

Vasilikos Valley Project: Fourth Preliminary Report, 1979–1980

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with Contributions by Various Staff Members

During the fourth season of the Vasilikos Valley Project in the Larnaca District of southern Cyprus, excavations were continued at the Aceramic and Ceramic Neolithic site of Kalavassos-Tenta. Excavation on the west side of the top of the site revealed more of the plan of the earliest curvilinear building that underlies the stone complex. Elsewhere on the top of the site, further mud-brick and stone structures were uncovered, and a unique wall painting was found on the central pier of one building. Excavations in the Lower South Slope area confirmed the existence of a deep ditch outside the outer settlement wall. Five Aceramic phase burials were excavated in different parts of the site. Investigation of the Ceramic phase deposits on the eastern flanks of the site revealed a series of pits, but no standing architectural remains.

Excavations at the Chalcolithic site of Kalavassos-Ayious on the east side of the valley were also continued. A series of pits of widely varying size was brought to light in several different areas of the site. The largest pits contained numerous artifacts, sometimes in situ on distinct surfaces. At the north end of the site three pits were found connected by subterranean tunnels.

Rescue excavations, lasting from July 1979 through February 1980, were also undertaken at the Late Bronze Age site of A. Dhimitrios, a short distance to the south of Tenta. An extensive architectural complex of finely built stone structures was uncovered within the line of the new Nicosia-Limassol highway. The quality of the building, and the clear degree of planning that underlies the whole architectural layout, betoken a site of considerable importance. The architectural levels on the site may be dated to a late phase of Late Cypriote II, but one of the tombs also contains material of Late Cypriote I or early Late Cypriote II date.

A systematic field survey of the southern half of the Vasilikos valley, employing a regularly spaced series of transects, revealed a number of additional sites of varying type and period. A chronological outline of prehistoric Cyprus is provided in Table I. Specialist reports on geographical, fluvial geomorphological, faunal, and conservation studies are also included.

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Introduction and Acknowledgements

The fourth season of excavation and field survey in the Vasilikos valley, Larnaca District, southern Cyprus, was undertaken in the months of June through September,

1979.¹ Rescue excavations, necessitated by the imminent construction of the new Nicosia-Limassol highway, con-

1. For reports on previous seasons, see: Ian A. Todd, "Vasilikos Valley Project: First Preliminary Report, 1976," *RepDeptAntCyprus*

tinued after the end of the main field season until February, 1980. The scope and purposes of the project are set out in the reports cited in footnote 1. This article provides a preliminary report on the 1979–1980 seasons.

The project was sponsored by Brandeis University and, since late 1979, by the American Schools of Oriental Research. The National Science Foundation continued to provide all of the funding for the project (grant number BNS77–07685 A02) and our debt of gratitude grows greater year by year. It is also a pleasure to acknowledge once again the indebtedness of the project to Dr. Vassos Karageorghis, the Director of the Department of Antiquities of the Republic of Cyprus. His help throughout the season greatly facilitated the work of the project, and his willingness to organize and fund the erection of a protective roof over the mud-brick structures at Kalavasos-Tenta is a prime example of the cooperation that is so readily extended by the Department to foreign excavation projects working in Cyprus. Dr. Ino Nicolaou also provided valuable assistance to the project in many ways, and Mr. Michael Loulloupis of the Cyprus Survey continued to expend his time and energy on matters pertaining to land ownership and the registering of sites as Ancient Monuments. Mrs. Androula Savvopoulou spent much time and effort on the design and erection of the Tenta roof. The project staff also wish to record their thanks to other members of the Department of Antiquities including Demos Christou, Sophocles Hadjisavvas, and Chrysilios Polycarpou who greatly assisted the rescue excavations at Kalavasos-A. Dhimitrios in the autumn and winter months. It is also a pleasure to acknowledge the great assistance provided by General Komnenos, the Commander in Chief of the Cypriote National Guard, and Major Christopoulos in organizing the work of a detachment of the National Guard at A. Dhimitrios in November and December, 1979. Without their help, these excavations would not have achieved the significance which may now be attributed to them. The continued kindness of the Ministry of Education in allowing the project the use of the facilities of the Kalavasos Elementary School also greatly contributed to the smooth operation of the project. The assistance of the Vassiliko

(1977) 5–32 and Plates II–XI; idem, "The Vasilikos Valley Project, 1976," *JFA* 4 (1977) 375–381; Ian A. Todd et al., "Vasilikos Valley Project: Second Preliminary Report, 1977," *JFA* 5 (1978) 161–195; Ian A. Todd et al., "Vasilikos Valley Project: Third Preliminary Report, 1978," *JFA* 6 (1979) 265–300. An interim report on the 1977–78 seasons was published by Ian A. Todd et al., "Vasilikos Valley Project, 1977–1978: an Interim Report," *RepDeptAntCyprus* (1979) 13–68 and Plates I–IV. General notes on the project were also published by Ian A. Todd, "Excavations at Kalavasos-Tenta, Cyprus," *Archaeology* 31:4 (1978) 58–59. In this report the First, Second, and Third Preliminary Reports are abbreviated, respectively, as Todd (1977), Todd (1978), and Todd (1979).

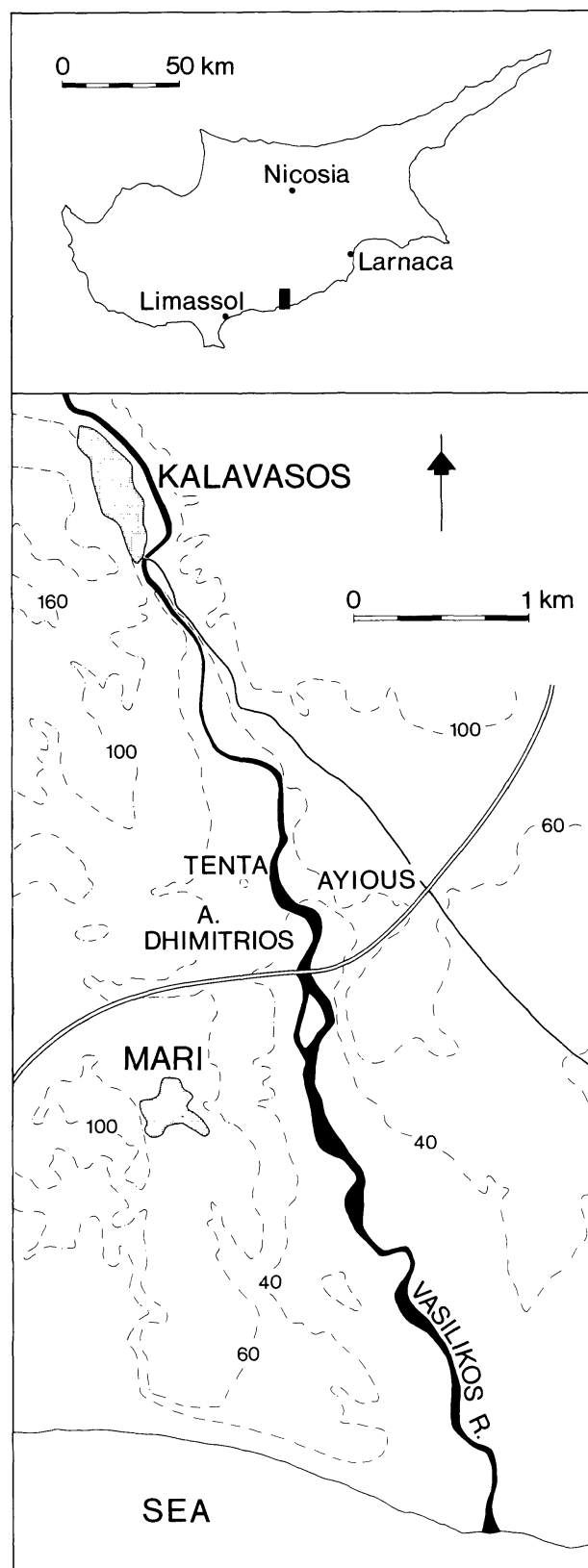


Figure 1. Sketch map of the southern part of the Vasilikos valley showing the general location of sites excavated in 1979. Drawing by A. South.

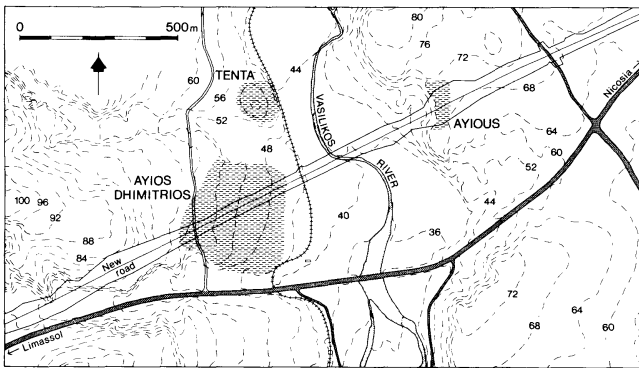


Figure 2. Topographical map showing the location of the sites of Tenta, Ayios and A. Dhimitrios. The site areas are shaded. Contours are in meters. Drawing by A. South, based upon the maps (1:5,000 Topographical Series D.L.S. 17) of the Department of Lands and Surveys with the sanction of the Republic of Cyprus; state copyright reserved.

Cement Works Ltd., and its manager S. J. Hartoutsios, again greatly facilitated the project's research in the Kalavassos area.

A special debt of gratitude is owed to John Jones, Peppis Christophi, Dinos Constantinides, Ross Gavalas, and other officials of the Public Works Department of the Ministry of Communications and Works and of Xekte S.A. They provided much information about the size, nature, and location of the new Nicosia-Limassol road, and they patiently answered persistent enquiries concerning the date of the commencement of the construction. They also provided valuable material assistance to the project in many ways including a furnished mobile site office for the excavations at Kalavassos-A. Dhimitrios. The close cooperation of the Public Works Department greatly eased the burdens imposed on the project by the construction of this major highway across the valley. To all of these officials, and to the officials and villagers of Kalavassos our sincere thanks are due.

The 1979 field staff consisted of Dianne Berrigan, Anne-Adele Brodie, Larry Bruce, Jill Carington Smith, Susan Chase, Sheena Crawford, Roger Cribb, Paul Croft, Tracey Cullen, Juliet Dearbergh, Larkie Gildersleeve, Jane Grenville, Steve and Anthi Held, Susan Heuck, Maria Holt, Larissa Hordynsky, Debra Hudak, Elizabeth Hutton, Gloria Ikosi, Jerald Johnson, Alice Kingsnorth, Stephanie Levine, Rebecca Mersereau, David Pearlman, Catherine Pellerin, Paul Rehak, Alison South, Katerina Thomas, and Elizabeth Wheeler in addition to the writer. Various other students joined the project for short periods of time. Basil Gomez, Susan Kromholz, Euphemia Photos, Malcolm Wagstaff, and Susan Westbrook undertook specialist studies during the season, and an ornithological study of the Kalavassos area was undertaken by Janet

South and Eunice Seaman in April, 1979. Eighteen local workpeople were employed at different times during the season.

During the summer season, excavation was concentrated at the Neolithic site of Kalavassos-Tenta, and at the Chalcolithic site of Kalavassos-Ayious (FIGS. 1-2; for chronology, see TABLE 1). Excavations at Tenta lasted from 18 June through 31 August; only minor operations were undertaken at the site thereafter. The protective roof over the mud-brick structures on the east side of the top of the site was erected in February-April, 1980. Excavations were conducted at Kalavassos-Ayious from 5 July through 15 September. Upon receipt of the news that plans for the new Nicosia-Limassol road had been changed to include a much wider right of way, the Ayious excavations were resumed on 8 November, 1979 and continued sporadically until 18 January, 1980. The trial sounding at the Late Bronze Age site of Kalavassos-A. Dhimitrios commenced on 22nd July, and the course of the excavation is outlined in a later section of this report. The field survey of the southern sector of the Vasilikos valley continued throughout the summer season.

Excavations at Kalavassos-Tenta

Excavation at Tenta in 1979 was concentrated in three areas of the site: the top, the Lower South Slope area,

Table 1. Outline chronology of Cyprus. The MASCA recalibration has been employed where possible for the earlier prehistoric dates, and all dates B.C. are approximate. In the prehistoric phases the table does not take into account the probable differences in rate of development in different regions of the island.

Aceramic Neolithic	6000-5500 B.C.
Dark Burnished Wares	5300 B.C.
Ceramic Neolithic	
Painted Pottery	4400 B.C.
Chalcolithic	3700 B.C.
Early Bronze Age (EC)	2600-1925 B.C.
Middle Bronze Age (MC)	1925-1600 B.C.
Late Bronze Age (LC)	
I	1600-1450 B.C.
II	1450-1225 B.C.
III	1225-1050 B.C.
Geometric	1050-750 B.C.
Archaic	750-475 B.C.
Classical	475-325 B.C.
Hellenistic	325-50 B.C.
Roman	50 B.C.-395 A.C.
Byzantine	395-1191 A.C.
Mediaeval	1191-1600 A.C.



Figure 3. Aerial photograph of Kalavasos-Tenta from the south (6 September, 1979).

and on the ENE flanks (FIGS. 3–5).² In the first of these areas, the excavation was designed to yield information on the earliest architectural levels to be found on the western side of the top of the site. Elsewhere on the top of the site, further excavation was undertaken of structures which had been partially excavated in previous seasons. A trench located to the east of the main area of mud-brick structures excavated in 1977–78 was excavated to provide information on the extent of the mud-brick buildings. It had also been hoped that the continuation of the outer settlement wall, Structure 1, might

2. A topographical plan of the site of Tenta was published in Todd (1978) fig. 5. The grid of 10 m. squares is shown on that plan, and the notation system employed at Tenta is explained on p. 168 of the same report. Plans of the architectural remains (with Structure numbers) excavated by the end of the 1978 season were published in Todd (1979) figs. 2 and 6. The complete architectural plan was published as one figure by Todd in *RepDeptAntCyprus* (1979) fig. 1. For the architectural plan revealed at the end of the 1979 season see figs. 6, 7, and 10 of this report.

have been located in this area, but this hope had not been realized by the end of the season. In the Lower South Slope area, excavation continued both inside and outside Structure 10, and further excavation outside Structure 1 at each end of the main area was undertaken to clarify the nature of the ditch, the existence of which had been postulated on evidence excavated in 1977 and 1978. On the ENE flanks of the site, a sizable area was excavated to determine whether or not structures of the Ceramic Neolithic phase were to be found in this part of the site, and to ascertain the nature and depth of the deposits. Good progress was made in all three major excavation areas, but none was completed, and it is anticipated that three more seasons of excavation will be required for the achievement of the overall goals of the Tenta excavation.

