, the highest infant mortality is found in the first two years of life. In Baṣta the situation is different. The majority of the remains of children examined are of children who died in the age range of five to seven years. This may possibly indicate that the weaning period included the upper limit of the infans I age group.

Among the adults, five males and two females have been identified. The sex of six of the individuals has not yet been determined. The skull morphology shows that the Baṣta population represents a very gracile type, similar to that found at Çayönü (Schultz, in preparation). It is apparent from the remains found at Baṣta, that males and females could attain an

advanced age. Further comment is, however, not possible at this stage. The mortality in adults is distributed as follows:

— two individuals of adultus I
— six individuals of transitional age of adultus/maturus
— two individuals of maturus
— three individuals of transitional age of maturus/senilis.

Eight individuals have been preserved with jaws and teeth (six adults, two children). The high degree of attrition (Pl. VII,1; abrasion of the teeth) and the presence of so-called approximal facets on the crowns of the teeth suggest that the diet of the people of Basța also included foodstuffs processed by millstones. Another piece of evidence for high stress of masticatory organs is the severe arthrosis of jaw joints (Pl. VII,3; three out of four individuals). Even in infant deciduous molars, the attrition is severe. Caries was very frequent, four of the five adults being affected. Periodontal diseases (including abscesses) are found in all adults (Pl. VII, 2). Dental calculus is also observed in all individuals. This indicates poor dental hygiene and might lead to further insight into nutritional factors.

Malnutrition is indicated in the form of transversal enamel hypoplasia (four out of eight skeletons). C-avitaminosis is found in at least one, and possibly two children. Cribra orbitalia is seen in only one case out of four. Stomatitis was not diagnosed.

Inflammatory conditions of the meninges and the skull vault were, however, relatively frequent:

— meningoencephalitis (five out of twenty-three cases)
— osteomyelitis (three out of twenty-three cases, one of which was induced by a trauma)
— four cases of perisinous abscess resulting from meningoencephalitis have been diagnosed.

In the completely preserved skeleton of a young male, there was strong evidence for arthrosis in the major joints of the extremities and for relatively severe spondylosis. Vertebral disease is found in this case mainly in the lower part of the vertebral column. It seems to have been induced by sacralization of the fifth lumbar vertebra. The latter finding is interpreted as a congenital malformation.

All in all, the preliminary data obtained from this limited sample of human remains, provides a foundation for a possible comprehensive osteological investigation. The results would help us to understand the factors, including diseases and environmental factors, contributing to life in the Late Aceramic Neolithic. Histological, scanning electron microscopical and radiological methods will be carried out in further investigations on the skeletal material.

Notes on the Technology and Typology of the Flint Industries (Tables 2-3; Figs. 9-12)

With the technological analysis of samples from the lowermost occupation in Area A and the occupation now exposed in Area B (Table 2) more differentiations are now possible. They are probably of a chronological nature. All the three sample complexes analyzed so far [including Locus 4 (fill of Room 1) of 505N/685E of the uppermost occupation in Area A; see Gebel, Muheisen and Nissen 1988], differ from each other technologically. While no important differences can be observed in either building techniques, ground stone industry, ornaments, or flint tool types, the differences in the degree of applying the bipolar technique in relation to flaking techniques is evident. The flakes:unipolar blades:bipolar blades frequencies are related

2:1:3 in a flint refuse area of the lowermost occupation in 500N/685E of Area A,
2:3 (3= both unipolar and bipolar blades, the latter represent the majority) in a room fill of the uppermost occupation in 505N/685E of Area A, and
9:2:1 in various loci of 400N/600E in Area B (associated with the sun-dried clay sherds).

If we apply results from other late PPNB - early PN industries for interpretation —which inform us on decreasing bipolar technique and increasing flaking techniques towards the Pottery Neolithic — the samples with the high bipolar

proportions (lowermost Area A; 500N/685E) would derive from an earlier occupation, the samples almost exclusively containing flakes (400N/600E) would represent a later stage of occupation. The samples from the room fill of the uppermost Area A occupation (505N/685E) should not be placed chronologically between these two occupations, because the high bipolar proportions are most likely the refuse of a highly specialized workshop. The clear technological difference between basal Area A and Area B is supported by another difference: in Area A a distinct type of tabular flint occurs almost exclusively, that of 400N/600E is primarily of nodular flint.

Apart from the 90-95% flint, quartzite —and rarely flakable igneous rocks and conglomerates— was used. One retouched obsidian flake is attested. Limestone flakes do occur, but not in quantities which should be expected through the dressed stones of the walls. While quartzite is available just east of Area A and flint pebbles were probably obtained from Wadi Baṣṭa as the nearest resource, the source of the tabular flint used is unknown yet.

Table 2 (and Table 1 in Gebel, Muheisen and Nissen 1988) lists the primary elements and chipping debitage found.

Characteristic of all samples studied is the small number of cores. Normally this would suggest that tool manufacture was undertaken outside these immediate areas, but the presence of crest blades, core tablets, and cortex removal flakes suggest it must have occurred on the site. The bipolar cores (Fig. 9:1-3) and their core rejuvenation elements in Baṣṭa allowed for a well founded reconstruction of this core technique. The technique is closely related to the quality and conditions of the tabular flint (10-45mm thicknesses): in short, after cortex removal flakes I cleared the narrow side of the flint slab (later core surface), lateral flakes (transverse to the later flaking direction/core surface; counted in Table 2 with "unret. flakes") and cortex removal flakes II (clearing the cortex of the large surfaces of the blank) created the crests. After the removal of crest blades and the blades themselves, the former procedure (lateral flakes, cortex removal flakes) was repeated, etc. Renewing of platforms is well attested, true primary core tablets are rare.

Amongst the flakes the dominant platforms were of the plain and cortical type, in the case of blades most of the platforms were of the punctiform type. This was also observed at other late PPNB sites including Beidha, Ba'ja 1 (Gebel and Starck 1985) and 'Ain Ghazal (Rollefson and Abu Ghaneima 1983).

Our list Table 3 had to summarize the various types in tool classes in order to consider the limits of a preliminary report. Therefore, the descriptions must also be rather general, and can consider only some tool classes and have to concentrate on characteristics. So far we do not have the varied and highly standardized tool shapes (types) at Baṣṭa that we find in Beidha. However, the 1987 findings permitted us to enlarge our list of types considerably.

Arrowheads (Fig. 10): Mostly found fragmentary, the average sizes of complete arrowheads are around 40mm in length and 9mm in max. width. The many subtypes and combinations of features make it difficult to work out proper types. In general, we have two major classes: arrowheads with tangs (Byblos-related types) and leaf-shaped arrowheads (Amuq-related types). The tanged arrowheads have their tang bifacially pressure flaked to various extents. Mostly the pressure-flaking dorsally covers a larger area of the tang than ventrally. The pointed end is mostly trimmed ventrally. The leaf-shaped projectile points (e.g. Fig. 10:10-12) are shaped partly or fully by parallel pressure-flaking on the dorsal side, resulting in more convex edges than attested by the tanged specimens. Like the tanged ones, they either have triangular or trapezoidal cross-sections, occasionally both. Ventrally, mostly no retouches occur. It is obvious that the tanged and leaf-shaped arrowheads can be typologically very close. The two ways of shaping an arrowhead also seem to have chronological relevance, but differences might be caused by the blank chosen.

Table 2: Frequencies of primary products from selected loci of two squares

	400N/600E		*500N/685E*	
	n	*%*	*n*	*%*
chunks	26	1.49	87	1.93
debris	312	17.92	153	3.99
thermal debris etc.	334	19.18	537	11.89
cores				
single platform flake cores	2	0.11	4	0.09
irregular flake cores	2	0.11	6	0.13
subpyramidal blade cores	1	0.06		
bipolar blade cores	1	0.06	12	0.27
core fragments	6	0.34	7	0.16
unid. core fragments	4	0.23	16	0.35
core trimming elements				
var. primary core tablets			12	0.27
secondary core tablets	1	0.06	67	1.48
primary crest blades			20	0.44
secondary crest blades			15	0.33
other crest blades			32	0.71
cortex removal flakes I			43	0.95
cortex removal flakes II			215	4.76
plunging flakes			16	0.35
debitage				
unret. flakes	164	9.42	421	9.32
unret. flakelets	140	8.04	381	8.44
fragm. of unret. flakes	41	2.35	210	4.65
fragm. of unret. flakelets	6	0.34	98	2.17
unret. bipolar blades I	1	0.06	151	3.34
unret. bipolar blades II	14	0.80	291	6.44
unret. bipolar blades III	1	0.06	240	5.31
unret. bipolar blades IV	3	0.17	86	1.90
unret. blades I	21	1.21	89	1.97
unret. blades II	33	1.89	112	2.48
unret. blades III	4	0.23	69	1.53
unret. blades IV	6	0.34	20	0.44
fragm. of unret. blades I	7	0.40	43	0.95
fragm. of unret. blades II-III	54	3.10	201	4.45
fragm. of unret. blades IV	11	0.63	81	1.79
unret. chips	71	4.08	112	2.48
fragm. of unret. chips	11	0.63	25	0.55
undet. b, f, fl, bl	103	5.92	402	8.90
undet. primary products	52	2.99	133	2.95
cortical flakes	19	1.09	36	0.80
cortical blades	16	0.92	18	0.40
burin spalls	2	0.11	12	0.27
tools	272	15.62	63	1.40
Total (number of pieces)	**1741**	**100%**	**4516**	**100%**

(b blade, bl bladelet, f flake, fl flakelet)

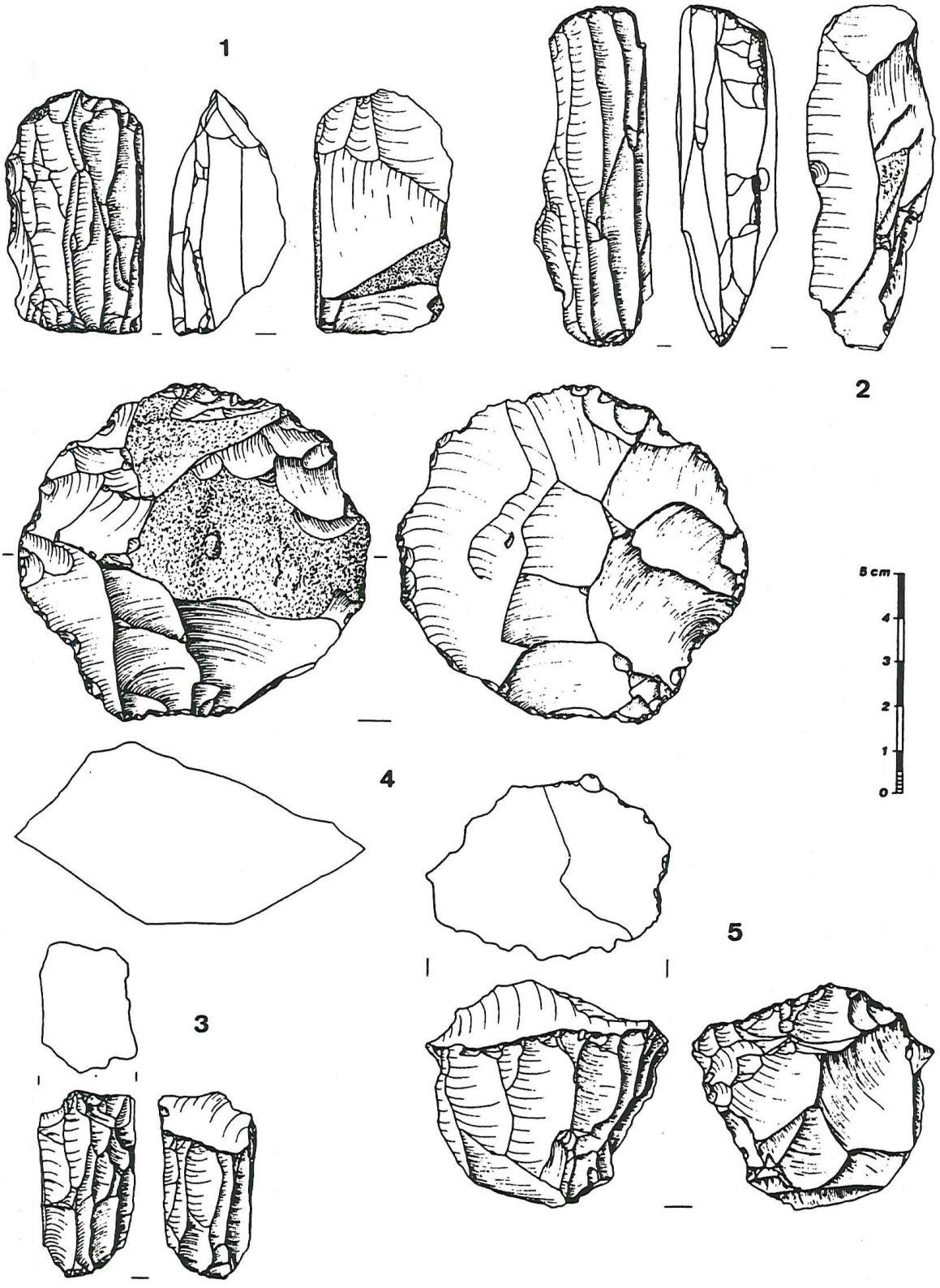

Fig. 9: Cores: 1-3 bipolar cores, 4 discoidal core, 5 single platform core (Area A).

Table 3: Frequencies of tool classes from selected loci of four squares.

	480N/680E		*395N/600E*		*390N/600E*		*400N/600E*	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
arrowheads	8	3.92	7	10.93	12	5.50	29	12.66
leaf-shaped pieces	—	—	—	—	2	0.91	1	0.43
borers	8	3.92	6	9.37	6	2.75	6	2.62
burins	19	9.31	4	6.25	6	2.75	10	4.36
scrapers	9	4.49	7	10.93	8	3.66	6	2.62
truncated pieces	5	2.45	2	3.12	13	5.96	18	7.68
knives	—	—	—	—	—	—	3	1.31
sickle blades	—	—	—	—	—	—	2	0.87
denticulated pieces	27	13.23	3	4.68	20	9.17	11	4.80
backed blades with abrupt retouch	—	—	—	—	—	—	2	0.87
"raclette"	3	1.47	—	—	—	—	1	0.43
backed bladelets w. abrupt retouch	3	1.47	—	—	2	0.91	16	6.98
rectangles	1	0.49	—	—	1	0.46	—	—
multiple tools	1	0.49	—	—	—	—	—	—
retouched blades and flakes	107	52.45	24	37.50	144	66.05	121	52.83
chisels	1	0.49	—	—	—	—	—	—
celts	4	1.96	5	7.81	1	0.46	1	0.43
adzes	1	0.49	—	—	—	—	—	—
picks	3	1.47	4	6.25	2	0.91	2	0.87
hammer stones	>4	>1.96	>2	>3.12	>1	>0.46	—	—
Total	**204**	**100%**	**64**	**100%**	**218**	**100%**	**229**	**100%**

Borers (Fig. 11:4-7; Gebel, Muheisen and Nissen 1988: Fig. 11:8-11): Borers and other piercing tools are as well represented as arrowheads, burins and scraping tools. Their active parts, the boring tips with lengths up to 50 mm, are shaped by abrupt retouches from ventral, along the major scar of the blade blank. Rarely double-tipped borers occur (e.g. Fig. 11:6). The base of the borers are mostly unmodified or show a breakage. Occasionally the unmodified distal end of a bipolar blade occurs. We relate the high proportions of borers to the bead manufacturing at the site, which must have been a large industry.

Burins (Fig. 11:9-12): Most common are dihedrial burins on a break, but there is also restricted evidence of burins on truncations, e.g. the oblique burin on lateral preparation. Blanks in general were blades.

Scrapers and scraping tools: Most frequent are the end scrapers on blades, but side scrapers also occur; they are mostly single convex side-scrapers with direct semi-abrupt retouch. Scrapers —possibly due to a more varied function— attest a more varied use of raw materials. One specimen is made of calcite.

Truncated pieces: Made on blades, they show straight or concave truncations. One piece on a blade is bi-truncated. Truncated pieces on flakes are convex with abrupt retouches.

Sickle blades: Only two sickle blades were encountered in the loci of the four squares studied. This scarcity is characteristic for Basta and is in contrast to the large quantities of grinding tools and the palaeobotanical evidence.

Another category to be mentioned here is the few *large foliates* concentrated in Area B (e.g. Fig. 11:1-2). Remarkable is the "fish-tail" bifacially worked piece of Fig. 11:3.