Structures Underlying the Stone Complex on the Top of the Site (FIG. 6)

Prior to the 1979 season it had been established that at least two architectural phases exist below the remains



Figure 4. Aerial photograph of Kalavasos-Tenta from the nw (6 September, 1979).

of the stone complex on the west side of the top of the site. Excavation in 1978 confirmed that the stone complex itself had been built on top of the collapsed mud-brick debris of Structure 17, a large curvilinear building with a mud-brick outer wall, the lime-plaster floor of which had been relaid and colored red on four separate occasions. In the same year a short stretch of stone footing was also uncovered (Structure 36) clearly belonging to an earlier phase than Structure 17.³

Excavation in 1979 concentrated on clarification of the construction and alignment of Structure 36. A stretch of ca. 9 m. of the wall was excavated on the western side of the building. It is clearly curvilinear in form, and the alignment approximates that which the overlying Structure 17 must have followed in this area. The wall consists of a single course of wide flat stones overlain by courses

of mud-brick. Immediately inside the stone footing, a mud-brick wall (Th. = ca. 0.5 m.) runs parallel to it for the whole of the excavated stretch. Excavation within the area bounded by these parallel walls revealed that this building also had a red plastered floor of similar color and composition to that of Structure 17. Little information is available about the alignment of Structure 36 on its eastern side, but a small sounding between Structures 14 and 15 of the stone complex revealed some flat stones with a mud-brick wall immediately inside (west of) them and a red plastered floor, all presumably part of Structure 36. The architectural sequence on the west side of the top of the site may thus be seen as a large curvilinear structure with red plaster floor (Structure 36) succeeded by another building on similar alignment (Structure 17). Following the collapse of this latter structure, stone walls were erected on top of the earlier remains, and the size of the central, presumably domestic, structure was greatly reduced. The overall impression created by this sequence is that the early inhabitants of Tenta were experimenting

3. Todd (1979) 270 and plan fig. 2.

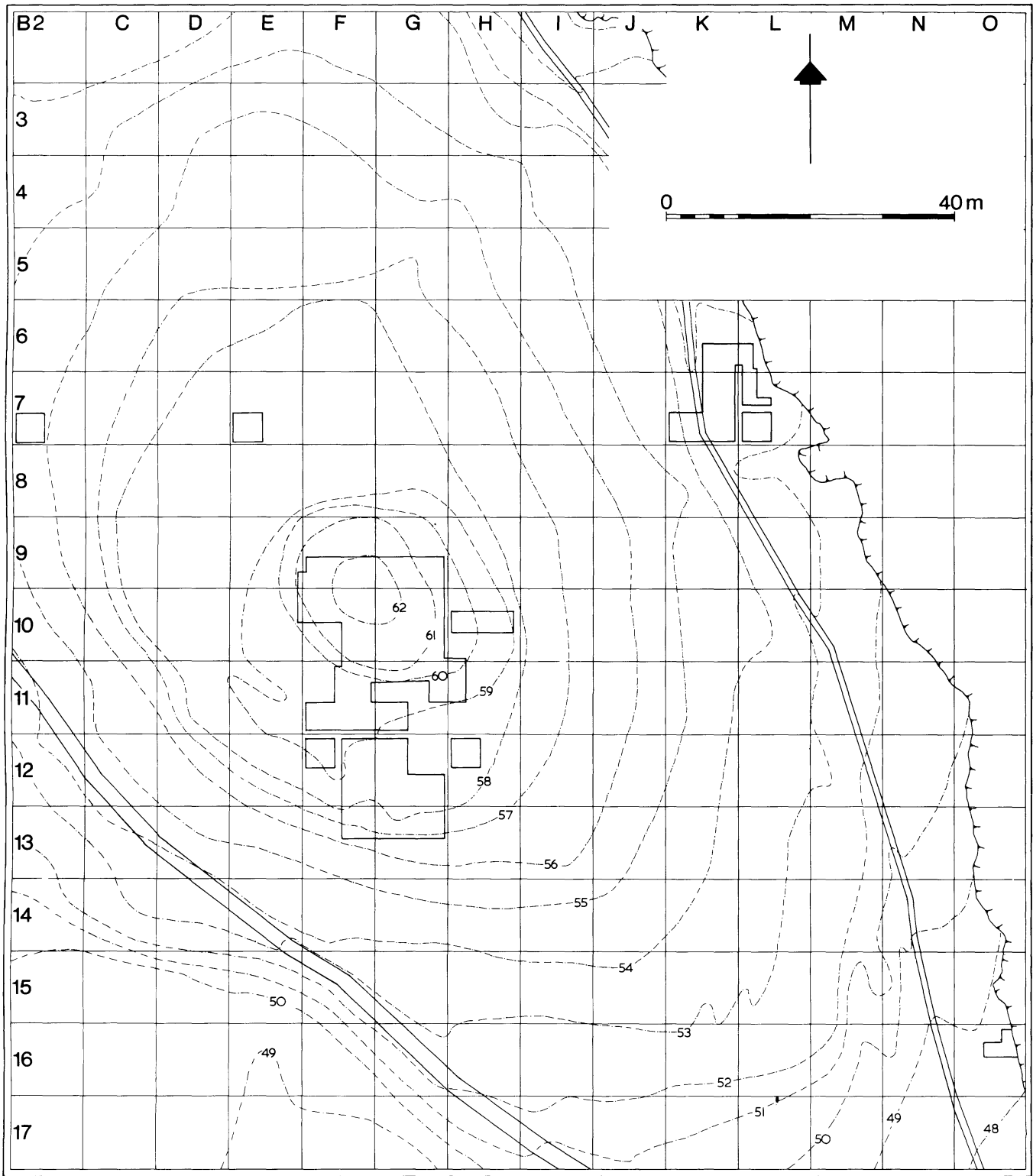


Figure 5. Sketch plan of Kalavassos-Tenta indicating areas partially or completely excavated by the end of the 1979 season. Contours are in meters. Drawing by A. South, based on the original site plan by C. Polycarpou and T. Boyd.

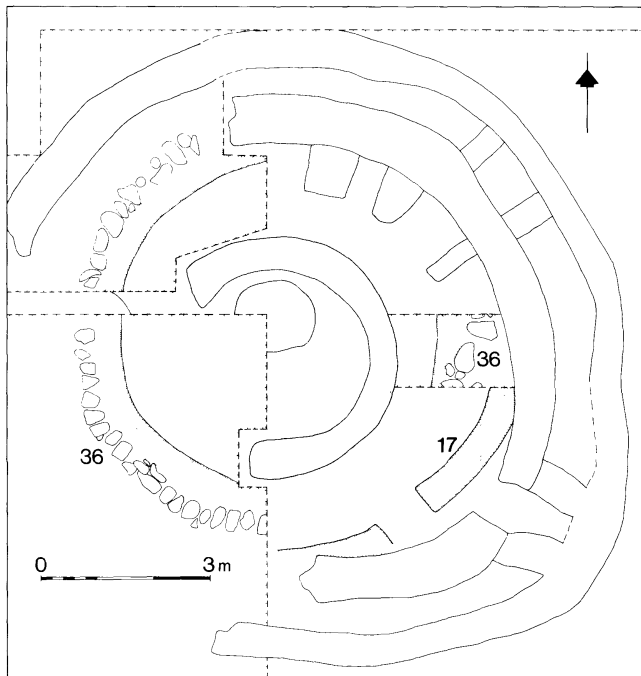


Figure 6. Plan of the structures on the western side of the top of the site of Kalavasos-Tenta. Mud-brick walls are indicated by darker shading. The lighter shading indicates the extent of the red plaster floor of Structure 17. The walls of the stone complex are shown in outline only. Drawing by A. South, based on original plans by T. Boyd, S. Held, and V.V.P. staff members.

with different building materials, and that ultimately they learned from their mistakes.

Outside the line of Structure 36 on its west side, excavation of a 1 m. wide trench, aligned E-W, revealed an irregular series of post holes dug to a depth well below the footings of Structure 36. While these might belong to a lightly-built structure that pre-dates Structure 36, it is also possible that they represent an attempt to stabilize the recently-terraced deposits on the top of the site. This problem will be further examined in a future season.

Mud-Brick and Stone Structures on the East Half of the Top of the Site (FIGS. 7-8)

Structure 58

The interior face of the wall on the west side of this structure⁴ was excavated to floor level. As expected, the wall was found to curve around under the baulk which separated squares G 9 C (mainly occupied by Structure

22) and G 9 D (occupied by Structures 58, 60, and 63).⁵ The wall is preserved to a height of ca. 1.32 m. and has a distinct inward inclination with the bottom of the wall set out ca. 0.13 m. from the line of the top of the wall. The outer face of the wall on the west side of the structure remains to be excavated. Excavation in 1979 revealed that the cavity in the wall on the SW side of the structure, mentioned in the previous report, represents a niche 0.58 m. wide at the top narrowing to 0.54 m. at the bottom. In the final phase of the building, this cavity was blocked up with stones and mud-bricks and plastered over. Further excavation will be required outside Structure 58 to determine whether this cavity was always a niche in the wall, or served as a window through the wall in an earlier phase. The stratigraphic relationship of Structures 58 and 22 still remains to be determined.

Structure 76

By the end of the 1978 season a few fragmentary stretches of mud-brick wall had been uncovered in the area bordered by Structures 34, 35, 42, and 11, but no coherent plan had been recovered. Deeper excavation in 1979 revealed the presence of a curvilinear mud-brick building, with a clearly preserved doorway on its east side. The wall stands to a maximum height of 1.01 m., and varies 0.35–0.40 m. in width. The plaster face on the interior of the wall is quite well preserved, and patches of plaster were also preserved on both vertical sides of the doorway. An irregular plaster floor covers much of the area of the building. An approximately rectangular rise in the floor (H. 0.04 m.), aligned E-W to the right (north) on entering the structure, may, on analogy with other buildings in this part of the site, represent the top of a pier of an underlying building. In other structures, such as Structures 35 and 42, the plaster floor of the building rose up noticeably as it crossed over the top of an underlying earlier wall. The walls of Structure 76 are approximately vertical with no marked inward inclination. On the NW side of the interior of the building, the plaster floor was not preserved, but a series of red plastered floors was visible in one small area that must at some time have been overlain by the floor of Structure 76. These floors bear a notable resemblance to those found in Structures 17 and 36, and they may indicate the existence of a series of large structures with red-plaster floors, some at least of which were partially cut into by the erection of later buildings. This problem will be further examined in the future.

No further excavation was undertaken in any of the

4. For the previously published description of the building see Todd (1979) 272.

5. The baulk is shown on the plan in Todd (1979) fig. 2. For the location of grid squares and the notation system employed, see note 2.

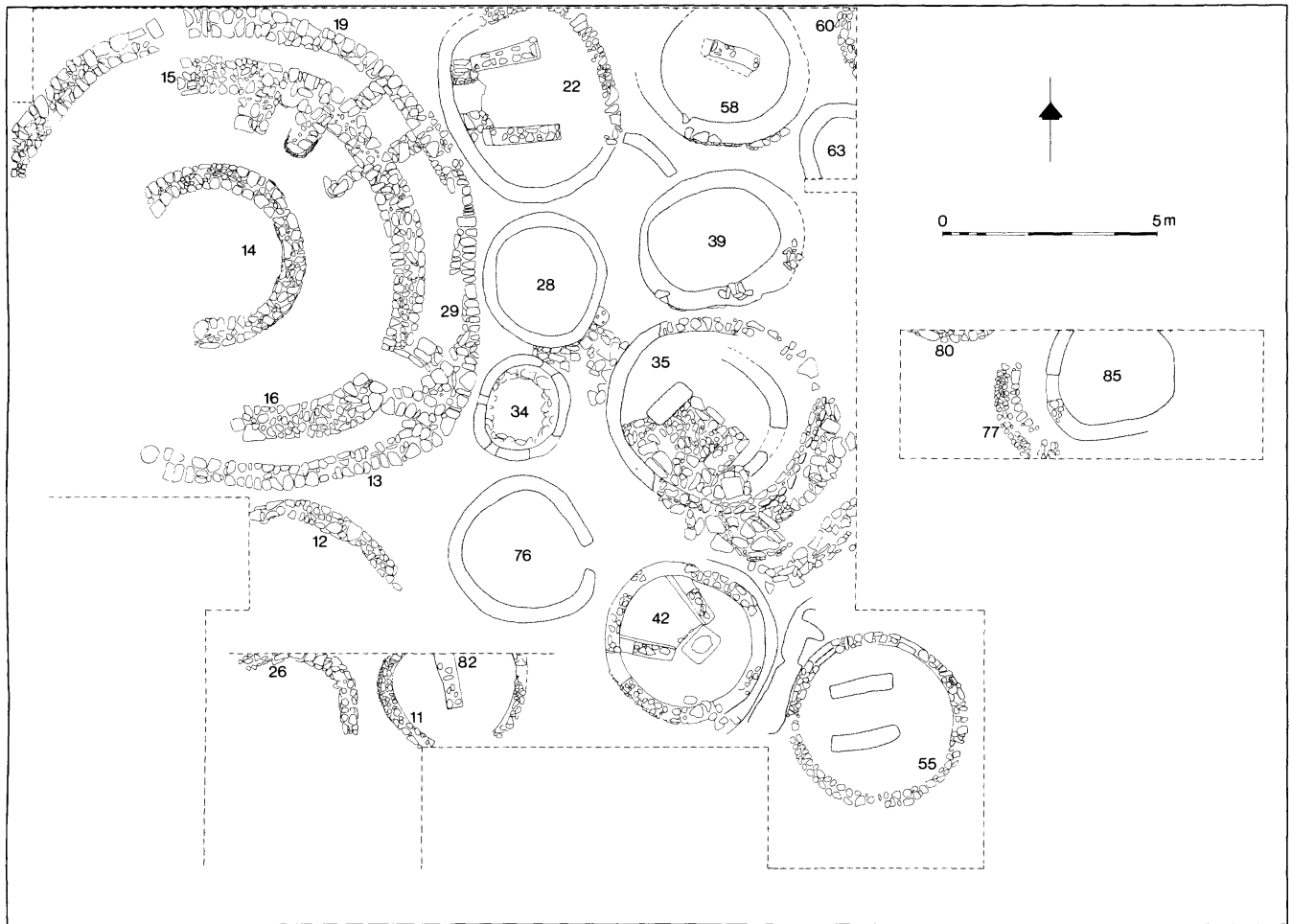


Figure 7. Plan of the stone and mud-brick structures on the top of the site of Kalavasos-Tenta. Mud-brick walls are indicated by darker shading. Surveyed by T. Boyd, S. Held, and V.V.P. staff members; drawing by A. South.

other structures in this area described in the previous report. Because of commitments elsewhere, it was impossible to undertake a detailed study of the chronological relationship of the various mud-brick structures, and this will be carried out in a future season.

Excavations on the Eastern Edge of the Top of the Site (FIG. 7)

In order to ascertain the extent of the curvilinear mud-brick structures on the eastern side of the top of the site, a trench (3 m. $\times$ ca. 8 m.) aligned E-W was excavated to the east of Structure 35. Parts of three curvilinear stone structures were brought to light; Structure 77 consists of a fragment of curvilinear wall built of several courses of small pieces of limestone, running approximately parallel to the wall that forms the west side of Structure 85. It is clearly later in date than Structure 85, and at least some of the plan of the building has been lost through erosion.

Another curvilinear stone wall, Structure 80, was located projecting from the north section of the trench near the NW corner. Most of the structure lies further north and remains to be excavated in a future season. Much of Structure 85 lies within this excavated area. It consists of an irregularly circular stone wall standing to a maximum height of 1.04 m. above the level at which excavation ceased within the building at the end of the 1979 season. No clear floor level was encountered, and it is likely that it remains to be discovered lower down. Much of the interior face of the wall is covered with a rather poorly preserved plaster face. A gap in the wall on the west side of the building, 0.53 m. wide, probably represents a doorway, but this remains to be fully excavated. Apart from a small niche in the wall on the south side of the building, no internal features were encountered in the excavation of the structure.

Excavation in this area has, therefore, shown that cur-

vilinear structures of stone and mud-brick extend to the eastern eroded edge of the top of the site. No trace was located of the outer settlement wall, Structure 1, which might have been expected to curve round at the eastern end of the trench.⁶ A line of stones, however, visible on the ground surface a little to the north of this trench, suggests that the wall will be located either at a lower elevation at the eastern end of the trench, or a short distance to the east of the trench. Koucky's suggestion that the outer settlement wall curves round the whole of the top of the site now seems likely, and this wall may be responsible for the retention of the deposits on the top of the site.⁷ This hypothesis will be tested in several different areas in future seasons.

Stone Structures on the South Side of the Top of the Site (FIGS. 7-9)

Excavations in the first three seasons at Tenta revealed the existence of a series of curvilinear structures along the south side of the top of the site numbered, from west to east, Structures 26, 11, 42, and 55.⁸ What little remains of Structure 26 was completely excavated in 1977. At the beginning of the 1979 season, only the western half of Structure 11 had been excavated, and work was resumed here in order to obtain the complete plan of the building. Several factors intervened to render the process of excavation a slower procedure than originally anticipated, and the northernmost sector of the building between the central pier and the outer wall on the north side still remains to be excavated. Excavation in grid square G 11 A revealed the wall curving around on the eastern side of the building as expected.⁹ As exposed so far, the wall stands to a maximum height of 1.28 m., and it bears a rather patchy and poorly preserved plaster face. A gap in the upper part of the wall, 0.70 m. wide, may represent a doorway, but the level of the bottom of this aperture above the plaster floor inside the building still remains to be established, and the general function of the gap is not yet certain. In places the wall on this eastern side of the building has a distinct outward lean. Initial excavation late in the season of deposits between the pier and the



Figure 8. Kalavasos-Tenta: general view of the architecture on the top of the site, from the SSE. Structure 11 lies to the left of the scale, and Structure 42 to the right. Photograph by I. A. Todd.

north side of the outer wall of the building revealed a curvilinear stone structure (not shown on the plan, FIG. 7) inside (south of) the expected line of Structure 11. To the south of this stretch of wall there appears to have been a mud-brick wall parallel to it. These walls could represent the outer wall of Structure 11 after it had partially collapsed inwards; alternatively they may represent totally separate structures. This problem will be examined in the next season.

The central pier, Structure 82, was located entirely within the baulk separating squares F 11 B and G 11 A.¹⁰ It is preserved to a maximum height of 0.99 m., and its top was slightly truncated in 1976 by the construction of steps up this steep southern face of the top of the site.

10. See note 9.

Figure 9. Kalavasos-Tenta: Structure 55 from the SE. Photograph by I. A. Todd.



6. For the location of this structure see fig. 10.

7. Personal communication. Examination of the aerial photograph in fig. 4 clearly shows how Structure 1 might surround the whole of the top of the site.

8. Structure 26: Todd (1978) 174 and fig. 10. Structure 11: *ibid.* Structure 42: Todd (1979) 273 and figs. 2 and 5. Structure 55: Todd (1979) 273 and fig. 2.

9. For the location of grid squares in this area see Todd (1978) fig. 10. Square G 11 A lies immediately north of G 11 C and east of F 11 B.

The condition of the plaster faces of the pier varies from fair to poor. Although large areas of plastered wall surfaces had previously been excavated at Tenta, no evidence had ever been found of painted decoration. It was, therefore, a great surprise to discover a wall painting on the east face of the pier; the painting is discussed in a later section of this report.

The interior of Structure 42 was completely excavated in 1978. In 1979, limited excavation outside this structure on its west side further clarified the nature of the wall, which is entirely of stone on this side. But much work still remains to be done before the building is entirely freed from the later deposits which built up around it.