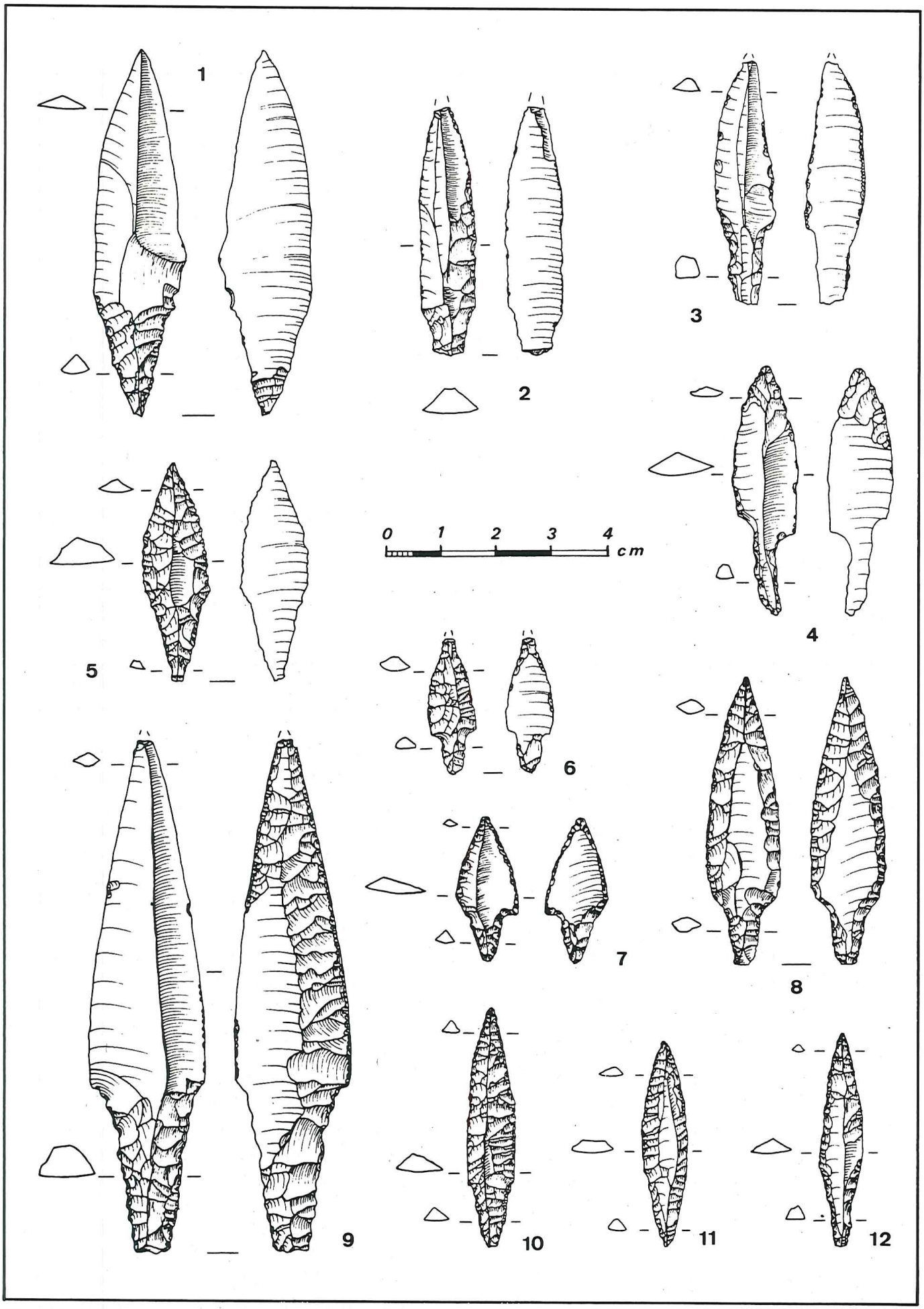

Fig. 10: Arrowheads: 1-5, 4 on reshaped borer (Area A), 6-12 (Area B).

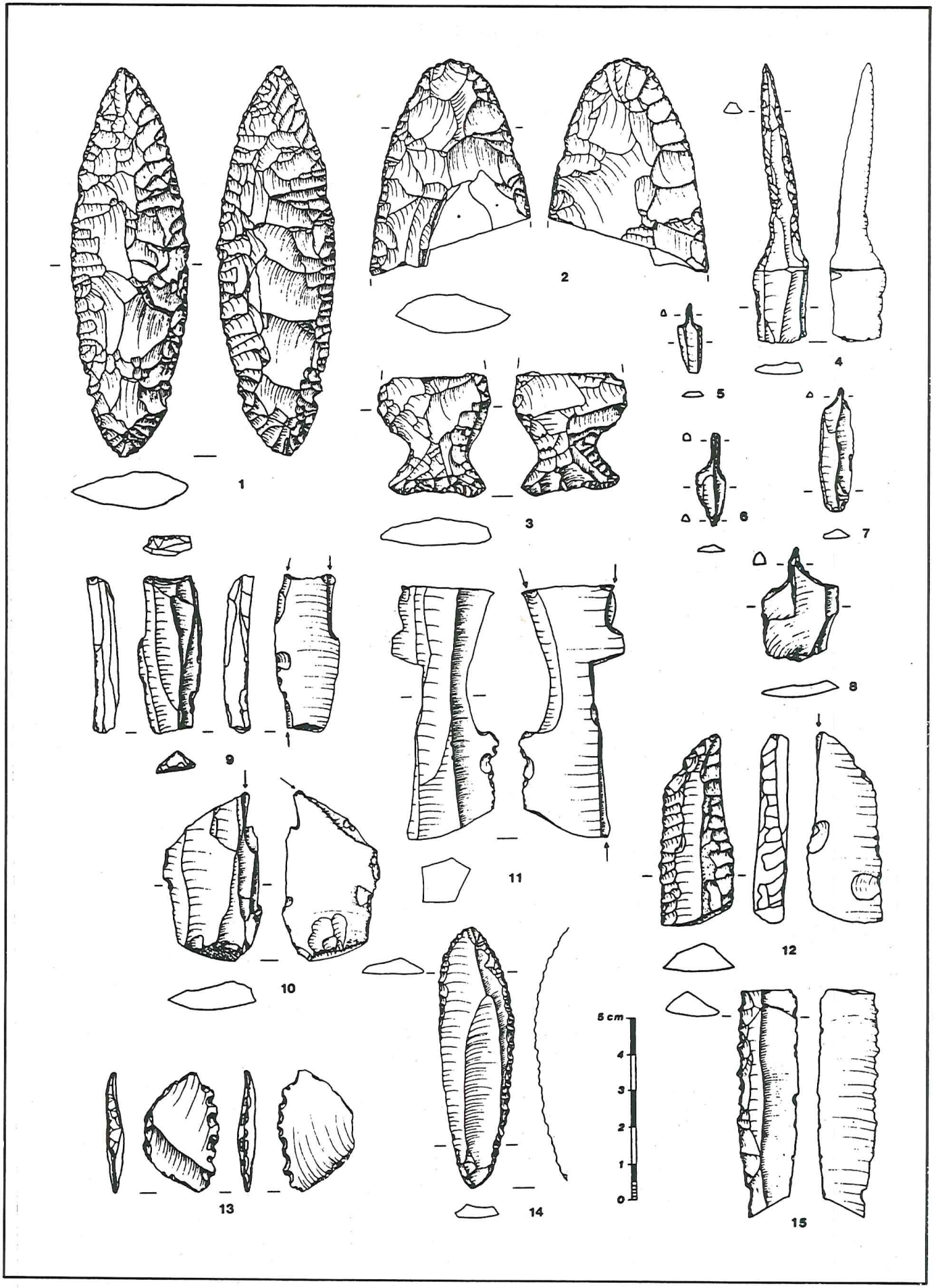

Fig. 11: Various tool types: 1-3 foliates/bifacially worked tools (Area B), 4-8 (Area A), 9-12 burins (Area A), 12-15 denticulated tools (Area A).

Table 4: Frequencies of grinding tools and fragments of stone vessels according to raw material classes (1987 campaign).

	var. lime-stones	*"carbonate" rocks*	*quartzite/ silicified sandstone*	*sandstone*	*other*	*n*	*%*
palettes	—	13	16	3	6	38	3.87
grinding slabs	2	8	22	7	2	41	4.17
querns	2	2	3	1	—	8	0.81
mortars	2	2	1	2	—	7	0.71
handstones I	13	95	505	75	44	733	74.71
handstones II	10	1	2	2	1	16	1.63
handstones III	—	14	—	2	—	16	1.63
pestles	2	6	8	2	3	21	2.14
pestles-handstones	—	1	1	—	—	2	0.20
egg-shaped pestles	16	1	2	—	—	19	1.93
grooved "weights"	3	—	1	—	—	4	0.40
pierced "weights"	16	—	17	4	13	50	5.09
pierced discs	2	—	—	—	1	3	0.30
pierced stones	2	1	3	1	—	7	0.71
other ground stone tools	6	5	3	2	—	16	1.63
Total						**981**	**100%**
large bowls	6	12	1	—	—	19	21.34
small bowls	10	42	3	—	1	56	62.92
other bowls	11	1	1	—	1	14	15.73
Total	**27**	**55**	**5**	**—**	**2**	**89**	**100%**

Picks, adzes, celts (Fig. 12) show a high degree of shape standardization. They sometimes appear concentrated in certain loci, together with frequent spherical hammering stones.

Grinding Tool Industry (Table 4; Figs. 13-14) (Contribution by N. Qadi)

In the following, a preliminary classification of grinding tools is presented. The countings (Table 4) consider the 1987 campaign and do not differentiate between the late PPNB layers of Area A and B.

The large quantities of grinding stones uncovered during both campaigns strongly support the assumption that subsistence considerably relied on the exploitation and processing of (domesticated) crops. However, this does not explain the large number of the more than 1000 grinding stones found (of the ground stone items *ca.* 74% belong to the class of hand stones and *ca.* 10% to the grinding slabs and other millstones). As traces of wear were not recognizable on many hand stones, they either were "industrially" manufactured here or were of other unknown functions.

The raw materials exploited for the manufacturing of grinding tools and other ground stone items like bowls, "weights", etc. can be classified[6] in the following groups: 1) various qualities of limestone, 2) "carbonate rocks", 3) quartzite and silicified sandstone, 4) sandstone, and 5)

6. No petrographic examination was carried out yet and the following preliminary classification may be partly erroneous as it is based on an infield hand-examination of artefact samples. Classifications were carried out with the advice of H.J. Pachur.

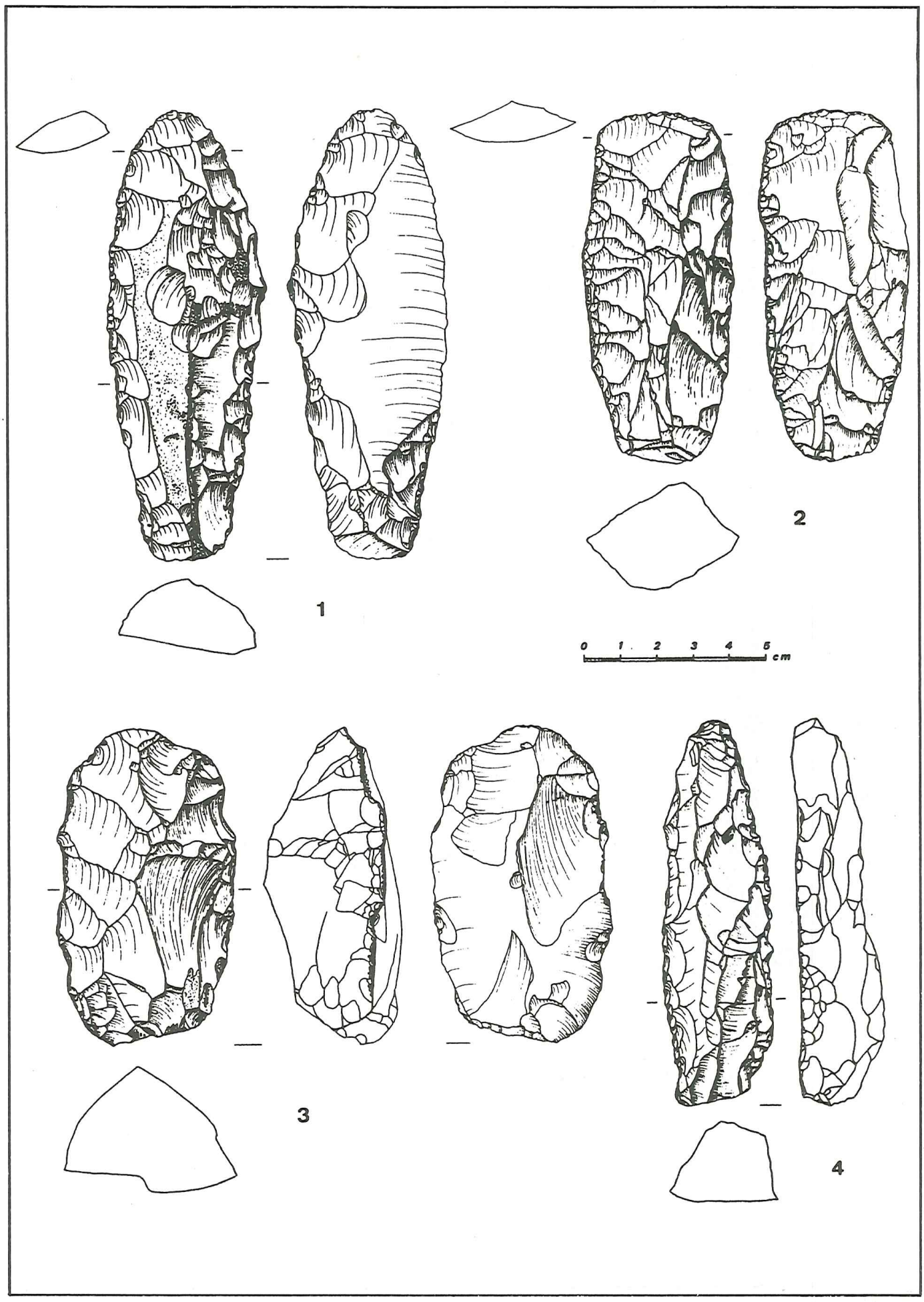

Fig. 12: Heavy duty tools: 1-2 celts, 3 adze, 4 pick (Area A).

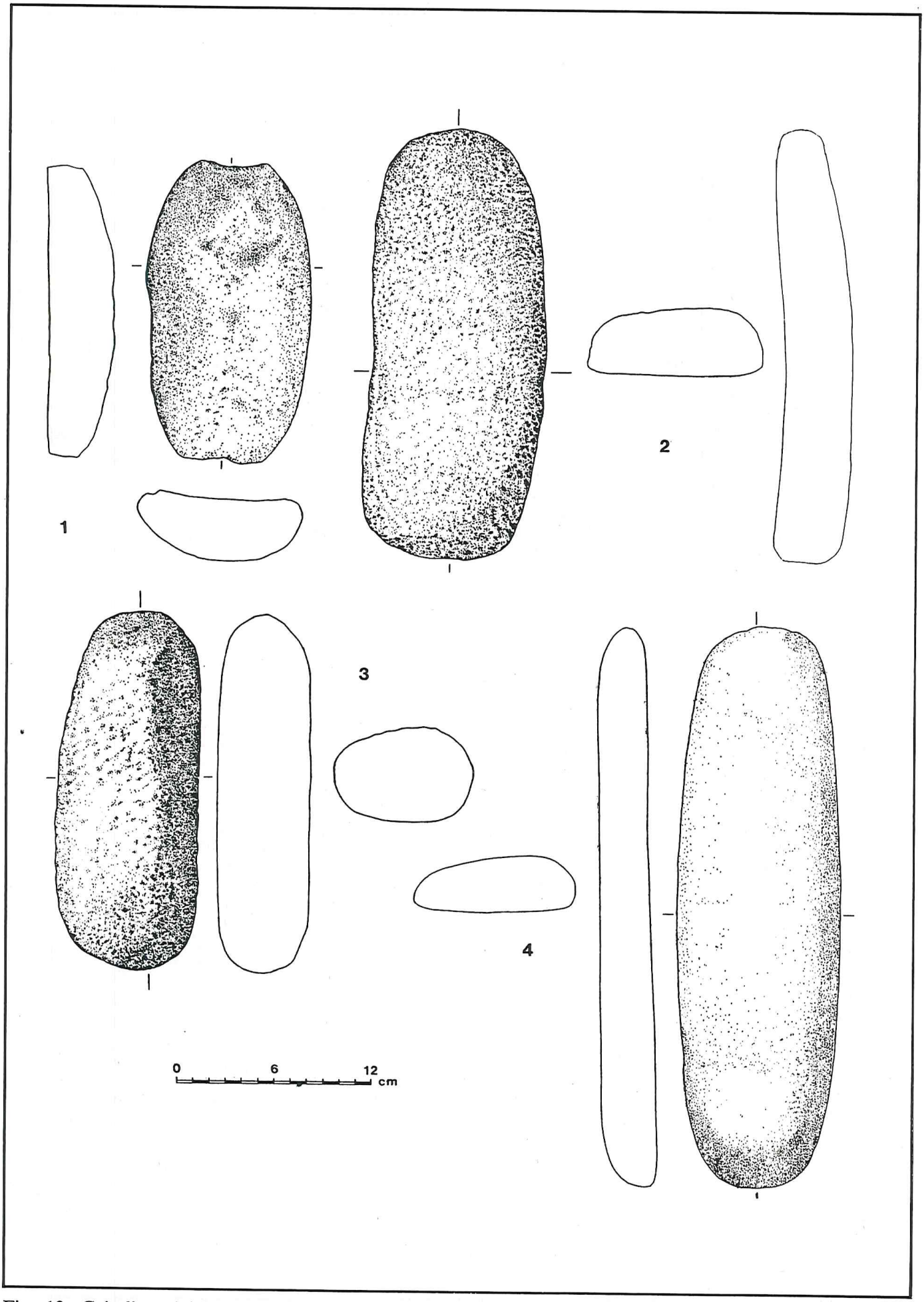

Fig. 13: Grinding slabs.