Only a small portion of the NW side of Structure 55 was cleared in 1978, and the whole of the remaining plan of the building was revealed in 1979 (FIG. 9). The structure is now seen to be approximately circular, with a maximum internal diameter of ca. 3.5 m. The wall is preserved to a maximum height of 1.20 m. on the north side, but it has been eroded down to the lowest course of stones on the south side. Like the stone walls of Structures 11 and 42, Structure 55 is notable for its thinness, being composed of one wide stone or two smaller courses of stones with yet smaller stones filling the interstices. The stones are almost entirely limestone. On the north side of Structure 55, a short stretch of mud-brick wall runs parallel to the stone wall outside it, but its full extent and nature remain to be delineated in the future. The interior face of Structure 55 was thickly plastered, and at least three separate layers of plaster are clearly visible. No traces of painted decoration were found in the building.

Several features have been preserved in the outer wall of the building, and there is considerable evidence for alterations to the structure after its construction. On the NW side of the building, a sizable aperture in the wall probably represents a niche or window in the final phase. The gap in the wall is 0.47 m. wide, and stretches from the top of the wall as preserved down to a level ca. 0.60 m. above the floor on the inside of the building. The plaster face was preserved on both sides of the gap, and these vertical faces appear to continue downwards below the level of the horizontal plastered sill or bottom of the feature. Further examination is required, but it is likely that this feature was originally a doorway that was subsequently blocked up to form a window or niche, perhaps when the mud-brick wall was erected outside the stone wall on the north side of the building. The bottom of the feature in its final form consisted of a plastered horizontal sill that ran from the interior face of the wall back into the wall for a distance of 0.09 m. at which point the plastered surface curves round to a vertical face for a distance of 0.02 m., above which it is not preserved. If this feature in its later form was a window, the bottom

of the aperture must have presented a stepped appearance with the outer edge higher than the inner. Analogy with another niche on the NNE side of the building, ca. 1.40 m. to the east of the feature already described, suggests that interpretation of the latter feature as a niche is more likely. No evidence, however, was found for the material that formed the back of the niche in the upper part of the wall.

The niche on the NNE side of the building also represents the final form of a feature that underwent at least one change. In its last stage it consisted of a 0.40 m. wide niche in the wall with both side edges, the back, and the bottom all being well plastered. The back is preserved for a height of 0.18 m. to the level of the adjacent stone wall top. The thickness of the wall behind the niche is only 0.19 m.; no stones are visible on the top of the wall at this point, and it appears to be composed of mud-brick. The earlier phase of this feature is indicated by the fact that both plastered side edges of the niche continue past the back of the niche to the exterior face of the wall. In this case it seems that a window, the bottom of which was situated ca. 0.90 m. above the floor of the building, was subsequently partially blocked with mud-bricks leaving a niche-like cavity on the interior face of the wall.

A third feature in the wall on the ENE side of Structure 55 is denoted by two plaster lines running through the wall 0.75 m. apart. These clearly represent an aperture that was subsequently blocked up with stones and mud-bricks. On the interior face of the wall, the original location of this aperture is indicated by poorer quality plaster than on the rest of the interior of the building. The poorer plaster stretches down to very near the floor level at which point the plaster face has been destroyed; there evidently was a doorway on this side of the house at an earlier phase. It should also be noted that the line of the stones of the wall on the south side of the building is not absolutely continuous, and the possibility of an additional feature on this side of the building remains to be clarified.

Within Structure 55, two free-standing piers, with no stones visible in their construction, were erected parallel to each other, slightly to the NNW of where they would have been placed if located centrally within the structure. The northern pier is preserved to a vertical height of 0.98 m. above the floor, but it leans heavily to the south, and it was necessary to leave a supporting baulk of earth on its south side. The southern pier is preserved only to a height of 0.14 m., but its ground plan is clear. Both piers seem to be entirely of mud-brick construction, which differentiates them from all other piers found on the site so far. Several large patches of thick cream-colored plaster indicate the nature of the floor within the building in its latest phase. The fact that the plaster face on the south

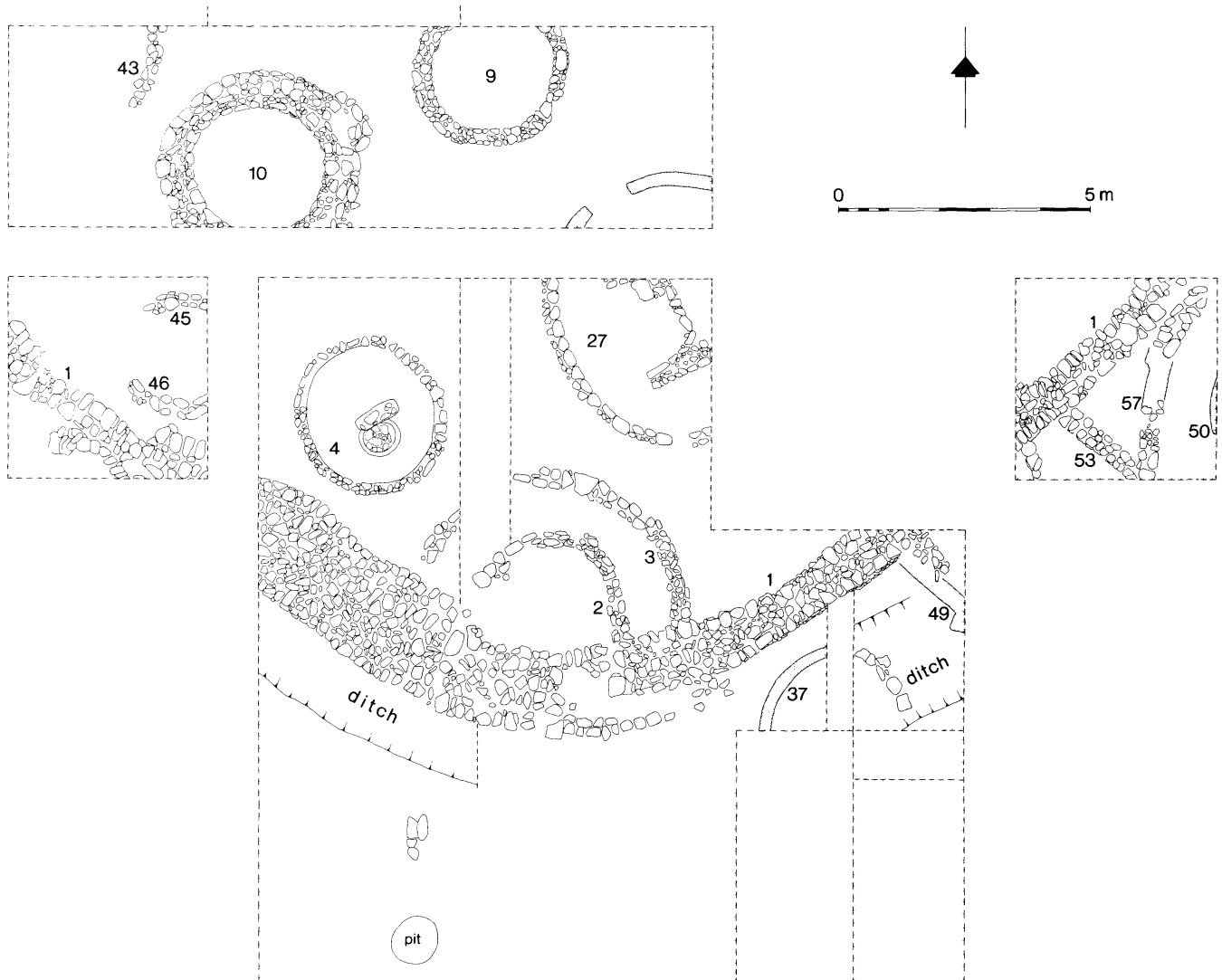


Figure 10. Plan of stone and mud-brick structures on the Lower South Slope area of Kalavasos-Tenta. Mud-brick walls are indicated by shading. Surveyed by T. Boyd, S. Held, and V.V.P. staff members; drawing by A. South.

side of the southern pier continues below this plaster floor indicates that earlier floor levels still remain to be investigated. No benches, platforms, or other features were located within the structure.

Although differences exist among Structures 11, 42, and 55, the similarity in construction is striking, and differentiates them as a group from buildings to the north. Too little remains of Structure 26 to determine whether or not it should also be included in this group. The chronological relationship of the group to the stone complex and the stone and mud-brick buildings on the east half of the top of the site remains to be determined.

Excavations in the Lower South Slope Area (FIG. 10)

The major excavation in this area was concentrated outside (to the south of) Structure 1 to determine the nature of the ditch, the existence of which was postulated in previous reports.¹¹ Work was undertaken at both ends of the area first excavated by Dikaïos, and only very limited operations were carried out elsewhere in this area, principally inside and outside Structure 10.

11. For previous discussions of this area see Todd (1977) 16–17, Todd (1978) 174–175, and Todd (1979) 273–276.

Work was resumed in 1979 in square G 12 D¹² outside Structure 1, at the eastern end of Dikaïos' area. In previous seasons it had been determined that Structure 1 was founded on the natural *havara* (soft, compact secondary limestone), and that close to the foot of Structure 1 the natural deposits outside it had been cut away to form what was probably a defensive ditch.¹³ Structure 1 belonged to an early phase of the Tenta settlement, and subsequently a mud-brick structure on a stone footing (Structure 37) was erected on top of the deposits that filled up the ditch. In 1979 more of the curvilinear mud-brick wall of Structure 37 was uncovered to the west of the stretch previously revealed. In order to examine fully the nature of the ditch, the trench, aligned N-S, originally excavated in 1977–1978 immediately south of Structure 1, was extended to the south to provide adequate space for the investigation. Two human skeletons (Burials 8 and 9), however, were discovered in the course of this operation, and there was insufficient time during the season to excavate the deeper levels in the area of the ditch.

At the western end of Dikaïos' area, excavation immediately to the south of Structure 1 was more successful in obtaining data pertinent to the nature of the ditch and the sequence of events governing its eventual demise. Excavation here also confirmed the architectural sequence proposed in the first preliminary report.¹⁴ Structure 1 incorporates masonry of two phases, an outer wall (Th. = ca. 1 m.) having been added to the south face of the original wall. The ditch belongs to the early phase of Structure 1, before the addition of the outer thickness of masonry. The following sequence is indicated by the available data. Structure 1 was constructed with a deep ditch cut in the natural deposits immediately outside it. The ditch was ca. 1.65 m. in depth, but its full width has not yet been revealed. In a later phase, the ditch was purposely partially filled with large stones, and additional deposits accumulated on top. At present it is uncertain whether the whole of the ditch was filled in, or the filling is limited to this small area. The pile of stones slopes down both to the east and west (i.e., it seems to be aligned across the ditch), and it could have formed a causeway across the ditch to an entrance in Structure 1, of which no traces remain. The outer thickness of Structure 1 was later constructed partially overlying the deposits in the ditch. Fragmentary evidence excavated by Dikaïos¹⁵ and by the present project indicates that curvilinear stone structures were erected in a final phase

immediately outside the additional thickness of Structure 1. The evidence in this area is confirmed by excavations in squares F 12 A and H 12 A where extensive architectural remains were revealed outside Structure 1 in 1978.¹⁶

Within the area bounded by Structure 1, excavation was continued inside and outside Structure 10. The stone platform left in situ inside the building on the west side at the end of the 1978 season was removed,¹⁷ but no other burials or features were uncovered. Outside the structure, an infant burial was located in a very small pit close to the wall on the west side of the house (Burial 7; see below).

Excavations on the ENE Flanks of the Site (FIGS. 3–4)

Excavation was begun in 1978 in the southern half of grid square K 7,¹⁸ close to the eroded east section of the site, because Neolithic sherds, seemingly in situ had previously been noticed in the side of a comparatively modern water channel. Well-stratified ceramic deposits had proved to be rather elusive in other parts of the site, and it seemed likely that excavation in the K 7 area would provide data pertinent to a number of major problems, including the nature of occupation in the Ceramic phase, and the relationship of that phase with the preceding Aceramic phase. Only limited progress was possible in 1978 in this area, and a major operation was mounted in 1979. The excavation covered an area ca. 15 m. × 14 m., including substantial parts of squares K 6, K 7, L 6, and L 7. A depth of up to ca. 0.50 m. of top soil was removed from the whole area, and several major baulks were left as stratigraphic checks.

The Neolithic remains encountered in this excavation area consist of a series of pits varying in diameter from ca. 0.6 m. to ca. 2.0 m. cut into the natural *havara*. They range in depth ca. 0.20–0.55 m. Ceramics and various stone artifacts were found in the fill of some pits. Ashy deposits indicate the use of several of the smaller pits as hearths. No pits resembling the largest pits at the site of Ayios were found in this area. The largest pit located, which had been truncated by a cemented (recent) water channel, contained in the preserved portion quantities of ceramics in situ on a surface that should probably be interpreted as a floor level. Two other surfaces in the same pit probably represent other floor levels. This pit provides the closest parallels to those at Ayios in which distinct floor levels or activity surfaces were encountered.

12. See note 2.

13. Todd (1978) 175 and Todd (1979) 275.

14. Todd (1977) 16.

15. See Dikaïos' plan republished in Todd (1977) fig. 4.

16. Todd (1979) 274.

17. Todd (1979) 276.

18. Ibid. 276–277. This excavation area can be seen on the right side of the aerial photograph in fig. 3, and on the far left side in fig. 4.

Excavation of this area in 1979 had to be concluded before many of the features had been completely examined. Further excavation will be necessary before the nature of this area becomes completely clear; the relationship of the area to other parts of the site remains to be determined.

Wall Painting on the Central Pier of Structure 11 (FIG. 11)

The wall painting was located on the east face of the central pier of Structure 11 which lies on the southern edge of the top of the site (FIG. 8). As stated earlier, Structure 11 seems to belong to a group of buildings that also includes Structures 42 and 55, but no traces of painting were found within those buildings. In fact no evidence of wall painting has been found anywhere else at Tenta, and this is the only evidence excavated to date of wall painting in the whole of prehistoric Cyprus. Kalavassos-Tenta thus joins the select group of sites in the Near East at which evidence has been found for early prehistoric wall paintings.¹⁹

Apart from several blobs of paint on the south end of the pier, the painting is confined to the east face of the pier (= Structure 82), although it should be noted that the north end of the pier still remains to be excavated. The composition of the paint has yet to be analyzed, but it is presumably red ochre, which could easily have been obtained from the area of the Kalavassos Mine. Considerable numbers of lumps of this material have been found in the excavations at Tenta, including some with faces finely smoothed through rubbing on some material. The color of the paint is red (Munsell 10R 6/8). The paint is

19. Prior to 1979 the earliest wall painting known in Cyprus was that found in Tomb 80 at the Koufomeron locality within the site of Salamis. It dates to the end of Cypro-Archaic II or the beginning of Cypro-Classical I, ca. 550–500 B.C. The discovery of the Tenta painting extends the history of this form of mural decoration in Cyprus by an additional 5,000 years. The Salamis tomb and its decoration are published in V. Karageorghis, *Excavations in the Necropolis of Salamis* Vol. III (Nicosia 1973) Chapter III.

The most important sites at which earlier prehistoric wall paintings have been found outside Cyprus are: Can Hasan I (Konya Plain, Turkey): D. H. French, "Excavations at Can Hasan: First Preliminary Report, 1961," *AnatSt* 12 (1962) 27–40; Çatal Hüyük East (Konya Plain, Turkey): J. Mellaart, *Çatal Hüyük, a Neolithic Town in Anatolia* (London 1967); J. Mellaart, "Excavations at Çatal Hüyük, 1975: Fourth Preliminary Report," *AnatSt* 16 (1966) 165–191; Ghassul (Jordan valley north of Dead Sea): A. Mallon, R. Koepfel, and R. Neuville, *Teleilat Ghassul* Vol. I (Rome 1934); Mureybet (Euphrates valley in north-central Syria): J. Cauvin, "Nouvelles Fouilles à Tell Mureybet (Syrie) 1971–1972. Rapport Préliminaire," *Annales Archéologiques Arabes Syriennes* 22 (1972) 105–111; Umm Dabaghiyah (Hatra area, northern Iraq): D. Kirkbride, "Umm Dabaghiyah 1974: a Fourth Preliminary Report," *Iraq* 37 (1975) 3–10; T. 'Uqair (Southern Iraq): S. Lloyd and F. Safar, "Tell 'Uqair: Excavations by the Iraq Government Directorate of Antiquities in 1940 and 1941," *JNES* 2:2 (1943) 131–158.