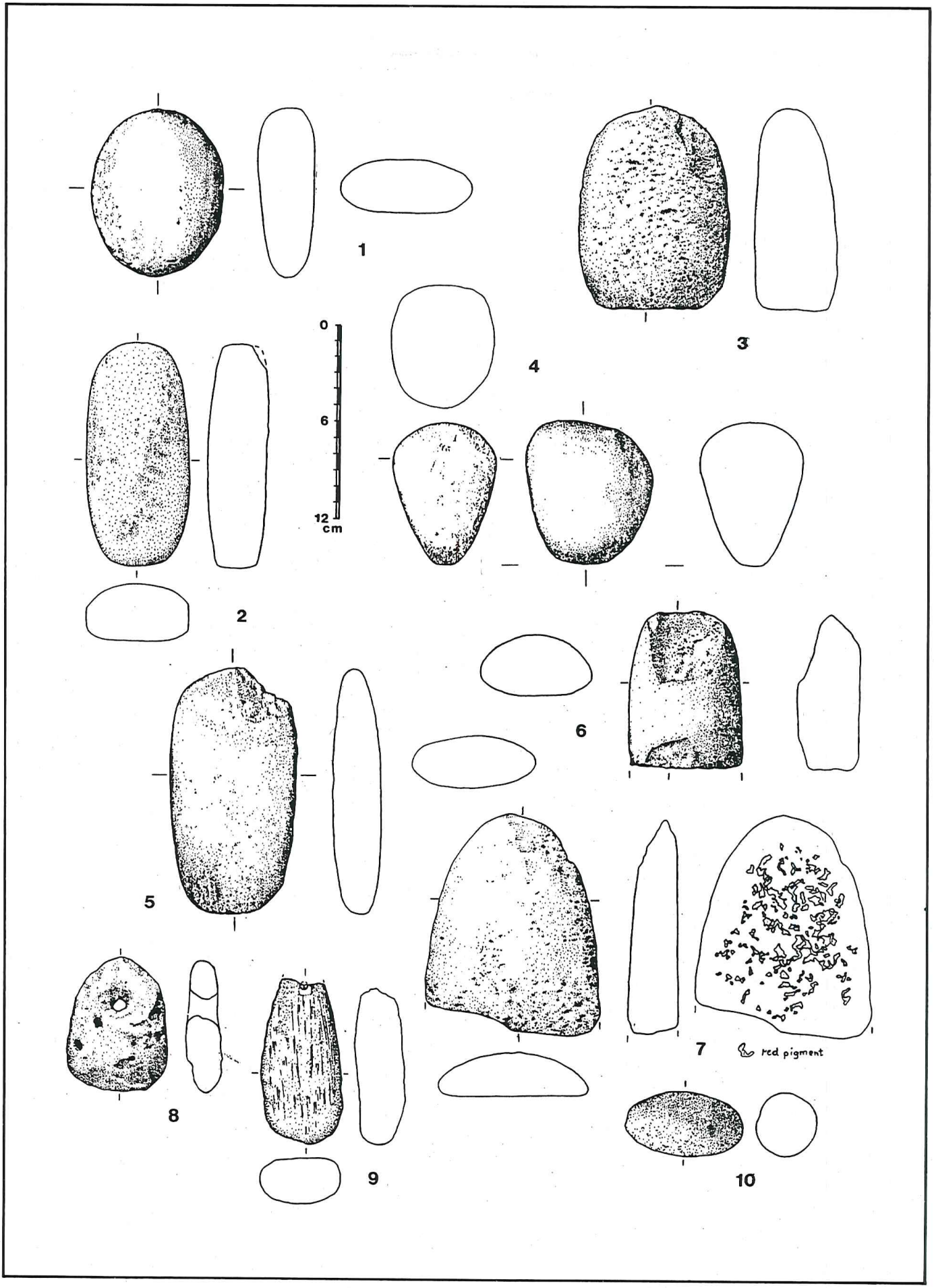

Fig. 14: Grinding tools: 1-2 hand stones, 3-4 pestles, 5-6 secondary used? flaked hand stones, 7 fragment of grinding slab with red pigments, 8-9 "weights" (9 broken), 10 egg-shaped pestle

others. Except for the igneous rocks (among Group 5) and sandstone related minerals, all the rocks were available locally.

1. *Mill stones:* 9 specimens were encountered in the 1986 season, 94 during the 1987 campaign. Except for the three from the site survey in 1986, all were either found *in situ* on (plaster) floors, in the fill of rooms, in building debris or built into walls. The shapes and types of raw material selected for making these grinding stones were usually thick, broad slabs of limestone, "carbonate rocks", silicified, sometimes sandy limestones and quartzite, which were then rounded by pecking and grinding. These often have natural or crudely pecked surfaces on their lower sides.

1a. Grinding slabs (Figs. 13:1-2): Few specimens from the 1986 campaign, 41 were excavated in 1987. Mostly fragments. Elongated oval-shaped pieces with plano-convex transverse sections and concave-convex longitudinal sections. The plain shape of the transverse section and the concave shape of the longitudinal section result from the process of grinding in some cases. Shape and dimensions of grinding slabs are sometimes very similar to certain handstone forms, which occasionally makes it impossible to distinguish the two, and may hint at a bi-functional use. This type shows the tendency for concavity, measuring 2-5cm in the central part. The length can vary considerably, but the width does not exceed 10 cm.

1b. Saddle-shaped mill stones or palettes: Mostly found as large fragments, they tend to have a slight depression and a smoothed rim-like edge and are preferably made on thick slabs. The ventral surfaces are pecked but original natural surfaces may be visible in places. It is expected that such pieces were used *in situ*, e.g. a finding on a plaster floor with two handstones nearby. Of the 38 pieces found in 1987, 16 were of quartzite or quartzite-like material, 13 were of "carbonate rock".

1c-d. Querns and mortars: Few of these mortar-like pieces were found, which suggests that they are less common in the Late than in the Middle PPNB of the area (Beidha, ad-Daman, Shaqarat Musai'id). It is basically a mill stone like b., but its thickness encouraged wider use which resulted in the piece becoming mortar shaped. Traces of pestling in the base confirm this.

2. *Handstones* (manos): In 1986 more than 190 handstones were found, from 1987, 749 handstones can be reported (*ca.* 70-75% of the ground stone collections in both sea-(sons). The size range — *ca.* 11% were found complete — is 4.2-10.4 cm for the width and 9.5-35.0cm for the length. Most of them were semi-oval in shape as a result of pecking and grinding and the continuous use of mainly one face. Such surfaces had been ground smooth. Several combinations of transverse and longitudinal sections are attested, but most have a convex side opposite to the grinding side. Transverse sections may vary between being plano-convex, triangular, parallel-sided and biconvex. Several manos show traces of secondary use (Figs. 14:6-10), having bifacial flaking along their narrow edges or wear from use as pestles. Almost 70% of the handstones were made of quartzite or quartzite-like minerals.

Handstones were not only used for crop processing. Residues on some of them ressemble a "white wash" of plaster-like substances or are red pigments. In addition, such patches of red pigments were found on the bottom of stone bowl fragments as well as on their inner surfaces. While the former may represent abraded particles of floors (except for the bottom of the stone bowl Fig. 15:3, which was stained in red), the latter possibly derives from grinding or storing pigments. Another secondary use of fragmented and unfragmented handstones and grinding slabs was their use in the walls and subfloor stone beds.

3. *Pestles:* Pestles of all types amount up to 4.3% of the 1987 grinding tools. Generally they were made of quartzitic sandstone and "carbonate" rocks and less frequently of limestone. Outstanding pieces were of the kind depicted by Dorell (1983) Figs. 221:5 and 14, 226:12-13 and 15.

4. *"Weight" stones:* The objects in the

class of type Fig. 13.6 (Gebel, Muheisen and Nissen 1988) were found fractured (50 pieces in 1987). Also smaller pieces with lengths of 67 and 83mm and thicknesses of 22-35mm appeared. The preferred raw material seems to have been a porous limestone and quartzitic sandstone. The objects are usually perforated between the central and narrowest area. The perforation is biconical in section. The shape tends to be that of a pyramidal stump with rounded edges. The spherical porous limestone pieces with a groove around their body have also been classified with the "weights". Perforated stone discs possibly belong to this class.

Other stone tools found possibly had celt- and chisel-related functions. A possible door socket with a V-shaped depression can also be reported. Several incised and grooved slabs appeared. Two polished celts made of limestone and flint occurred.

Stone Vessels and Other Ground Stone Artefacts (Table 4; Fig. 15 and 16). (Contribution by Nabil Qadi)

Five fragments and one complete bowl were found in 1986. 70 fragments and 4 complete stone vessels (Fig. 15:1-4) can be reported from the 1987 excavations. The vessels and the plate (Fig. 15:1-4) are made from a marble-like stone, carefully smoothed over their complete bodies. The vessel with the loops (Fig. 15:10) is made from a soft limestone and is the only specimen found of its kind.

Soft limestone seems to have been the preferred material for a class of objects, which cannot be explained at the moment (Fig. 16:3-4). An outstanding find is the fragment of a stone mask made of porous limestone (Fig. 16:1).

Burned and Unburned Clay Materials and Objects (Fig. 17:6-10; Pl. V,2 and 3)

Aside from burned and sun-dried figurine fragments, in the 1987 campaign many fragments of moulded, fibre tempered and in cases unevenly burned clay materials were encountered. They obviously are sherds of larger vessels, clay bins and/or oven-like installments and mostly appear to be sun-dried. However, many fragments are also burned, showing reddish surfaces, having blackened outer or inner faces or cores, or are even completely blackened by direct contact with the fire. These fragments appeared mostly in the squares of Area B, but occasionally also in Area A (e.g. 490N/690E: Loc. 9 or 495N/685E: Loci 5 and 9). In two cases, a spherical vessel (Pl. V,3) and a bin- or oven-like installment (Pl. V,2 middle right) were found made of such material (Area B, 400N/600E: Loci 44 and 43). It cannot be excluded that some pieces are burned wall plasterings, however, the majority of fragments show two hand-smoothed surfaces and are slightly curved. Thicknesses of the sherds usually range between 15 and 20mm and the material was heavily tempered with fibres and to some extent by coarse grits. The uneven burning attested even with smaller fragments is possibly secondary, having happend through the function of the installment (400N/600E, Locus 43) or stationary vessel. In general, the fragments are very fragile, especially if they are completely burned, and disintegrate in water.

Objects of unevenly burnt clay with rather thick firing cores were also uncovered. Three nail-like objects (e.g. Fig. 17: 7 and 10) derive from the upper occupation in 505N/695E. They are characterized by having a concave "base" and a circular section which decreases in diameter towards the apex. Parts of figurines are very rare (Fig. 17:6, 8-9).