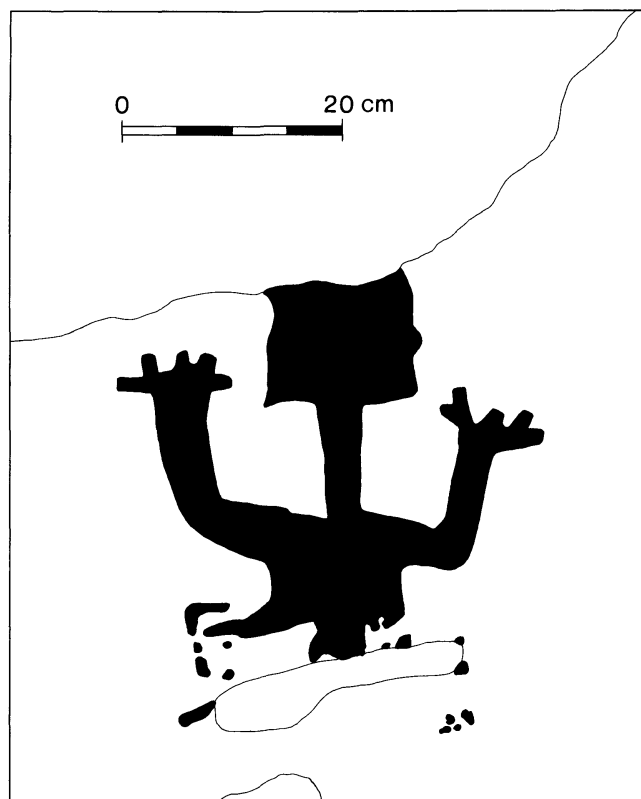


Figure 11. Kalavassos-Tenta: drawing of southern portion of wall painting on central pier of Structure 11. Drawing by I. A. Todd after the original by A. South.

frequently rather streaky and variable in thickness, but it is not clear whether it was applied with a brush, a cloth, or some other material. The surface of the plaster face is badly cracked over the whole area of the painting, and it is in many places buckled. The top of the painting was truncated by the destruction of the top of the pier, and the painted surface was not preserved near the floor of Structure 11. The painted plaster layer was overlain by an additional thick layer of plaster and hard, mud-like material, the painstaking removal of which was cheerfully undertaken by Larry Bruce. The difficult task of detaching the southern section of the painting from the pier was undertaken successfully by Costas Hasapopoulos of the Department of Antiquities who also undertook subsequent conservation of the painting in Nicosia.²⁰ This part of the painting is now on display in the Cyprus Museum, Nicosia. Notes on the removal and conservation of the painting are provided below.

The wall painting covered much of the preserved east face of the pier, and it must originally have been more

20. The project is most grateful to Mr. Hasapopoulos for his work on the painting, and to Dr. Karageorghis who authorized the work.

extensive than it was when found. Although the whole painting should be considered as a single composition, it consists of two major parts separated by a small area that was totally devoid of paint. The southern part of the painting, which is distinctly better preserved than the northern, shows a human figure with a more or less square head (the top of which is not preserved) atop a long narrow neck. No features are shown on the head. The upper part of the body is painted solid red, but of the lower part of the figure, unfortunately, only small fragments which might belong to the legs are preserved. Both arms are upraised and each ends in five fingers. On analogy with the southern figure, the northern section of the painting (not shown in FIG. 11), which is much more fragmentary, may also be interpreted as a human figure of generally similar form. The head may also have been square, but much of it has been destroyed where there is a large approximately oval hole in the plaster. Immediately to the south of the head there is a long feature that could be an upraised arm ending in a series of projections. The plaster is badly cracked here, and the paint is rather faint; it is impossible to make out the number of fingers. Below the area of the head there are only small fragments of paint which do not provide any clear idea of the form of the body. Immediately south of the (possible) upraised arm, there are other patches of paint, but it is not possible to determine to what they originally belonged. The whole composition may, therefore, be understood to represent two human figures, both with upraised arms, with a small unrecognizable feature close to the northern figure.

Accurate interpretation of such a painting is clearly impossible in view of the fragmentary nature of the composition and the lack of parallels. It is interesting that the painting was found on the central pier of a building that was otherwise undistinguished by size or any other features. The general parallel with the painted and relief figures of Çatal Hüyük East inevitably comes to mind, but it is not a close parallel.²¹ The temptation to attribute a religious significance to such a composition must be resisted, at least until much stronger evidence comes to hand that supports such an attribution.

Concerning the removal and conservation of the southern section of the painting, Mr. Hasapopoulos writes as follows.

The operation commenced with the consolidation of the plaster upon which the painting had been executed. Several layers of Mowilith (Polyvinyl acetate emulsion) were applied to the thin layers of argillaceous clay which overlie a mud

base against the stones of which the pier was constructed. After the consolidation, the process of removal of the painting was started by covering the surface of the painting with two layers of gauze glued with Paraloid B. 72 diluted in acetone. Because of the extremely crumbly state of the plaster, it was necessary to reinforce the gauze layers with bamboo canes which were placed in between the layers of gauze. Following this procedure, metal spatulae were employed to cut the consolidated plaster face away from the stone pier on which it was situated. The painting was then transferred to the laboratories of the Department of Antiquities in Nicosia where it was placed on a fiberglass support. Conservation is now complete, and the painting is on display in the galleries of the Cyprus Museum, Nicosia.

Human Burials

The remains of five human skeletons, none with grave goods, were found in different parts of the site of Tenta in the 1979 season. These are numbered Burials 6–10; Burials 1–5 were excavated in 1977 and 1978.²² In contrast to Burials 1–5, which were all found in pits below the floors of structures, Burials 6–10 were all found outside structures. In most cases (Burials 6, 8, 9, and 10) the burials are represented by skeletons that were deposited in layers of rubbish that accumulated in the rather confined spaces between structures on the top of the site (Burials 6 and 10), or in similar deposits outside (to the south of) the outer settlement wall, Structure 1 (Burials 8 and 9). Although this method of disposal of the dead seems at first somewhat lacking in ceremony, the attitude of some of the bodies indicates that they were interred with rather more care than their location might imply. The considerable degree of articulation of some skeletons found in these deposits, and the presence of small bones, also indicate that the bodies were not merely thrown out with the rubbish and left to the mercy of predators.²³ Burial 7 more closely resembles those excavated in previous seasons; although it was found outside a structure, the infant skeleton lies in a pit that is clearly associated with the adjacent building. It now seems that the burial habits of the inhabitants of Kalavassos-Tenta were more varied than was previously reported. Pending detailed physical anthropological examination of the skeletons, the following notes may be provided about the individual burials.

22. Todd (1978) 177–178; Todd (1979) 277; Schulte-Campbell in Todd (1979) 298–299.

23. The writer is grateful to Paul Croft for valuable comments which he has made about the burials. Some of the statements in this section, and the identification of the various bones, are derived from the report that he submitted following the removal of the burials from the ground.

21. For painted and plaster relief figures with upraised arms and legs in various positions, cf. J. Mellaart, 1967 op. cit. (in note 19) Chapters VI and VII.

Burial 6

This skeleton of an adult, sex undetermined, was found lying against the outer face of the north wall of Structure 42. The bones are in an extremely fragile condition, and the deposit surrounding them contains some ash and pieces of mud-brick. The skull, which was badly crushed, lay under a thin slab of limestone and up against another thin limestone slab which was set on edge. The skeleton had suffered considerable disarrangement before excavation. The skull lay at the sw corner of the main concentration of bones. The skull and mandible appeared to be articulated; beneath the skull, on its sw side, a set of metapodials was also found in articulation. Three ribs lying in association with the pelvis (?) on the north side of the main group of bones were the only others that appeared certainly to be in their correct position. Several bones were not found at all. The skull is extremely thick, possibly the result of pathological causes.

Burial 7

This infant burial was found in a small pit located up against the outer face of Structure 10 on the west side of the building in what seems to have been an open courtyard area.²⁴ The skeleton was articulated, but badly crushed and heavily encrusted (as are other Tenta skeletons). The skull was located at the northern end of the pit, probably facing eastwards towards the wall of Structure 10, and the body was in a contracted position. Some bones were missing, and a limestone cobble was removed from the center of the body where it had crushed the rib cage. The burial was removed en bloc for conservation. It may be significant that the only burial found inside Structure 10 consisted of a group of four infants in a pit against the wall on the SE side of the building. No adult burials have yet been found in association with this structure.

Burial 8

This adult skeleton, sex as yet undetermined, was found in a deposit close to the present ground level, outside (to the south of) the south face of Structure 1 on the north edge of square G 13 B. The deposit post-dates Structure 37, but no evidence exists to suggest that it is of other than Aceramic phase date. Some of the bones had been displaced by the action of tree roots, and, as usual at Tenta, they were in generally poor condition. The skeleton was aligned ENE-WSW with the head to the ENE, in approximately the same position as the nearby Burial 9. The body had been deposited on its back with

ankles together and legs flexed. Such a posture probably indicates a degree of intentional placement of the corpse since it is unlikely that this position would have been adopted by a body that had merely been dumped as rubbish. No grave pit had been dug to receive the body, but the degree of articulation and the presence of small hand and foot bones in correct anatomical position indicate that the corpse was not exposed for any great length of time before being covered by the surrounding deposits.

Burial 9

This burial consists of an adult, probably female, skeleton located in the same basic deposit as Burial 8 outside the outer face of Structure 1. It lies ca. 1.50 m. to the south of Burial 8 on the sloping lower south face of the site. The skeleton lay at a deeper level within this deposit on the north side of square G 13 B, and the relationship of the lower part of the deposit to Structure 37 remains to be clarified. The body was aligned ENE-WSW with the head to the ENE facing SE. It was lying horizontally on its left side, with the femora pulled up very tightly to the body, and the knees tightly flexed. The skull and mandible were in articulation, with the neck bent backwards so that the head was tilted upwards with respect to the line of the spine. The rib cage was in very poor condition but apparently complete. The pelvis was similarly in very fragile condition, but the wide sciatic notch suggests that the sex was female. The left femur was complete, but the right femur and both tibiae and fibulae were very fragmentary, and some of the lower bones of the body were missing. Once again no evidence was found for a pit having been dug to receive the body.

Burial 10

This skeleton was located on the top of the site, immediately to the north of Structure 11, in mixed deposits containing much animal bone (some burnt), and various artifacts. Preliminary analysis while still in the ground suggested that the body belonged to an adult, probably a male about 20 years old at the time of death. Despite evidence of minor disturbance, the skeleton is basically complete and in articulation. Once again, although no evidence of a pit was found, the completeness of the skeleton and the presence of the various small bones indicates a certain degree of purposeful burial of the corpse. The body was aligned NW-SE with the skull at the SE end facing SW. It was loosely contracted and lying on its left side. The right arm was bent at the elbow through ca. 90°, with the right hand lying beside the knees. The left arm was only slightly bent at the elbow and underlay the leg bones with the left hand protruding beyond the shaft of the left tibia. The skull was complete, although

24. Some of the notes on this burial are derived from a brief report submitted by Larissa Hordynsky.

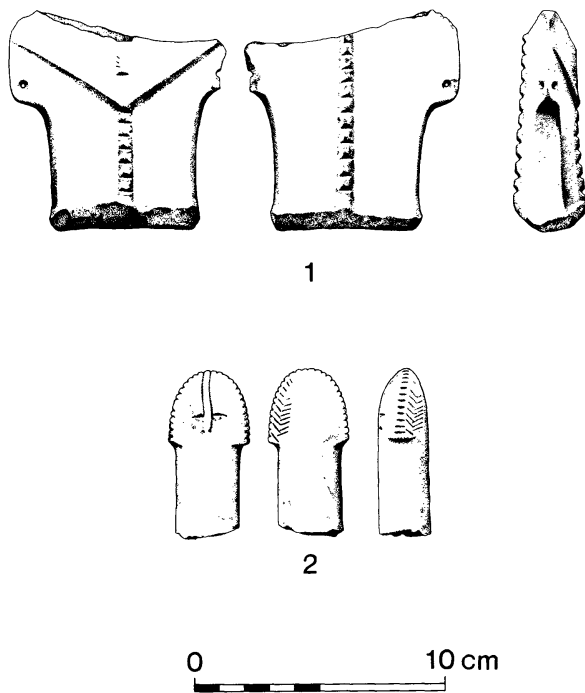


Figure 12. Kalavassos-Tenta: stone figurines K-T 660 (1) and K-T 682 (2). Drawing by E. Hutton.

somewhat distorted and crushed, and positioned vertically, seemingly held in place by its leaning against the outer face of Structure 11. The right side and the back of the skull were blackened by burning, but none of the postcranial bones was fire blackened. Black ashy patches in the deposits in which the burial was located suggest that several fires may have been lit in the vicinity. The burning of the skull alone may be explained by the fact that it was elevated above the level of the rest of the body, and the head of the corpse might have been left protruding from the ground. The burning on the skull could have resulted either from intentional ritual or the burning of rubbish adjacent to the skull while the rest of the body was covered and protected from such burning.

Artifacts

During the 1979 season at Tenta, 181 small finds were registered, bringing the total from all four seasons to 775. With the exception of two figurines, no especially significant additions have been made this season to the Tenta artifactual repertoire.²⁵ No definite figurines had been

found at the site previously, and these two examples are worthy of brief description here since they attest to the existence of this category (FIG. 12).

K-T 660 (G 9 D, w Baulk, 2.2). Greenish diabase fragment of a head of a figurine, found on the top of the site in an ashy layer close to Structure 39 on its NW side; probably originally the handle of a stone vessel. The preserved portion of the front of the head bears a small oval depression representing the mouth, and has a pierced projection on each side. Two raised diagonal bands meet in the center, below which is a single raised band with regular incisions across it. The back is plain except for a single raised band which also bears crosswise incisions at wider intervals than on the front. For parallels, cf. Khirokitia objects no. 929 and no. 1140.²⁶

K-T 682 (G 13 B, 1.2). Head of a limestone figurine broken at the neck, found in the extensive deposit of stones and rubbish outside the outer face of Structure 1. This is also the deposit in which Burials 8 and 9 were found. The eyes are represented by two horizontal grooves which, at their inner ends, meet two vertical grooves which descend from the top of the head and end in two small depressions (nostrils) below the level of the eyes. The mouth is not indicated. A series of horizontal grooves around the edge of the head seems to represent hair. The surface of the back of the head is in poor condition, but a series of wide V-shaped parallel grooves is visible on its left side. Most of the surface on the right side has flaked off. There are no close parallels at Khirokitia, but the figurine from Tenta bears some general resemblance in the rendering of facial features to other Cypriote Chalcolithic figurines, including one excavated by Dikaïos at Kalavassos "B".²⁷

Excavations at Kalavassos-Ayious

by ALICE KINGSNORTH

The site consists of a fairly flat-topped plateau on the east side of the Vasilikos valley, ca. 2.5 km. SE of Kalavassos. Initial soundings undertaken at the site in the autumn of 1978 indicated the desirability of a full-scale excavation in 1979 prior to the construction of the new Nicosia-Limassol road through the site.²⁸ The initial ob-

26. In his description of the stone vessels from Khirokitia, Dikaïos assigns the two objects to a separate category of vessel that he terms "Figure-bowls". They are clearly rare at Khirokitia, and although the Tenta figure is not precisely the same as those from Khirokitia it belongs to the same class. See P. Dikaïos, *Khirokitia* (London 1953) 298–299 and Pl. XCVII and CXLIII.

27. P. Dikaïos, "The Stone Age," *The Swedish Cyprus Expedition IV, Part 1A* (Lund 1962) fig. 65:24.

28. For a summary of the 1978 season at Ayious, including a description of the site and its location and a list of previous references to the site, see Todd (1979) 278–282. Excavations at Ayious during the summer season were directed by A. Kingsnorth, and those in the subsequent fall and winter months of 1979–1980 by P. Croft.

25. For previously published descriptions of the registered small finds found at Tenta see Todd (1977) 21–24; Todd (1978) 179, 181; Todd (1979) 277–278, and the drawings and photographs that accompany these summaries.

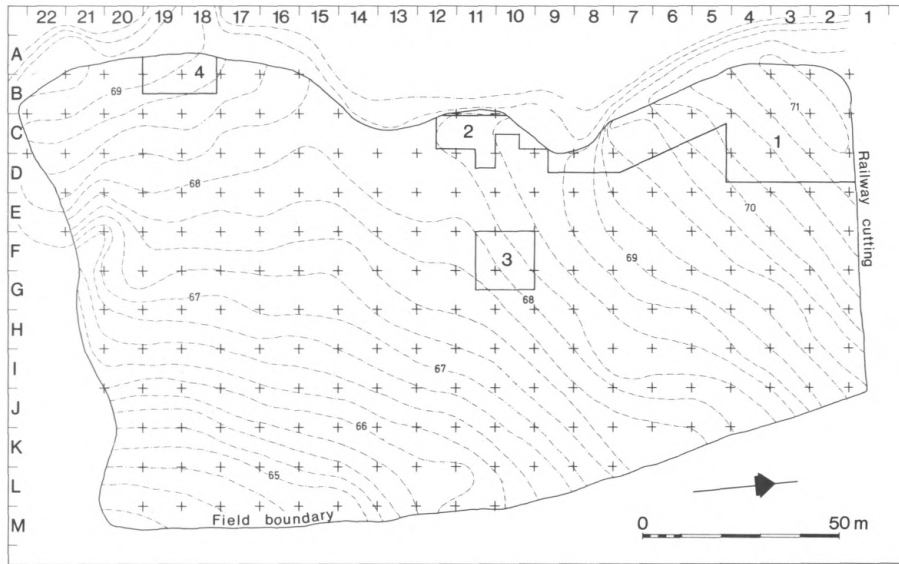


Figure 13. Kalavasos-Ayios: schematic plan of site showing grid and location of excavation areas. Contours are in meters. Surveyed by C. Polycarpou and A. Marshall; drawing by A. South. Key to excavation areas: 1: NW area; 2: west central area; 3: east central area; 4: sw area.

jectives of the 1979 season were to obtain absolute and relative chronological data, to determine the limits of the site, to gain an understanding of the relationship between the various pits and between the pits and exterior features, and, if possible, to discover their function.