Small Finds (Figs. 17-18)

The raw materials used for small finds can be subdivided into marine shells, non-local minerals such as sandstone, turquoise, malachite, steatite?, etc., burnt clay, plaster-like mouldable material, limestone, bone (and dentine?).

The most commonly used raw material for ornaments was marine molluscs. The following species —in the order of frequency— were used: cone shells (Conidae), slipper winkles (Neritidae), cluster winks (Planaxidae), mother-of-pearl, tusk

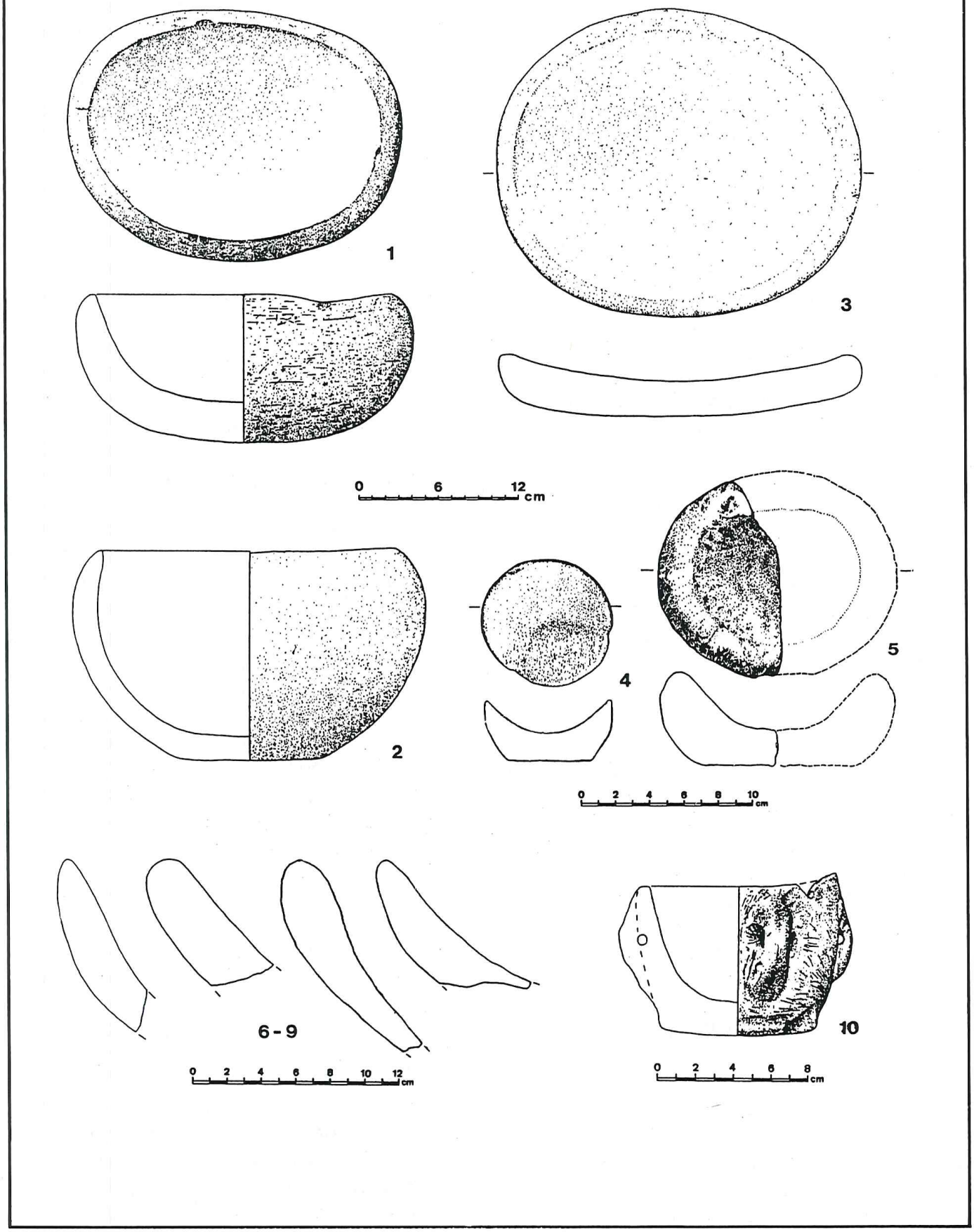

Fig. 15: Stone vessels: 1-3 (Area A), 4-5, 10 (Area B).

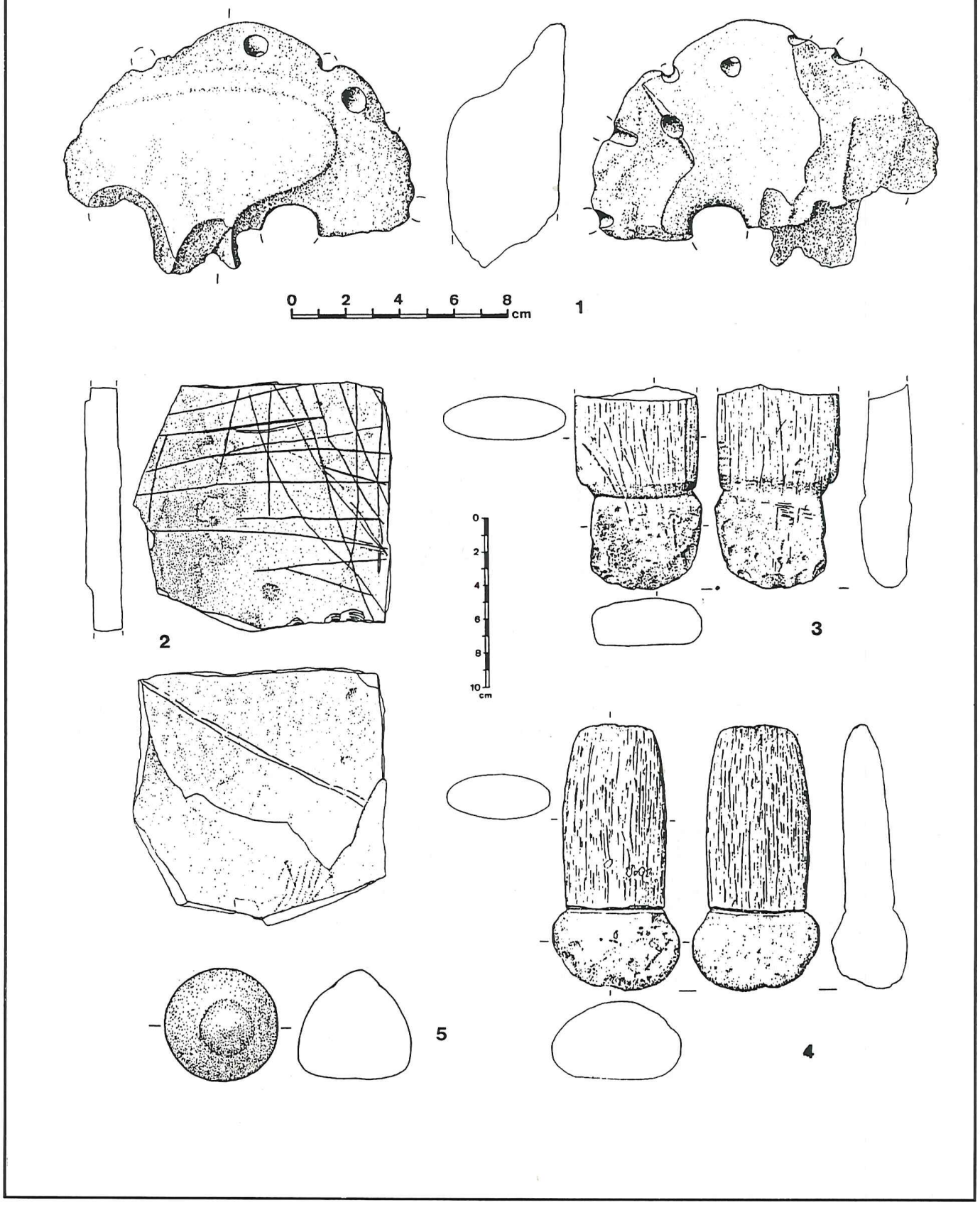

Fig. 16: Ground stone artefacts: 1 fragment of stone mask (Area A), 2 limestone slab with incisions containing red pigments (Area B), 3-4 limestone objects of unknown function (Area B), 5 crystalline rock object, possibly a pestle (Area B).

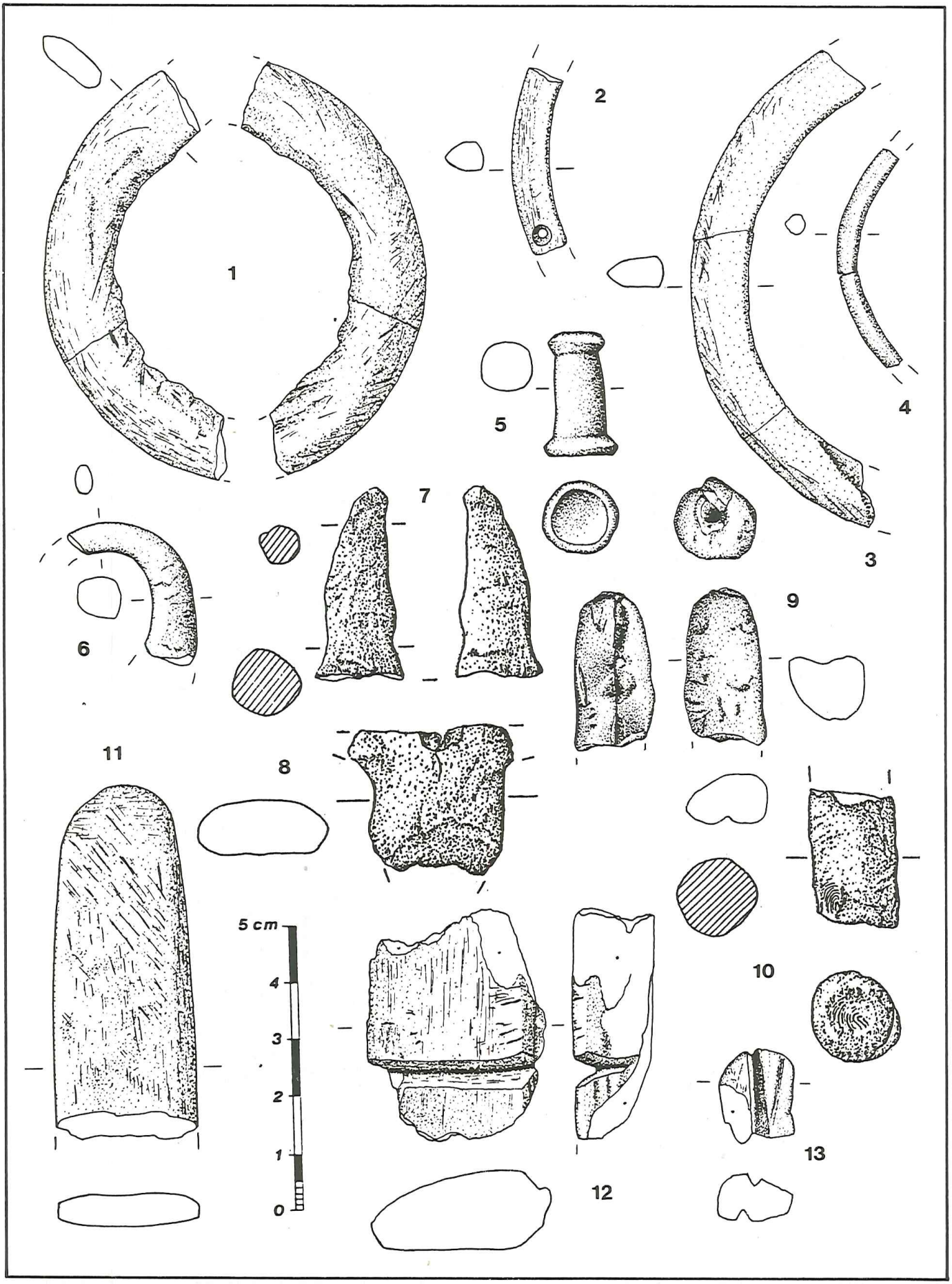

Fig. 17: Various small finds: 1-4 (fragments of) sandstone rings (1 unfinished, 2 perforated), 5 object of unknown material, 6-10 fragments of burnt clay objects/figurines, 11 sandstone palette, 12-13 grooved stones (steatite?).

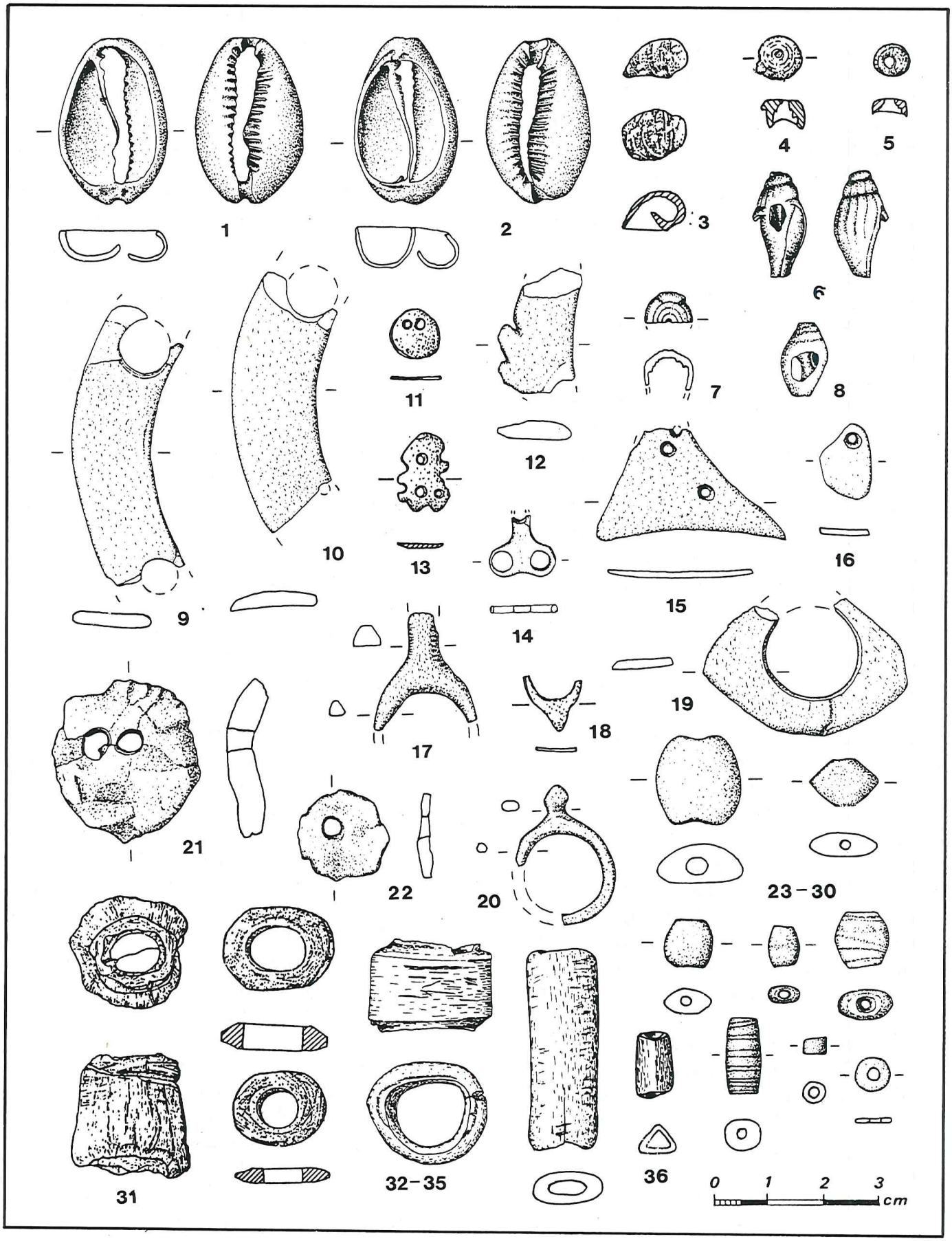

Fig. 18: Ornaments: 1-2 worked cowries (from Burial 4), 3 *Nerita* sp. with intact apex, 4-5 small *Conidae.* with abraded apexes, 6-8 various worked marine molluscs, 9-20 carved/cut/perforated mother-of-pearl objects, 21-22 pierced plaster objects, 23-30 various types of beads of different minerals, 31 tubular bone waste of bead making 32-35 various types of bone beads (Area A and B).

shells (Dentalidae), cowries (Cypraeidae). Occasionally turbans (Turbinidae), moon snails (Naticidae), dove shells (Columbellidae), and auger shells (Terebridae) were utilized, while true limpets (Petellidae) and horn shells are very rare.

The *Nerita* sp. shells have usually had their apexes abraded which created holes allowing for mounting them on strings. An alignment of *Nerita* sp. shells was found in the wrist area of a burial near 499N/687E. Only a few of the *Nerita* show complete apexes. Apart from unmodified smaller Conidae, the worked Conidae mostly have flat abraded apexes. In addition the bodies have been pecked and abraded to produce fairly flat beads (Fig. 18:5). A necklace? with 351 such beads was found with the child burial (Pl. VI,2). Several fragments of cowrie shells have been found. These are the toothed segments which have the interstice on the ventral side of the shell. Their purpose is uncertain. Carved/cut and drilled pieces of mother-of-pearl (Fig. 18:9-19) have been found and are likely to have been sewn-on objects ("paillettes"). The earlier soundings at Ba'ja 1 and Basṭa (Gebel and Starck 1985, Gebel 1986) already hinted at the existence of a rich mother-of-pearl industry in the late PPNB of the area. Fig. 18:21-22 possibly represent such paillettes made of plaster. The presence of lumps of raw material and waste in Basṭa reinforces this idea. The sorting of the 4-1mm fraction of the sieved samples from the 1984 sounding also demonstrated that bead manufacture from what seems to be *Dentalium* and coral existed. Some of these are as small as 2mm in diameter.

Beads made from various minerals (Fig. 18:23-30) and tubular bones (Fig. 18:32-36) are also quite numerous. The piece shown in Fig. 18:31 is the waste created by cutting such a slice from a bone blank.