The Excavations

The geological stratigraphy of Ayios consists of an immature plough-disturbed soil overlying consolidated Monastirian II beach sands and Pleistocene marls containing naturally rounded concretions.²⁹ Loose topsoil,

29. The writer is indebted to F. Koucky for the geological information provided in this report.

overlying a somewhat more compacted plough-furrowed zone (designated 1.1 and 2.1 respectively)³⁰ cover a grayish-brown layer permeated with calcrete precipitate that merges into bedrock. This layer (informally labelled "crumbly gray" or "crumbly brown") may or may not be archaeologically sterile. In several trenches, at the juncture of 2.1 and the crumbly brown deposit, streaks of ash, hard or slick clay patches, and small holes (some of which appear to be stake holes), indicate use of the site outside the pits. These remains unfortunately proved to be so irregular and exiguous that it was impossible to reconstruct their original form. In the central area of the site, the existence of all pits except one was first noted in the crumbly brown deposit, and the deeper pits penetrated well into the firm Pleistocene marls. In the NW area, however, the marls occur at a higher elevation than elsewhere, and no crumbly brown deposit survives. Here the pits were easily recognizable, since their archaeological fill contrasted sharply with the pale-colored marl. Many of the pits were very shallow, since much of their upper portions were lost through erosion.

During the summer season ca. 1000 sq. m. were opened to a depth of 20–50 cm. below topsoil in four major areas (FIG. 13). The west central area (FIG. 14) was an extension of the original test trench in square C 11 C.³¹ Squares C 9 C and C 9 D through C 12 A and C

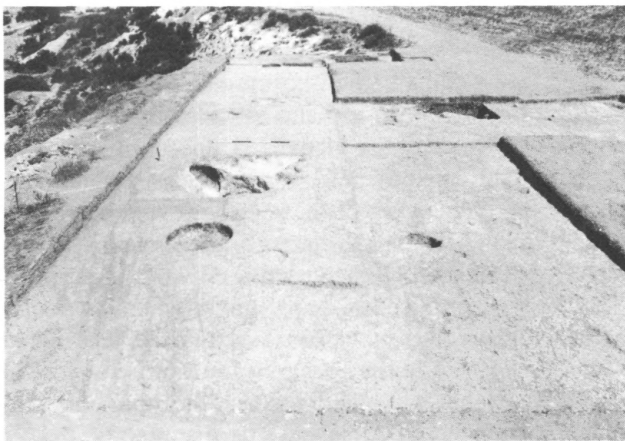


Figure 14. Kalavasos-Ayios: general view of the west central area, from the south. The scale lies on the north side of Pit 1. Photograph by I. A. Todd.

30. Excavated deposits at Ayios were numbered according to the standard procedure of the project explained in Todd (1978) 168–169. Individual pit/feature numbers were also assigned in many cases.

31. The grid system at Ayios is oriented to the compass points, and based on 10 m. × 10 m. squares designated by letters from west to east and numbers from north to south.

12 B, as well as D 11 A, were excavated to sterile deposits. In the west central area, and in B 6 D, C 6 C and its extensions, trowels, picks, and shovels were used to remove all deposits, which were then passed through 1.0 and 0.5 cm. mesh screens. These techniques were designed to acquire information on the external and post-pit use of the site, and to provide a comparative reference for results from the other three areas where heavy earth-moving machinery (a grader and an excavator) removed deposits down to the pit level. Throughout the site all feature and pit deposits were screened through a 0.3 cm. mesh. In the NW area, excavation proceeded outwards from major features so that small associated features would not be overlooked. Immediately south of this area, the 1978 sounding in B 6 D³² was extended manually to include portions of the adjacent squares.

The SW area and the east central area were selected to test the extent of the site. The SW excavation area, located where the density of surface artifacts was distinctly less than further north, revealed a number of square yellow patches which, when sectioned, turned out to be shallow, flat-bottomed pits, full of sterile sandy earth. Nothing indicated that these pits were prehistoric, and they may be of comparatively modern origin. An isolated cluster of mud-brick fragments³³ resting in loose earth constituted the only other feature in the area.

The east central area, situated at the edge of the densest concentration of surface artifacts, although rich in ceramics and chipped stone tools to a depth of 1.5 m. below topsoil, as indicated by two deep soundings into sterile layers, proved featureless. The disturbed and rather uniform nature of the deposits in these soundings suggest that the periphery of the site has been reached here. Excavation results thus support the previously published statement³⁴ that the N-S dimensions of the site were at least 150 m., but may imply that the E-W dimensions of 75 m. are a little excessive for the surviving part of the site, since no clear prehistoric features were discovered ca. 60 m. east of the present edge of the plateau. On the other hand, artifacts were recovered by the excavation here, and the soundings were very limited in extent. The western edge of the site has been heavily eroded, and numerous prehistoric artifacts are to be found on the

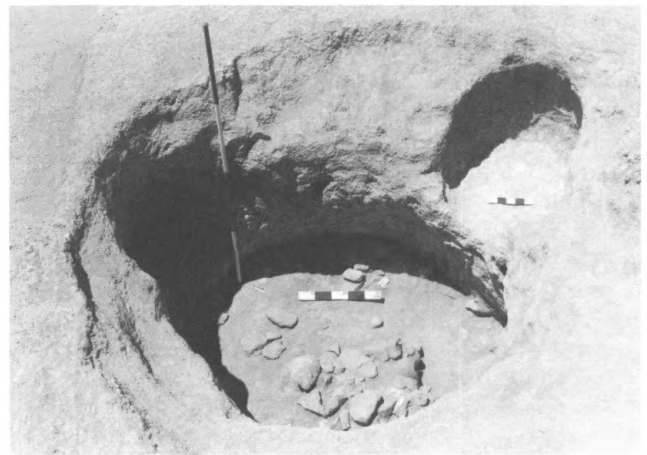


Figure 15. Kalavassos-Ayios: the upper NW alcove and "floor" in deposit 6.2 in Pit 1, from the east. Photograph by A. Kingsnorth.

slopes below the edge. The original size of the site may, therefore, have been somewhat greater than at present.

The West Central Area and the B 6 D Area

By the end of the summer season, more than 50 pits varying in diameter from 0.4 m. to more than 6 m. had been revealed. Brief notes are included here on the five most important pits.

Pit 1 (FIGS 14–15). This pit, which was partially excavated in 1978, is 3 m. wide at the top, but narrows by more than 1 m. into a shaft before widening out again near the bottom. All around the circumference of the pit, about half way down the pit face, is a series of small holes (D. 5–10 cm.) which may be man-made and which could have been used to support a light form of floor. Two alcoves were found in 1978 cut in the side walls of the pit on the NNW and SW sides, and three more alcoves (depth 45–60 cm.) were discovered at a lower elevation in 1979 on the north, SW and SE sides of the pit. The purpose of these lower alcoves is uncertain; they may have been designed to create additional space, but it may also be that the cutting of these alcoves was never completed. At this depth the natural deposits change from *havara* to sand, and the continued downward cutting of the alcoves would have been impractical. The lowest archaeological layer in the pit, which overlies the natural sands, consists of a discontinuous layer of *havara* which may have been left as a deliberate surface, possibly originally augmented by some flooring material.

Within the pit a sequence of five similar deposits (avg. Th. 25 cm.), consisted of yellowish-brown, slightly gritty material with varying amounts of calcareous inclusions

32. Todd (1979) 281.

33. In this report mud-brick/mud-brick fragments indicates material of a rectangular or sub-rectangular shape, pisé refers to the same substance ranging from an amorphous to sub-rectangular form, whereas daub is taken to be lining material, or lumps of the same, which might have been used as covering over organic matter.

34. Loc.cit. (in note 32).

and clay patches. Some discontinuous lenses of pisé were also encountered in the upper deposits. Three of the lower layers may qualify as true floors on the evidence of the ground stone and other artifacts distributed in clusters around the periphery and center of the pit. Internal features in the center of the pit include a loosely consolidated stone platform that was superseded by a stone-lined pit (W. 30 cm., depth 60 cm.), both features possibly to be connected with a central roof support. No definite evidence of roofing material was found, but four patches of granular brown material in the upper levels of the pit may represent the remains of wooden beams, roughly square in section, with a daub coating. One post hole was found within the deposits in the pit, and two more were located outside the pit. A daub-lined pit was also found occupying much of the sw quadrant of the pit in one of the upper levels.

The purpose of the pit is unclear, and it may have been used for different purposes at different times. Even if some of the deposits are interpreted as floor levels, they may only indicate use of the pit as a temporary shelter rather than a permanent dwelling. In shape and dimensions, this pit resembles Dikaïos' Kalavassos-Kokkinoyia ("Site A") type I and type II pits, being cave-shaped like type II and having a possible central-post arrangement like type I.³⁵

Pit 2. This very large pit could not be traced clearly on the east side and it lacked a clear, clean wall face and bottom, suggesting both to the excavator and the project geologist independently that the pit was a natural depression, deeper in the west than in the east, that filled rapidly.³⁶ Natural *havara* occurred at a depth of 40 cm. below the modern pit top, beneath a truncated terra rossa-like fossil soil that included a small quantity of artifacts. The soil was composed of fine mud-like silicates indicative of formation during a moist phase, but it was also riddled with calcrete specks representing the effects of a period of drying out. In the eastern part of the pit, the buried soil abutted against a deposit similar in texture, color, and contents to the upper deposits of Pit 1. A few mud-bricks and mud-brick fragments were found in this deposit. Resting on a very red, probably heated surface in the NW quadrant of the pit below this deposit was a scatter of ground-stone tools and large sherds in situ. On top of the terra rossa-like soil was a later buried soil (Th. 10–15 cm.) of aeolian sand mixed with archaeological remains. On the east side, this deposit had been seriously disturbed by pits and ashy spill from a firepit. The latest deposit in the pit was crumbly brown with much archaeological

material, very similar to the uppermost pit fill of Pit 1.

Pit 3. This pit was partially excavated in the 1978 sounding in B 6 D.³⁷ It consists of a broad pit with a depth of less than 50 cm., with a small extension to the south, partially skirted by a narrow channel that may originally have been used for fluid runoff, or as the base of a palisade or screen. Several post holes encircled the perimeter of Pit 3, and a few depressions and stake holes pierced the floor of the pit. The face and bottom of the pit were composed of smoothed *havara*. The pit fill resembled the uppermost deposits in Pits 1 and 2: a moist, soft mixture of crumbly brown earth with much pottery and chipped stone but little bone. But the earliest deposit consisted of a shallow patchwork of localized lenses of fine silty or gritty earth.

Pit 4. This pit, which abuts Pit 3 on its SE side, is symmetrical and slightly bell-shaped. The *havara* floor, which occurs at a depth of 75 cm., merges into sterile crumbly brown soil near the top of the sides of the pit. The two pits were once connected by a rectangular opening that was subsequently blocked. Half way down the blocking, a small runnel was located that might have been used to funnel liquids or some other commodity from one pit to the other, or for holding something in place. The bottom of the pit was covered with a shallow layer of granular, charcoal-flecked material. Set in the middle of the floor were several large, smooth, oval diabase stones, one of which bore a few peckmarks in the center of its underside. The main deposit in the pit was a compacted, yellowish material in which some pottery and chipped-stone artifacts occurred. The final deposit in the pit consisted of a loose, gray earth that contained numerous chunks of limestone and mud-brick. These seem to have been placed across the neck of the pit as a capping. A small post hole was located immediately north of the pit. At least two other pits similar to Pit 4 have been excavated at Ayios, and it is possible that they served the purpose of granaries. Larger versions of such pits are known from later periods in Cyprus when they were used to protect grain from vermin by sealing and fumigating.³⁸

Pit 5. This pit lies to the SE of Pit 3. Since it was discovered near the end of the summer season, it was only partially excavated, and its overall dimensions are unknown. It must have covered a large area, and have been 1 m. or more in depth. The sides of the pit consisted

37. Loc.cit. (in note 32).

38. The writer is indebted to S. Held for drawing attention to the following reference: V. Krestos, "Letter to Sir Mortimer Wheeler on the Subject of Cypriot Storage Pits," *Antiquity* 30 (1956) 223. Further information on this subject was obtained through discussions with F. Koucky, G. Ikosi, and an older resident of Kalavassos.

35. Dikaïos, op. cit. (in note 27) 107, fig. 52.

36. Personal communication from F. Koucky.

of several stepped shelves cut into the *havara*, and five complete or mostly complete pottery vessels were found within a small depression near the outer edge of the pit. A dense concentration of lumps of *pisé*, somewhat less extensive than the perimeter of the pit, concealed the top, and may represent the remains of roofing material or the debris of a later structure.

Several medium-sized “firepits” were also found at Ayious. These symmetrical pits (D. 1+ m., depth 30–50 cm.) have smooth, concave sides that were occasionally plastered with a clay-like material. They contained stones tightly packed in ash, and, in at least one case, flat stones had been placed around the sides of the pit. They all contained several fine-ware ceramic sherds, at least one coarse-ware ceramic base, and very little or no animal bone. That they were used for cooking, baking, or firing seems certain; the two or three layers of stones used to line the base of the pits were probably designed to retain the heat as long as possible, and these pits may have been used for the firing of pottery. Alternatively, they might be considered to represent an early stage in the preparation of subterranean, fumigated granaries.

Post holes, stake holes, large shallow depressions, and various other features also occurred throughout the site. Many of these are prehistoric, but they offer no clearly intelligible pattern. It can be stated only that they apparently relate to above-ground structures. Despite the overwhelming impression that Ayious is dominated by subterranean features, there were probably also considerable numbers of standing structures of which few traces have survived.

The NW Area

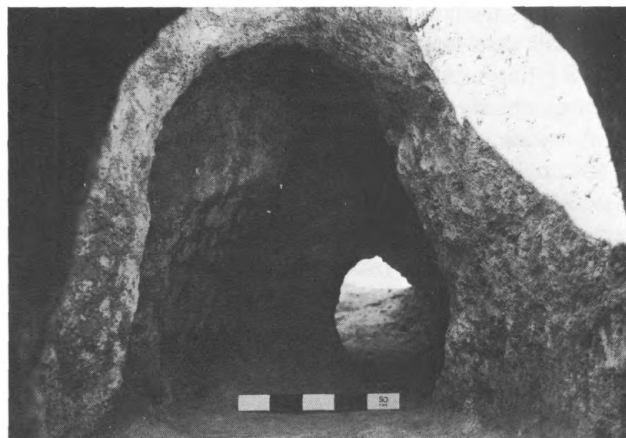
by IAN A. TODD

This area lies at the north end of the site and is bordered on the north side by the cutting for the railway that used to run from the Kalavassos gypsum quarry down into the valley, and on the west side by the eroded western slopes of the site. That the site continues further northwards is demonstrated by the fact that there is a sizable pit containing prehistoric artifacts visible in the north section of the railway cutting; no excavation, however, has been undertaken on this side of the cutting. At its maximum extent the area investigated measured ca. 34 m. (NNE-SSW) × 25 m. (WNW-ESE); the topsoil was removed by mechanical means over the whole area, but the extent of deeper excavation was more limited. This area mainly covers grid squares A-D 2–4. At one point during the season, the project was informed that the right of way of the new Nicosia-Limassol road would include this NW area, and that the features located within it would be

destroyed. The final line of the north side of the right of way, however, has now been fixed ca. 3 m. south of the SE corner of the excavation area. During the summer months, the excavations in this part of the site were directed by Alice Kingsnorth, and in the autumn and winter months by Paul Croft.