Many fragmentary and some almost complete rings of bracelet size can be recorded from both areas. They are made of non-local sandstone, limestone/marble?, unidentified rock, and of a plaster-like material. For example, in Area A during the 1987 campaign, 19 fragments of possibly 18 rings were of sandstone, 77 fragments of possibly 29 rings were of plaster-like material, and two of other minerals. To our knowledge, this is the first time that such rings are reported as being manufactured of mouldable material. Some of these fragments bear traces of red and black painting.

Among the other various small finds, local and non-local odd-shaped minerals are the most frequent, e.g. spherical limestone balls, fossils, all sizes of quartz pebbles (from sandstone areas). The latter often bear red pigments, e.g. the *in situ* mano-sized quartz polishers (?) of Locus 20 in 400N/600E.

Bone Implements

After it was possible to clean and process the — partly heavily carbonate incrusted — bone material of the 1987 season, the wealth of this industry became evident. In addition to implement types (awls/perforators and spatulae) recognized during 1986 (Gebel, Muheisen and Nissen 1988: Fig. 16), a more differentiated spectrum of spatulae and a small rod-like type with two pointed ends can be reported. Also, a very distinguished tool type made of radii of *Bos* sp. has to be mentioned. This implement, possibly having also the function of a polisher, has a large perforation through its proximal joint surface and a flattened smoothed surface of 15-10 cm^2 at the distal end.

Bone working at Basṭa is attested by many cut, incised, split and polished bone fragments. While some of these workpieces and blanks cannot be understood yet, the tubular bone waste of beads like Fig. 18:31 are well identifiable (see Gebel, Muheisen and Nissen 1988: Fig. 14.12)[7].

7. Bone working and implements at Basṭa will be studied by Wajeeh Karasneh, Institute of Archaeology and Anthropology, Yarmouk University.

Palaeoethnobotany
(Contribution by Reinder Neef)

Soil samples for botanical analysis have been taken from the main loci in both areas of excavation (Area A and B). Carbonized botanical remains were retrieved from soil samples by means of water flotation. The remains consisted mainly of charcoal; samples contained 0.25 up to 70 ml charcoal per litre.

The wood originated for 74% of the samples from juniper *(Juniperus phoenicea),* and for 25% from pistachio, most likely *Pistacia atlantica.* However, its wood is anatomically not distinguishable from *Pistacia khinuk.* The high amount of juniper charcoal is surprising, requiring further explanation as nowadays forest remnants of this tree are mainly located on the western steep slopes of the Arabian Plateau (Area II, e.g. between Wadi Musa and Tayiba; see Gebel, Nissen and Muheisen 1988). The altitudes of juniper forests here range between 850m up to about 1500m, with an average annual precipitation of 200-400 mm. There is no evidence of present-day juniper associations on the calcareous soils east of this line. This area is now completely deforested due to severe overgrazing. However, one can hardly imagine that the Neolithic people of Basṭa had their main wood resources at distances of 6 to 8 km (linear distance), including crossing the crests bordering the western Arabian Plateau. So we have to assume that juniper was not restricted to sandy soils, but also covered the more mountainous areas with calcareous soils of the plateau west of Basṭa. According to the charcoal remains another major component of arboreal vegetation in the Neolithic of Basṭa is *Pistacia atlantica.* Both trees probably formed a savanna like forest gradually changing into dwarf shrub vegetation east of Basṭa. Such vegetation types are also indicated by the faunal remains found (Contribution C. Becker). This leads to the assumption that climatic conditions did not differ much from today. About one percent of the charcoal originated from wadi floor environments, namely from *Salix/Populus.*

Fruits were gathered in large quantities. Almost every sample contained complete or fragmented edible pistachio nuts, and about 5% contained fragments of almonds *(Primus amygdalus).* Less gathered were wild figs *(Ficus* sp.). Wild fig trees grow in preference around wadi beds or in rock cliffs.

The spectrum of cultivated plants is rather small. The bulk of the material belongs to domesticated cereals, two-row hulled barley *(Hordeum distichum)* and emmer wheat *(Triticum diccocum).* From emmer wheat remains of the spike were recovered as well, the so-called spikelet forks and glume bases. They are the result of pounding the ears to free the grains. The only other domesticated plant appears to be the field pea *(Pisum sativum).*

Apart from the general analyses of the plant material, further studies will especially concentrate on the palaeoenvironmental questions arising from the charcoal and wild plant remains.

Faunal Remains
(Contribution by Cornelia Becker)

During the 1987 campaign at Basṭa, about 120 kg of faunal remains were retrieved from PPNB layers in Areas A and B. Most of the material, about 73 kg consisting of 25,000 specimens, could be analyzed within a three weeks' stay. The following preliminary results are based on these finds.

The animal bones of Basṭa are generally well preserved. However, a good deal is badly crushed and sometimes even has thick carbonate incrustations. Therefore, and partly because some bones were splintered during excavation, 17% (referring to the weight) of the treated material could neither be identified nor allocated to possible size classes. The analysis included usual archaeozoological procedures like species identification, localisation of skeletal elements, slaughtering age, and any possible fragmentation patterns. Animal gnawing marks as well as marks resulting from cutting and burning were documented according to frequency. The bones were

then weighed and measured bearing in mind any possible pathological abnormities.

The list of wild species, identified so far without reference to a comparative collection, is relatively short. In addition, some of the specimens were too fragmentary for anything more than a genus-level identification, or are in need of a more detailed analysis. To date, the following species were recovered at Basța: *Bos primigenius, Capra aegagrus, Gazella* sp., *Cervus* sp., *Equus cf. hemionus, Sus scrofa, Canis lupus, Canis aureus, Vulpes* sp., *Felis* sp., and *Lepus capensis.* There was a small number of bird and tortoise bones, as yet unidentified. Beyond this, the Basța material contains a lot of bones which seem to derive from domesticated animals, especially from small ruminants. Taking the present knowledge and osteological methods into account, it promises to provide further detailed information on one of the major difficulties of PPNB faunal assemblage, i.e. the status of domestication. We are able to make more reliable statements on the process of domestication of animals at this site, because bones are quite numerous and many of them could be measured. Here, one can for example find in the same stratigraphical context large amounts of ovicaprine remains from adult individuals that differ enormously not only in their size but also morphologically. These unmistakable differences suggest that we are hereby dealing with wild and domestic goats and maybe even sheep, having excluded ibex and gazelle. The domesticated animals outnumber the wild ones. This tentative impression has to be proven by metrical multivariate analysis and detailed morphological comparisons. This is supported by a relatively high frequency of young-killed individuals. In addition, some pathological changes like exostotical phalanges and narrow standing teeth in the lower jaw were observed — typical indicators for domestication.

Among the cattle remains we find medium-to-large-sized elements outdone only by the very large definite aurochs bones. The problem is our meagre knowledge of metrical variability and sexual dimorphism in the aurochs from the early Holocene in the Near East. If it should be possible to solve this problem, one could decide whether the smaller-sized cattle bones represent an early stage of domestication or not. The same goes for the hog remains from the site.

Subsistence in and around Basța (excluding the vegetarian component) was largely based on goat (and sheep), cattle, onager and gazelle. The remaining species like boar, deer, small carnivores, birds and tortoises were scarce except for the hare which was found in larger quantities. The frequencies of the major species are shown in Table 5. The overwhelming part of the faunal refuse derives from the ovicaprines. Referring to the number of bones, they amount to 91.2%, referring to weight, 67.2%, the latter figure giving a better impression of their importance as a primary source of meat. Within this category of small ruminants the gazelle did not play a basic part in the economy (7.0% and 5.3%). The same goes for the larger mammals, cattle and onager, if one considers the number of specimens (8.8%). But as for the weight of the bones, they comprise more than 30% of the meat diet.

Table 5: Frequencies of major species by number of fragments and bone weights.

	n	%	*g*	%
Capra/Ovis	10485	84.2	37318	61.9
Gazella	881	7.0	3110	5.3
Bos	348	2.8	10201	16.9
Equus	211	1.7	4611	7.7
Bos/Equus	531	4.3	4965	8.2
n_T	12456	100.0	60205	100.0

The animal exploitation at Basța seems to have been quite intensive. Bones are very fragmentary and bear a lot of cutting marks from flint tools, especially near the joints. These fragmentation patterns enable us to reconstruct slaughtering processes concerning disarticulation, removing of flesh, brain and marrow and even bone working activities. The skeletal elements of the main species are nearly represented in their natural composition. There is no evidence that single parts of the

slaughtered animals or the vension were over or under represented. Most of the animals were butchered on the site and the greater part of the consumption must have taken place there as well.

The preliminary analysis of the Basța fauna strongly suggests that the main part of the diet derived from domesticated animals, although hunting of wild species was still important. The Basța inhabitants exploited different eco-niches: the flat steppes to the east with its gazelles, onagers and hares, the mountainous region to the west being the natural habitat of wild goats, its hillslopes and valley floors being more suitable for aurochs, wild boar and deer. This suggests at least the existence of an open forest or several fringe forests in these areas where the animals could live in their adequate biotope.

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M. Muheisen
H.G. Gebel

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