Approximately 30 pits of varied shape and size were located within the NW area. While many of these resemble features found in other parts of the site, one particular group is worthy of individual mention. This consists of three pits (Pit 25, Pit 27, and Feature 111), which were connected by narrow, rather irregular subterranean tunnels (FIG. 16). The largest of the three (D. ca. 2.75 m.), Pit 25 at the SW end of the group, was cut to a depth of ca. 2.3 m. into the natural marl. The sides of the pit are steeply cut back below the top forming deep alcoves. The central pit of the three (Pit 27) is more shaft-like in appearance (D. ca. 1.0 m., depth 1.95 m.) with a small post hole at its center. The third pit (Feature 111), which lies at the NE end of the group, consists of a small irregular pit (surface dimensions 1.0 m. × 0.8 m.) with four rough steps on the NE side leading down to the tunnel that runs SW into Pit 27. Both tunnels are similar, although the NE tunnel is distinctly longer than the SW tunnel: ca. 5.0 m. and 3.2 m., respectively. Several changes of angle occur within the length of the NE tunnel; at a point ca. 1.0 m. SW of Feature 111, where the tunnel turns through an angle of almost 45° to run in a more westerly direction, the height of the tunnel is reduced from ca. 0.75 m. to 0.55 m. and the width to 0.5 m. forming a “porthole” beyond which the tunnel gradually widens out again. A similar narrowing of the tunnel was encountered between Pits 27 and 25 (W. 0.6 m., H. 0.55 m.) ca. 1.0 m. from the point where the tunnel emerges into Pit 27. These

Figure 16. Kalavassos-Ayious: tunnel between Pits 25 and 27, from inside mouth of tunnel leading NE from Pit 27. Photograph by A. South.



features were clearly designed to impede movement along the tunnels, and two large gypsum slabs found in the tunnel between Pit 27 and Feature 111 were probably used to block the tunnel when needed. The fill of this complex of pits and tunnels contained considerable quantities of domestic debris including ceramics, lithics, some ground-stone artifacts, and seven figurine fragments. It is notable that all nine of the figurines and fragments thereof found at Ayious were found in the NW area, seven in the area of Pit 25 and two in Feature 117 (ca. 3.2 m. NE of Feature 111). This complex of pits and tunnels is unique at Ayious, but fairly close parallels are to be found at the site of Philia-Drakos A, west of Nicosia.³⁹

Artifacts

by ALICE KINGSNORTH

Large quantities of ceramics were recovered from many parts of the site.⁴⁰ Some of these have been examined in a preliminary manner by Susan Kromholz, and the material as a whole will be the subject of a detailed study by Jane Grenville. The categories of ground-stone artifacts include quern and grinder fragments in hard stone (diabase), and coarse platters of pinkish calcareous marl rich in *Globigerina* microfossils. The latter material is very easy to work, but disintegrates near heat, which characteristic may explain why most of these soft limestone trays were broken and distorted. The use of this material for the manufacture of artifacts apparently represents an innovation, since it was not used for artifacts at Tenta. The finest ground-stone artifacts from Ayious are a varied collection of elegant, polished stone axes, adzes, and chisels of dense, fine-grained, slightly altered green diabase. Some of these were found in a pair of caches east of Pit 1 and of the Pits 3–5 complex. A very hard, carnelian bead that would have required considerable experience to manufacture may have been imported from Egypt. Hard hematite pebbles were used at Ayious, but no soft hematite from the Kalavassos mines area was found. Pillow lavas and gabbros were also apparently not used for the manufacture of objects. Artifacts of organic origin include shell beads, a piece of polished ivory, and bone points. Several of the coarse-ware sherds retain basketry impressions on their undersides, probably having been placed on coil mats during manufacture.

Human Skeletal Remains

The only human skeletal remains found at Ayious are the very incomplete skeleton of an infant under two years

of age, found in a shallow grave without burial gifts in the NW area, and the teeth of an individual of similar age discovered in the fill of a deep pit just south of one of the firepits in square C 11 B.⁴¹

Chronology

Considerable quantities of carbonized material were retrieved from the excavations at Ayious, and a series of samples has been sent to the British Museum for testing.⁴² Pending receipt of the results of these tests, the chronological position of the site can be based only on comparison of artifactual typology. Initial examination of the ceramics⁴³ and lithics⁴⁴ suggests that the site post-dates the Ceramic Neolithic of Khirokitia, Sotira, and Tenta, and predates Erimi. It may be slightly earlier than Kalavassos-Kokkinoyia/Pamboules, although the fabric, finish, and stylistic differences noted may be attributable to intersite cultural variation rather than temporal differentiation. Recent ¹⁴C dates obtained for the site of Kissonerga-Mylouthkia in the Paphos area may suggest a mid-4th millennium B.C. date (MASCA recalibrated) for Ayious.⁴⁵

Since the stratigraphy at Ayious is not continuous from pit to pit, it has not been possible to establish definite contemporaneity of similar deposits. Pit deposits and re-cuts indicate that the majority of pits were used at least twice. In Pit 1, however, at least four phases of use for a similar purpose are attested, as well as a period when it was reused for an internal pit. The final phase of Pit 1 corresponds to the final phase of Pit 2 and Pit 3 in deposit makeup if not also temporally. Conceivably, the latter deposit represents the same time period as the prehistoric post-pit use of the site, but no data exist to prove that the prehistoric use of the site external to the pits actually post-dates the latest use of the pits.

Interpretation and Conclusions

The purpose of the pits at Ayious is uncertain; the pits themselves, together with the finds, suggest that much of the site was devoted to some kind of specialized, quite

41. Appreciation is here expressed to J. Johnson for preliminary aging of the human skeletal material.

42. The project is most grateful to the British Museum and Dr. R. Burleigh for their agreement to undertake the tests (I.A.T.).

43. S. Kromholz, personal communication.

44. Based on the writer's personal inspection of the material. Full-scale analysis, including microwear traces, lithic reduction sequences, and experimental reconstruction is planned for the future by L. Hordynsky and A. Kingsnorth.

45. Addendum 1 in E. J. Peltenburg, "Lemba Archaeological Project, Cyprus, 1976–77: Preliminary Report," *Levant* 11 (1979) 9–45.

39. The writer is grateful to Dr. T. Watkins for drawing his attention to the similarity between the features at Ayious and Philia.

40. Alice Kingsnorth is the author both of this section, and the following sections on Ayious.

possibly processing, activity that apparently involved storage, heating, and probably wood-working. Clearer definition of this activity must await further specialist analyses of the artifactual and non-artifactual data, but the manufacture of ceramics is certainly a possibility. Some of the pits may have been used as shelters, but there is no conclusive proof of this. Pits may have been dug in the ground, at least in some cases, for the purpose of obtaining raw material rather than the creation of hollows, and the present eroded state of the site may present a very misleading impression.

A search for specific analogies to the Ayious pits reveals that Pit 1 is somewhat like Dikaïos's type I and type II pits at Kalavassos-Kokkinoyia ("Site A"), being both "cave shaped" like the latter and having a putative "central post" like the former.⁴⁶ Some of the other larger pits at Ayious more closely resemble Dikaïos's Kalavassos-Pamboules ("Site B") type I "dwellings".⁴⁷ At Kalavassos-Pamboules, however, the post holes were internal, not external as at Ayious, and the pits were a meter or more larger than the Ayious features. The problem of comparison is further compounded by the uncertainties regarding Dikaïos's typology. It is not clear, for instance, upon how many examples it is based, how it is derived, or what the range of variation was at the latter site. Moreover, the significance, if any, of similarities and differences between pits at the two sites is unclear.

Further afield, obvious parallels to the subterranean aspects of Ayious are provided by the ceramic-phase pits at Kalavassos-Tenta, and, to a greater extent, by the underground features at Philia-Drakos A, and the large hollows at Kissonerga-Mylouthkia in Cyprus; by the Ghassulian Beersheva group of sites in Palestine, and by the semi-subterranean structures at Ma'adi and Merimde in Egypt.

In the view of the writer, the most rewarding aspect of the Ayious excavations was not structural or artifactual, but ecological. Archaeologists in Cyprus traditionally have paid insufficient attention to environmental reconstruction, neglecting consideration of the human impact upon the natural realm. The reasons for this oversight are the well-known difficulty of obtaining pollen samples in the dry, alkaline Mediterranean ecozones, the circumstantial nature of the evidence for past human interference, and a disinclination to seek the relevant data. Certainly many archaeologists expend effort to obtain botanical and faunal information from their excavations, but it should not be forgotten that such data reflect original human selection-prehistoric economics rather than prehistoric ecology. In this context the buried soils from Ayious Pit 2 are significant.

The terra rossa-like soil above the *havara* indicates that at some time after the Pleistocene the area probably enjoyed a climate of hot, dry summers and wet winters.⁴⁸ The mud-like silicate makeup further implies formation of the soil under rather moist conditions, whereas the calcrete specks indicate a drying-out phase. Limbrey states that terra rossa and related soils originally supported deciduous and evergreen forests of the kind now restricted to a few mountainous slopes in the Mediterranean region.⁴⁹ This, then, is the kind of landscape that the Neolithic populations most probably encountered along the valley ridgetops in southern Cyprus. By the time of the occupation or utilization of the site at Ayious, however, the area had not only undergone a period of relative dryness, but virtually all traces of the soil, and presumably the associated vegetation, had disappeared.⁵⁰ The presence of a wind-blown deposit overlying the earlier soil and associated with an early use of the pit strengthens the picture of a deteriorating environment in which exposed sediments, fine enough to be borne by wind, could accumulate, contemporary with human activity. The reason for the disappearance of the vegetation that previously protected such material from erosion, is particularly intriguing in view of the fact that the time period in question corresponds to the Atlantic climatic phase elsewhere, normally associated with warm, moist conditions responsible for the growth of rich vegetation cover.⁵¹ The few pollen cores available to Near Eastern archaeologists indicate a more luxurious vegetation picture than the fossil soils at Ayious would suggest.⁵²

It is possible that rather than natural deterioration in the vegetation cover, and consequent alteration in soils during the late Neolithic and Chalcolithic, the effects of human alteration of the landscape are visible here. The means at the disposal of small agricultural and herding communities for affecting the environment are deforestation and grazing, both of which can, in time, irrevocably change the ecology even of lush northern lat-

48. For a review of the conditions surrounding terra rossa formation, see S. Limbrey, *Soil Science and Archaeology* (London 1975) 204–205; K. Butzer, *Environment and Archaeology: An Ecological Approach to Prehistory* (Chicago 1971) 95–96, 306–310, and especially 378–379.

49. Limbrey, op. cit. (in note 48) 205.

50. This disappearance is evident from the fact that the soil was not found below or associated with any other prehistoric remains on the site, and because the relict was truncated by a later soil contemporary with human activity in the lowest deposit in Pit 2.

51. Butzer, op. cit. (in note 48) Table 22 and 571–572.

52. W. van Zeist and H. E. Wright, "Preliminary Pollen Studies at

46. Loc. cit. (in note 35).

47. Dikaïos, op. cit. (in note 27) 133.

itudes.⁵³ This being so, how much more devastating might several thousand years of clearance and intense animal herding have been on the marginal ecozones of the Mediterranean belt?

It has been suggested by E. J. Peltenburg that the advent of subterranean features in this phase of Cypriote prehistory was a response to earthquake activity.⁵⁴ It would seem unlikely, however, that the pits at Ayios would have provided the necessary protection, since their sides would be liable to crumble and cave in. In various parts of the world resort has been made to subterranean features or rock-cut chambers purely on the grounds of ease of construction, and the desire to avoid the heat above ground. Additional reasons may be concerned with tradition and metaphysical beliefs about chthonic forces. At Ayios, the dust-bearing winds may have provided a further incentive to the adoption of subterranean or semi-subterranean features. The change from the standing architecture of the Aceramic Neolithic period to the pits of Ayios may be, in large part, a response to the changing ecological conditions in the Vasilikos valley.

Excavations at Kalavassos-Ayios Dhimitrios

by ALISON SOUTH

Introduction

The existence of the Late Bronze Age site of Kalavassos-Ayios Dhimitrios has been known since 1976 when

it was reported by C. Polycarpou of the Department of Antiquities.⁵⁵ The full extent and significance of the site were not appreciated until a detailed investigation of it became necessary in 1979 because of the imminence of work on the new Nicosia-Limassol road which passes through the center of the site.

Ayios Dhimitrios covers an area of ca. 11.5 ha., comprising several small fields of arable land with scattered olive and carob trees, on flat and gently sloping land (48–64 m.a.s.l.) adjacent to the alluvial plain of the Vasilikos river. The river now runs at a distance of ca. 175 m. from the NE side of the site. The site is bounded on the north, east, and south sides by a small scarp of varying height that drops down to subsidiary valleys on the north and south, and to the Vasilikos flood plain on the east side. On the west side the site is overlooked by a flat-topped limestone ridge. The site lies ca. 3.5 km. from the sea, and 8.5 km. south of the Kalavassos copper mine area.

The location is well placed to take advantage of a number of factors. The Vasilikos river provided an ample water supply, and further supplies could be drawn from wells cut into the conglomerate bedrock that underlies the eastern part of the site. The site lies in an area of reasonably good agricultural land in the widest part of the valley. It is also at the intersection of the N-S route up and down the valley, linking the Kalavassos copper mine with the coast, with the E-W route connecting the eastern regions of the island with the south coast valleys and the west. Thus a settlement here would be excellently placed for collection of, and trade in, the products of the valley, whether agricultural or metallurgical. The field survey of the valley has revealed very little evidence elsewhere for Late Bronze Age settlement (although several cemeteries are known), so this large site is crucial to the understanding of the whole of the Late Bronze Age in the region.

During the 1979 season the field survey team, led by J. Johnson and L. Hordynsky, investigated the site. They noted the presence of pithos sherds and a variety of ground stone implements over an area ca. 450 m. (N-S) by 350 m. (E-W), with great concentrations of ground stone in some parts of the area. Fine-ware ceramics were almost completely lacking on the surface. Only a few pieces of slag were found. Two areas of probable building rubble were identified, consisting of large numbers of large pieces of limestone, many roughly rectangular in shape, but none showing any traces of intentional shaping. In one of these areas of building rubble a small rectangular trench was found (1.30 m. × 0.60 m., depth 0.70 m.), apparently dug as part of a government survey

Lake Zeribar, Zagros Mountains, Southwestern Iran," *Science* 140 (1963) 65–69; S. Bottema, *Late Quaternary Vegetation History of Northwestern Greece* (Groningen 1974). It is interesting to note that Butzer dates much of the demise of terra rossa and accompanying vegetation to Byzantine period interference (K. Butzer, "Physical Conditions in Eastern Europe, Western Asia and Egypt before the Period of Agriculture and Urban Settlement," *Cambridge Ancient History*, Vol. 1, Part 1 [Cambridge 1970] 39–41). The Ayios evidence would indicate an earlier date.

53. For a discussion of this topic see G. W. Dimbleby, "The Ancient Forest of Blackmore," *Antiquity* 35 (1961) 123–128; G. W. Dimbleby, *The Development of British Heathlands and their Soils*, *Oxford Forestry Memoir* 23 (1962) especially 25–29, 34–41, and 44–45; I. G. Simmons, "Environment and Early Man on Dartmoor, Devon, England," *ProcPS* 35 (1969) 203–209; J. G. Evans, *The Environment of Early Man in the British Isles* (London 1970) 93–102, 109, 112–123, 137 and 139. The sections in the latter volume pertaining to the Bronze Age—particularly the Early Bronze Age—should be reviewed as representing small scale farming-herding economies and land use in some ways analogous to that of the time period under discussion in this report in the Mediterranean region. See also Limbrey (1975) 211 for a discussion of the effects of herding and agriculture on red and brown Mediterranean soils.

54. E. J. Peltenburg, "The Sotira Culture: Regional Diversity and Cultural Unity in Late Neolithic Cyprus," *Levant* 10 (1978) 55–74, esp. p. 67.

55. Todd (1977) 29.

in the path of the new road, although in fact it lay just outside the final line of the road. In this trench a wall of possible Bronze Age construction type was visible. It had faces of boulders of limestone, diabase, and chert with a core of smaller pebbles, and was ca. 0.50 m. wide. Some sherds found in the vicinity were identified as Middle Bronze Age. In view of the road-construction work that was about to commence, it was thought to be an urgent necessity to clarify the date of the structures that evidently existed in this area. A test excavation of 10 m. $\times$ 10 m. was opened around the pre-existing trench, a wheel loader being employed with caution to clear the topsoil from the area.

*The Excavations*⁵⁶

R 14

The excavation of square R 14 of the site grid, directed by J. Johnson and L. Hordynsky, resulted in the discovery of well-constructed walls, forming a small street or corridor with two small storerooms to the south of it and other rooms to the north. (FIG. 17). Ceramic material found included Late Bronze Age types of pithoi, White Slip, Base Ring, various coarse wares, an imported "Canaanite" storage jar, and Mycenaean material of LH IIIB type, which date the occupation to the Late Cypriote IIC period (approx. 13th century B.C.).

The two small rooms (1 and 2) were entered from outside the excavation area to the west. In Room 1 a floor was reached consisting of pebbles packed in crushed limestone, resting on the conglomerate bedrock. On this floor were five large pithoi, the Canaanite jar, a LH IIIB

stirrup jar and a LH IIIB pilgrim flask, all crushed below the collapsed superstructure of the building. Room 2 had a very hard lime-plaster floor, not preserved in all areas; it did not contain any large storage jars, but quantities of coarse ware, several sherds of White Slip II, a LH IIIB stirrup jar, six small ground-stone tools including three diabase pestles, a rolled copper pin, a fragment of a copper ring, and a steatite spindle whorl with incised decoration. A conoid stamp seal engraved with the figure of a quadruped was found below the level of the floor.

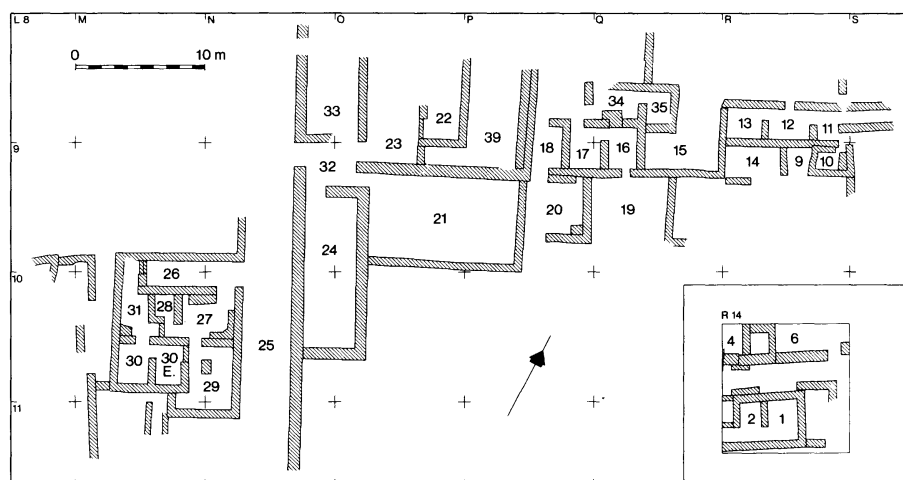
The street or corridor to the north of Rooms 1 and 2 was floored with at least two layers of chalky white lime plaster separated by a layer of diabase pebbles. The plaster sloped up against the walls of the buildings to the north and south. On top of the latest floor were two stone benches, on opposite sides of the corridor. To the north, Area 4 was once entered by a doorway that was later blocked. A layer of crushed sherds, ground stone tools, and stones lying flat on an earthen floor was found in the area. Large amounts of pithos sherds, as well as two ashy areas of indeterminate nature, were found in Area 6.

The East Area

The excavation of square R 14 amply demonstrated the existence of well-built architecture of Late Cypriote IIC date. The exact line of the new road, when surveyors' pegs were put in, proved to be ca. 20 m. north of R 14. At the end of the 1979 summer season, two small (4 m. $\times$ 4 m.) soundings were opened within the road line, one in square R 9 to the north of R 14, and one in N 10 45 m. to the west (FIG. 17). Substantial walls in association with Late Bronze Age material were immediately encountered. Although the new highway would only de-

56. A longer report on the 1979 excavations will appear in *Rep-DeptAntCyprus* 1980.

Figure 17. Kalavassos-A. Dhimitrios: plan of the architecture excavated in the east area within the line of the new road, with inset showing the plan excavated in grid square R 14. The numbers refer to area numbers. Surveyed by C. Polycarpou, A. South, and V.V.P. staff members; drawing by A. South.



stroy about 10% of the site, it lay across the center of the site where buildings of special importance might be expected. In order to gain more information in the time available, a machine was again employed for preliminary clearing, covering an area ca. 30 m. $\times$ 70 m., equivalent to most of the width of the road line and joining the two small soundings. This area lay in the eastern part of the site, but did not include the limits of the site (as defined by surface indications). A labor force of inexperienced volunteers was used to undertake the rescue work since the project funds had been exhausted, and skilled staff were not available because of the lateness of the season. The first aim of excavation was to clear the tops of walls to obtain some understanding of the architectural plan, but time also allowed for the excavation of several rooms and small soundings.

An important feature of the area was a N-S street (W. ca. 3.80 m.). On the west side of the street was an approximately rectangular building, which can probably be termed a "house", with several rooms opening off each other (areas 26–31). Area 27 had a well-laid floor of small flat stones, with two stone benches against the walls. Other rooms had floors of pithos sherds or of hard white plaster. Various ground-stone artifacts including querns were found in the rooms, and ceramics included coarse wares, White Slip, Base Ring, and Mycenaean. A chamber tomb, the dromos of which was cut through the floor of area 30E, was found to contain almost no ceramics, and a pit, probably also a tomb, in area 28 contained a Mycenaean stirrup jar and juglet. Predating the walls of the structure, at the west end of area 26, was a well cut to a depth of 7.5 m. below the top of the bedrock.

The street (area 25) was surfaced with two layers of gravel. On its east side, a doorway led to area 32 from which there was access to two large rectangular rooms (33 and 24). Room 24 had a very thick, hard white plaster floor on which little material was found in situ, as it was at a level very near the modern ground surface. In the NE corner of the room a ceramic bath of uncertain purpose was set into the floor. Further east lay a series of small rooms and yards (areas 9–23, 34, 35, 39) in most of which only the wall tops were excavated. Area 10, a very small room that was a later addition to the building of which it forms a part, had a pebble floor that sloped down to the mouth of a large, complete ceramic vessel sunk below the floor in the NE corner. A stone trough on top of a bench against the east wall of the room also sloped down towards the mouth of this vessel. The arrangement was evidently intended for the retention or processing of some liquid. To the north of area 13 a small concentration of copper slag was found.

The West Area

In late November and December 1979, since road construction had not yet started, the Department of Antiquities arranged for 75 soldiers of the National Guard of the Republic of Cyprus to work at the site, supervised by an Archaeological Officer of the Department. In order to test a different part of the site from those already examined, they worked in the western part within the road line, immediately to the east of the track that crosses the west end of the site. Of the four groups of structures found in this area, three are on the pattern of a central space, ca. 4 m. square, surrounded by smaller rooms (FIG. 18). Because of a lack of time, the buildings were not completely excavated, and floors were not reached in most rooms, but in several places pithoi and large stone basins and querns were found in situ. At least some of the spaces between the areas of architecture were surfaced with layers of small stones. Bedrock was not reached anywhere in this part of the site.

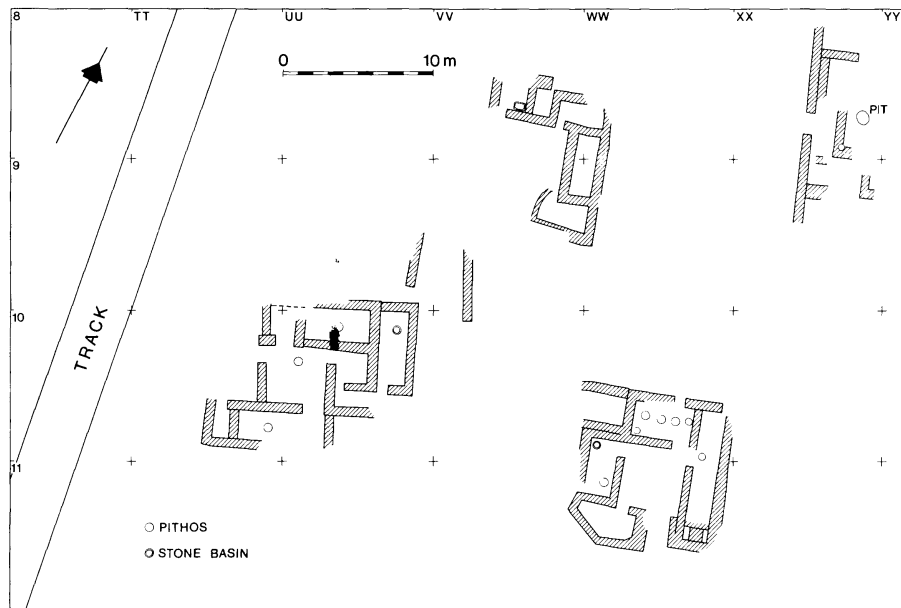
Tombs

Approximately in the center of the site, machines working in the road line revealed the presence of four subterranean tombs. All had a single chamber, either oval or kidney-shaped, and two had a rectangular dromos (in the other two cases the dromos was not found). Two of the tombs (Tombs 1 and 4) contained a substantial amount of disturbed material, at least some of which is earlier in date than anything found so far in association with the architecture on the site. Between the tombs and the West Area, no traces of architecture were observed during machine clearance, although such may once have existed and been lost through ploughing or terracing. Between the tombs and the East Area abundant traces of walls similar to those found elsewhere could be seen, but time did not permit their excavation.

Conclusion

An understanding of this large and very important site is essential for the study of the settlement system and the economy of the Vasilikos valley in the Late Bronze Age. Future plans include the sampling of as many parts of the site as possible in order to ascertain whether or not specialized activities were undertaken in different parts of the site, and whether or not occupation in all areas was limited to one period of ca. 100 years, as is the case in the areas excavated so far. The location of the site close to the Kalavassos copper mines, and the presence of some copper slag at the site, indicate that the site probably played an important role in the mining, working of, and trade in copper. The large size of the site, its strategic location, and the degree of organization implied

Figure 18. Kalavastos-A. Dhimitrios: plan of the architecture excavated in the west area within the line of the new road. Surveyed by C. Polycarpou and A. South; drawing by A. South.



by the architectural evidence can be explained adequately at present only in terms of the trade in copper—a trade known to have been of great economic importance in the Late Bronze Age in Cyprus.

Faunal Remains from Tenta and Ayious

by PAUL CROFT

The systematic analysis of the animal bones from Kalavastos-Tenta and Kalavastos-Ayious was conducted intermittently during and after the 1979 excavation season. The analysis is still far from complete, and the metrical and aging data recovered thus far have not been processed. Some general comments on the material may nevertheless be made, and a brief discussion offered at this point.

Kalavastos-Tenta

Apart from a small number of the best preserved animal bones excavated in 1976 and previously analysed by A. J. Legge,⁵⁷ the whole of the faunal collection accumulated in the four seasons 1976–1979 remained to be examined. In the time available, the writer was able to study approximately one third of this material, and more than 1,000 items were identified (TABLE 2).

The quantitative relationship between the identified and unidentified fractions of the Tenta sample is particularly difficult to assess. The animal bone is generally

fragmentary and frequently affected by a calcareous encrustation on and inside the bones, rendering them extremely brittle and liable to fragmentation during the course of even the most careful excavation. The encrustation was found to be impossible to remove by physical means without damaging the bone. The indurated state of much of the material thus precludes an assessment of the identified:unidentified ratio in terms of weights of fragments, and a count of fragments for this purpose would clearly be misleading on account of the high frequency of fresh breaks, which produces a massive number of small undiagnostic splinters. It is estimated, however, that the identified fraction at Tenta was proportionately smaller than that at Ayious (see below) where preservation was somewhat better.

It is of interest to note that the 1,081 items identified by the writer have not significantly modified our knowledge of the most basic details of the Tenta fauna. Legge,⁵⁸ in his collection of 75 items, noted the presence of Persian fallow deer, caprines, and pig (and also possibly red deer), while the far larger sample at present under consideration yielded only a single mammalian bone that is not attributable to the same range of animals (a damaged distal scapula of fox or cat). A raw count of the identified fragments confirms the predominance of deer (ca. 50%) and the subsidiary but important role of pigs (ca. 30%) and caprines (ca. 20%) in the Tenta fauna, all of which details were suggested by the composition of Legge's

57. A. Legge, "Faunal Remains," in Todd (1978) 184–185.

58. Ibid.

Table 2. Summary of the faunal composition of Kalavassos-Tenta and Kalavassos-Ayious (approximate percentages based on raw counts of identified fragments).

Site	Approx. Date	Fallow deer %	Caprines %	Pig %	Canis sp. %	Fox %	Sample size
K-T	5500–5000 B.C.	50	20	30	—	—	n = 1081
K-Ay	3000–2500 B.C.?	70	13	11	5	2	n = 436

small sample. The fact that the increase in sample size by a factor of 14 has produced a less than concomitant degree of refinement of the answers to our most basic initial questions is a powerful corroboration of the point, perhaps not fully appreciated by faunal analysts, that minimum sample size is a function of the complexity of the questions posed.⁵⁹

The problem of the possible presence of red deer at Tenta⁶⁰ remains unresolved. Three other early prehistoric sites in Cyprus have yielded Cervid remains, which have excited comment because of their large size; at Dhali-Agridhi,⁶¹ and Kissonerga-Mylouthkia and Lemba-Lakous,⁶² as well as at Tenta, the possibility is recognized that this material could represent red deer. Although large size alone would be an inadequate criterion for the confident attribution of such material to red deer rather than fallow,⁶³ the morphological similarity of the bones of the two genera renders them difficult to differentiate on other grounds. Antler should be the least ambiguous indicator of the presence of red deer as the general morphology and characteristic beaded surface of red-deer antler differ from that of the fallow. The writer has examined some hundreds of antler fragments from a number of early prehistoric sites in Cyprus, and has as yet found no suggestion of the presence of red deer from this source. This experience is echoed by that of A. J. Legge.⁶⁴ If, in the light of the serious criticisms of Watson and Stanley

Price,⁶⁵ we disregard the claim by Schwartz⁶⁶ for dwarf red deer in Cyprus, all that may safely be said at present, pending the acquisition of less equivocal evidence, is that it is possible (although becoming less and less probable with the increasing weight of negative evidence) that red deer is present as a minor component in early prehistoric site faunas.

Of 198 postcranial caprine items it has been possible to attribute 88 specifically to sheep or goat, using the criteria of Boessneck.⁶⁷ According to these criteria many specimens were indeterminate in their characteristics and were therefore not attributable at the genus level. Although the criteria are demonstrably inappropriate for most items, if it is assumed that they are valid for the bones which are most characteristic of their genus, then it appears that sheep outnumber goats at Tenta by about three to one.

Kalavassos-Ayious

Analysis was completed of the material from the small-scale 1978 season, and the greater part of that from the more extensive 1979 excavations (TABLE 2).

The total weight of animal remains examined was ca. 28 kg. of which just over 7.5 kg. could be identified; deer, caprine, pig, *Canis* sp., and fox were represented. Of the identified fraction of the assemblage, ca. 1.8 kg. consisted of deer-antler fragments. The substantial unidentified fraction consisted largely of small undiagnostic bone fragments, many of which were burnt or encrusted, although in general the encrustation was less serious than that on the Tenta material.

The identified material comprised 436 individual bone

59. C. Gamble, "Optimising Information from Studies of Faunal Remains," in J. F. Cherry, C. Gamble, and S. Shennan, eds., *Sampling in Contemporary British Archaeology* (Oxford 1978) 321–353.

60. Legge, op. cit. (in note 57) 184.

61. P. L. Carter, "The Fauna from the 1976 Excavations at Dhali-Agridhi," in press in the second preliminary report of the Idalion excavations.

62. P. Croft, "Preliminary Comments on the Faunal Remains from Lemba Project Sites," in E. J. Peltenburg, "Lemba Archaeological Project, Cyprus, 1976–77: Preliminary Report," *Levant* 11 (1979) 37–40.

63. Ibid. 37.

64. Personal communication.

65. J. P. N. Watson and N. P. Stanley Price, "The Vertebrate Fauna from the 1972 Sounding at Khirokitia," *RepDeptAntCyprus* (1977) 232–260.

66. J. H. Schwartz, "The Palaeozoology of Cyprus: a Preliminary Report on some Recently Analysed Sites," *WA* 5:2 (1973) 215–220.

67. J. Boessneck, "Osteological Differences between Sheep (*Ovis aries* Linne) and Goat (*Capra hircus* Linne)," in D. Brothwell and E. Higgs, eds., *Science in Archaeology*, 2nd ed. (London 1969) 331–358.

fragments as well as several hundred pieces of antler. Approximately half of this material came from a single large complex of features (Pit 25 complex), while the other half came from a variety of pits and other contexts. In view of the close similarity of the sample from the Pit 25 complex to that comprising the far smaller amounts of bone from all other contexts on the site, it has been considered appropriate, for the purposes of this general discussion, to consider the site fauna as a whole, as was done for Tenta.

Discounting the antler fragments, raw counts indicate that about 70% of identified fragments derive from deer, while caprines (ca. 13%) and pig (ca. 11%) come a rather low second and third in importance. *Canis* sp. (ca. 5%) and fox (ca. 2%) constitute relatively minor components of the Ayios faunal spectrum. Exclusion of the cranial material, which is generally recognized as a source of bias in such calculations, changes the picture only slightly; pig and *Canis* sp. are reduced to about 9% and 4% and deer is increased to about 73%.

Of 45 postcranial caprine items only 19 could be assigned to genus level with any degree of confidence, and all of these appeared to derive from sheep; not a single item appeared to be characteristically goat-like. *Canis* sp. regularly occurs at a low frequency on early prehistoric sites in Cyprus, and the difficulties encountered in attempting to specify precisely which canid(s) is involved (dog, wolf or jackal) are summarized by Clutton-Brock.⁶⁸ Fox has previously been recognized in early prehistoric contexts at Lemba-Lakkous and Kissonerga-Mylouthkia in Cyprus.⁶⁹ The fox and the dog are potential suppliers of both meat and pelts, and they are known to occur at early Jericho and other western Asian sites in significant numbers.⁷⁰

Discussion

Despite the fact that the identified sample from Ayios is less than half the size of that of Tenta, for the reasons outlined above in the discussion of sample sizes, it is considered that both samples should possess a broadly comparable degree of reliability in providing answers to the simple questions that have been asked of the data. Thus a basis for at least a measure of intersite comparability is established.

The fact that the sites lie within half a kilometer of one another on terraces above the Vasilikos floodplain indicates that there must have been a considerable degree of

overlap between the areas of landscape regularly utilized by the inhabitants of each site. If, for example, we were to assume an exploitation territory around each site of radius 5 km.,⁷¹ then the two site territories would overlap to the extent of roughly 95%. This observation suggests that differences in the economic evidence from Tenta and Ayios should be viewed within the framework of a dynamic economic adaptation to changing conditions in what is essentially the same area of landscape.

The absence of *Canis* sp. and possibly also of fox, from Tenta, and their presence in a small but significant amount at Ayios, may be more a product of different conditions of preservation than a reflection of prehistoric reality. Conditions at Tenta militate fairly heavily against the preservation and successful extraction of the bones of the smaller mammalian species. Alternatively, it could be that these animals were genuinely absent from Aceramic Tenta and were introduced to the Vasilikos valley at a later date.

With regard to the pig, the situation may resemble that described by Jarman and Jarman for Neolithic Knossos.⁷² Pigs are well adapted to a wooded environment, such as may have existed in the locality at the time that the first Neolithic community settled at Tenta. When under human control and compelled to exploit such an environment at a high population density, the intensive foraging of the pig will result in the creation of a more open vegetation. Vegetational modification of this kind would have the effect of diminishing the resource base upon which the livelihood of the concentrated pig population depends, and at the same time favor an increase in the ruminant population. If this was the case for the lower Vasilikos valley during the 5th and 4th millennia B.C., it could account for the marked decrease in the proportion of pigs to ruminants (deer and caprines) at Ayios, where it is 1:8, as compared to 3:7 at Tenta.

Current thinking favors the deliberate introduction to Cyprus by man of the larger mammals,⁷³ and, while such a belief in no way negates the possibility of the early establishment of feral populations on the island, it does lend credence to the idea of a close relationship between the early villagers of Cyprus and their pigs.

The figures in Table 2 demonstrate that, whatever degree of responsibility for this trend may justly be apportioned to the activities of the pig, the animal component

68. J. Clutton-Brock, "The Mammalian Remains from the Jericho Tell," *ProcPS* 45 (1979) 135–157.

69. Croft, op. cit. (in note 62) 38–39.

70. Clutton-Brock, op. cit. (in note 68) 137–142.

71. C. Vita-Finzi and E. S. Higgs, "Prehistoric Economy in the Mount Carmel Area of Palestine: Site Catchment Analysis," *ProcPS* 36 (1970) 1–37.

72. M. R. Jarman and H. N. Jarman, "The Fauna and Economy of Early Neolithic Knossos," in P. Warren et. al., "Knossos Neolithic, Part II," *BSA* 63 (1968) 241–264.

73. Watson and Stanley Price, op. cit. (in note 65) 247.

of the local economy came increasingly to depend on the exploitation of deer. Caprines, and in particular sheep, appear to decrease in overall importance during the period under consideration, the caprine:deer ratio falling from 1:2 at Tenta to 1:5 at Ayious. Thus, over a period of possibly two millennia or more, the deer is elevated from a position of dominance at Tenta to one of overwhelming predominance at Ayious. The period of the Aceramic occupation at Tenta may witness an early stage in the evolution of a heavily deer-oriented economy, a later stage in the development of which may be seen at Ayious.

These speculative comments will doubtless be modified and amplified as the analysis proceeds. Detailed comparative work, ultimately encompassing faunal remains from other sites in the valley, is expected to increase both the scope and depth of the study, permitting a reasoned assessment of stability and change in the human economic adaptation to the local environment. This study, combined eventually with the results of those that the writer and others are currently making of faunal remains from other parts of the island, should contribute to the more general and hitherto virtually unpursued enquiry into patterning, both spatial and chronological, in the economic prehistory of Cyprus.

Vasilikos Valley Field Survey, 1979

by JERALD J. JOHNSON and LARISSA HORDYNSKY

Prior to 1979 archaeological survey in the Vasilikos drainage had resulted in the recording of 39 sites,⁷⁴ 23 of which are located in the lower valley south of the village of Kalavassos, within the area examined in 1979. Several of these sites were identified and tested by excavation prior to the beginning of the Vasilikos Valley Project in 1976. Of particular importance was the work at Kalavassos-Tenta, Mari-Paliambela, Kalavassos-Kokinoyia "Site A", and Kalavassos-Pamboules "Site B" by Dikaios in the 1930s and 1940s. With the inception of the project in 1976, most of the areas felt to be likely for the location of past settlements and cemeteries were surveyed on the basis of an intuitive method. The large number and variety of sites recorded suggested that this method of survey was suitable for the gathering of a substantial amount of data in a relatively short period of time. The areas covered included isolated hilltops, flat

ridges overlooking the lower Vasilikos valley, and some flat areas on the terraces above the Vasilikos River. When we reviewed the data after the 1978 field season it became evident that certain categories of information were missing, and for this reason a different survey strategy was adopted for the 1979 field season.

The previous methodology had largely omitted small seasonal side drainages of the Vasilikos River, slight to steep hill slopes, and much of the flat terraced lands along both sides of the present and past waterways. In order to obtain a sample of all types of terrain within the project boundaries a different survey methodology was indicated. Because of the impossibility of covering the entire 16 sq. km. of the lower Vasilikos drainage between the village of Kalavassos and the coast, it was decided to survey an initial 20% sample of the area. Twelve 100-meter-wide transects were established between the center of Kalavassos and the mouth of the Vasilikos River. The investigators decided to keep a uniform width of 400 m. between each transect to provide a systematic coverage of the area. The transects were established from east to west completely across the drainage (including branches of the main stream) and were generally perpendicular to the river, thus crosscutting the major environmental zones. The areas surveyed ranged from less than 1.5 km. to over 4.5 km. in length. Because of lack of time transects 1, 11, and 12 were not surveyed.

Each transect was established in the field with the use of a Lietz No. 8042-60 sighting tube with built-in level, a Silva Explorer III compass, and copies of the Cyprus Department of Lands and Surveys 1:5,000 maps (1978 series) and the accompanying cadastral plans. After plotting the transects on the maps the sighting tube was used to establish baselines, which were maintained with the use of the compass as well as visual orientation to major geographic features. The field team consisted of two to four individuals, spaced 10 to 50 m. apart, who covered the terrain by walking back and forth in a zigzag fashion. Occasionally, in areas of low profile and/or high vegetation, it was difficult to maintain the proper bearing; but for the most part sighting on natural features proved to be a very useful and relatively easy way to maintain control over the areas surveyed.

During the 1979 survey 24 new sites were discovered. We note also that 18 of the 23 previously recorded sites occurred within the nine investigated transects. The most important site that might have been missed by this method is Neolithic Tenta, but since this site lies on a prominent elevation it undoubtedly would have been recorded during a routine examination of outstanding geographical features. Of special interest is the location of several types of sites previously under-represented within the project area. Prior to 1979 very few Late Bronze Age or

74. Sites discovered before 1979 are listed, with brief commentary, in Todd (1977) 26-29, fig. 2; Todd (1978) 185-187; Todd (1979) 284-286. A summary list of those sites also has appeared in Todd et al., op. cit. (*RepDeptAntCyprus* [1979] in note 1) 31-35. Some of these previously discovered sites are omitted from Figure 19 because they were not visited in 1979, and their dimensions and other data have not yet been recorded.

Archaic settlements had been recognized on the lower Vasilikos drainage. Even though four sites were known to consist of Middle Bronze Age tombs and one had evidence for both settlement and cemetery, there was little to suggest a Late Bronze Age presence. The test excavation of Kalavasos-Ayios Dhimitrios brought to light a Late Cypriote town of substantial size which had been buried almost completely under fill in terraced fields. The evidence for this site on the surface consisted of occasional building rubble, a large number of diabase ground-stone tools, and pithos sherds. It is evident that surveyors need to become familiar with coarse-ware pottery types, other utilitarian objects, and architectural styles if they are correctly to identify the time periods associated with many sites from surface remains alone.

The location of five Archaic cemeteries and three possible settlement areas had been noted in the lower valley prior to 1979. In 1979 four additional tomb locations and four settlements were recorded. The majority of the cemeteries are on ridge tops or hillsides, while three of the settlements are on the edge of the main terrace overlooking the Vasilikos River, and the fourth is on a major western branch of the drainage. In addition, four small sites with Hellenistic and Roman material and one major Roman settlement were found, as well as four areas with considerable evidence of Mediaeval activity.

The distribution of sites now known on the lower Vasilikos drainage represents several different land-use patterns. The two Aceramic Neolithic settlements occur on isolated hilltops. Ceramic Neolithic sites are located on these two isolated hills, as well as on the ridges overlooking the river from near its mouth to a point 4 km. upstream. Chalcolithic sites are also located on ridge tops. Evidence for Neolithic and Chalcolithic occupation has not been found outside the main part of the valley. No securely datable Early Bronze Age sites have been found at all, and there is virtually no evidence of Middle and Late Bronze Age materials within 3.2 km. of the sea. From that point upriver, the settlement and cemetery areas appear to occur in a variety of environments. These sites are located on flat stream terraces, gentle slopes, and ridge tops, while the flood plain and first terrace above the main river appear to have been little used. The peoples of Archaic times apparently lived on the first terrace above the river and on some of the side streams, maintaining cemeteries on ridge tops and exposed bedrock areas of hill slopes in the vicinity of their settlements. The Classical period is so far represented by several isolated tombs. The Hellenistic and Roman population appears to have had two main towns, Kalavasos-Kopetra and Kalavasos-Sokopra, located in the lower valley ca. 1.5 km. apart, and possibly several small farmsteads and outposts scattered elsewhere on the drainage.

Evidence of Mediaeval occupation is present throughout the valley.

Since 1976 over 30% of the lower Vasilikos drainage has been intensively covered on foot in the search for archaeological sites. There appears to have been considerable variation in utilization of the area over the last 7500 years. Through the investigation of additional areas between the Mediterranean and the village of Kalavasos, as well as further upstream, we hope to bring into clearer focus our knowledge of land-use patterns from Neolithic times through the present.

Sites Discovered in 1979

The number in brackets following the site name indicates the site number on the map (FIG. 19). Each site description is preceded by the reference to the relevant cadastral plan.

KALAVASOS-AYIOS DHIMITRIOS I (10): LV.20.Plots 349, 400, 402. Late Bronze Age settlement and cemetery; see report above by South. First examined in 1976; recorded in detail and dated in 1979.

KALAVASOS-AYIOS YEORYIOS KEPHALA (18): LV.28.Plot 585. Archaic cemetery (two tombs visible on surface) on east side of Vasilikos River ca. 2.3 km. east of Mari village.

KALAVASOS-BAMBOULOS (49): LV.11.Plot 134. Small Middle Bronze Age settlement on steep hill slope 1.6 km. southwest of Kalavasos, overlooking western tributary of Vasilikos River.

KALAVASOS-KAFKALIA II (21): LV.20.Plot 315. The cultural affiliation is unclear, pending further examination. The site consists of a thin and discontinuous scatter of sherds of several time periods (Roman most heavily represented) on a hill slope ca. 400 m. west of Tenta. It is heavily eroded, with many of the sherds resting on bedrock.

KALAVASOS-KAFKALIA III (22): LV.20.Plot 315. Archaic cemetery (two tombs visible) on hill slope west of Kafkalia II.

KALAVASOS-KAFKALIA IV (23): LV.20.Plots 336/2/1, 406. Small Roman settlement, possibly farmstead, on gently sloping hillside overlooking a western tributary of the Vasilikos River, c. 500 m. southwest of Tenta. Building rubble is concentrated in a 31 m. × 35 m. area; besides ground stone the surface finds include sherds predominantly from large storage vessels.

KALAVASOS-KAFKALIA V (24): LV.20.Plot 316. Mediaeval, probably wayside chapel, located c. 300 m. west of Kafkalia IV, adjacent to a track in a small saddle between two western branches of the Vasilikos River. Limestone blocks and roof tiles are scattered over a 16 m. × 23 m. area; little associated utilitarian pottery. A possible Aceramic Neolithic chipping station is also located in this area.

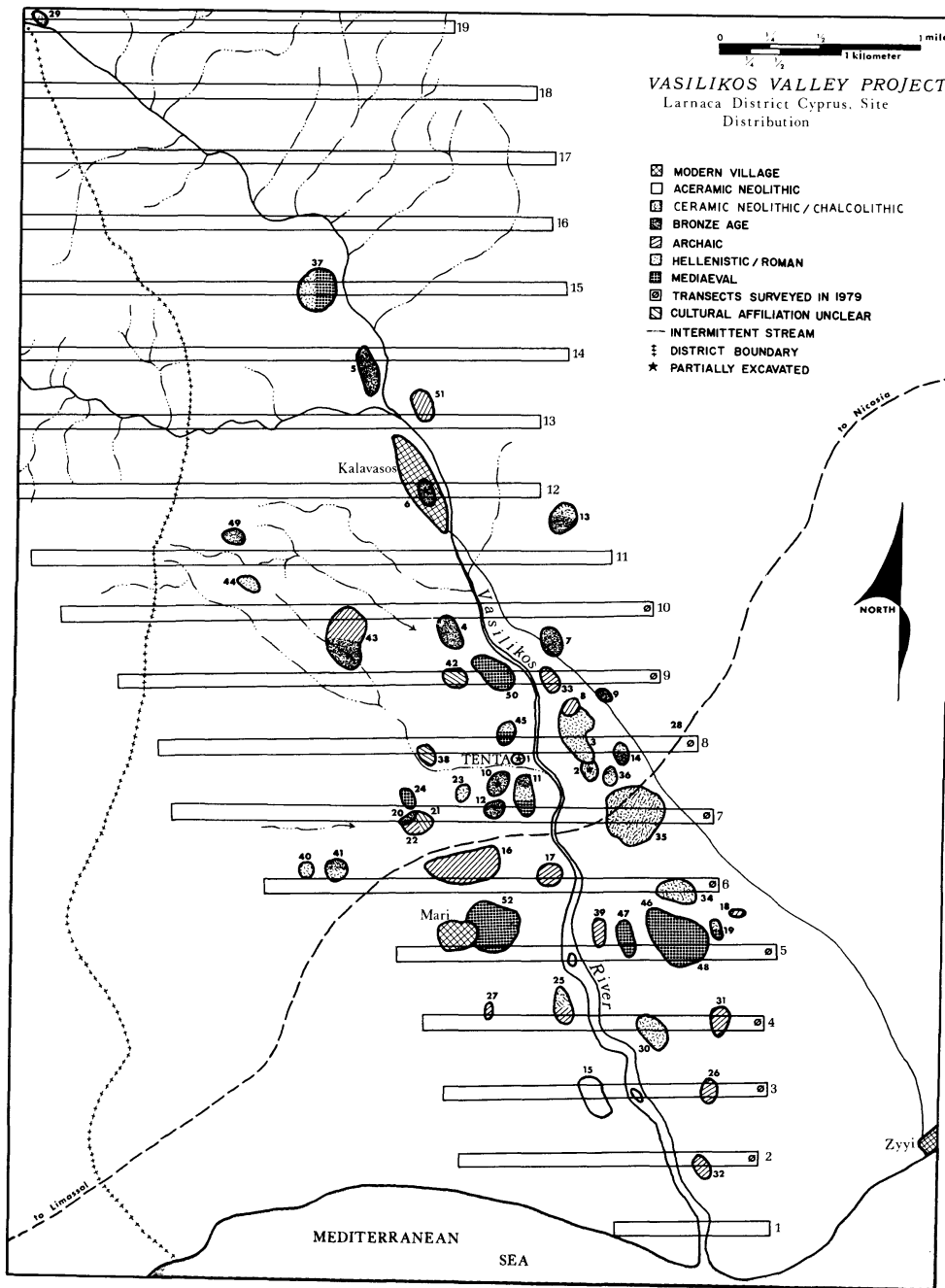


Figure 19. Sketch map of known sites (see note 74) in the Vasilikos valley showing the transect sampling design employed in 1979. Drawing by J. J. Johnson. The letter preceding the hyphen in the site names in the following list indicates the village land in which the site occurs: K = Kalavassos, M = Mari. Sites marked * were discovered in 1979. 1. K-Tenta. 2. K-Ayious. 3. K-Kopetra. 4. K-Mitsingites. 5. K-Arkangelos. 6. K-Village: Tombs near Panayia Church, Mosque, and Cinema. 7. K-Lourca. 8. K-Mangia III. 9. K-Mangia I-II. 10. *K-Ayios Dhimitrios I. 11. K-Ayios Dhimitrios II. 12. K-Ayios Dhimitrios III. 13. K-Mandres tou Lani. 14. K-Sirmata. 15. M-Mesovouni. 16. M-Moutsounin. 17. *M-Kalotsikous. 18. *K-Ayios Yeoryios Kephala. 19. *K-Kokkinoyia II. 20. K-Kafkalia I. 21. *K-Kafkalia II. 22. *K-Kafkalia III. 23. *K-Kafkalia IV. 24. *K-Kafkalia V. 25. M-Paliambela. 26. *K-Loures. 27. *M-Alonotopo. 28. K-Kafkalies. 29. Kalavassos Mines. 30. *K-Sokopra. 31. *K-Vouomandra. 32. *M-Kremnos tou Sani. 33. *K-Perivolia II. 34. K-Kokkinoyia ("Site A"). 35. K-Pamboules ("Site B"). 36. K-Ayious East. 37. K-Ayios Kaloyeros. 38. *K-Latomari. 39. K-Krommidhia. 40. *M-Skali I. 41. *M-Skali II. 42. *K-Yerakia. 43. K-Vounaritashi. 44. *K-Mersinia. 45. *K-Kaoukkos. 46. K-Kaphkalia A. 47. K-Kaphkalia B. 48. K-Kaphkalia C. 49. *K-Bamboulos. 50. *K-Perivolia I. 51. K-Ammos. 52. *M-Village.

- KALAVASOS-KAOUKKOS (45): LV.20.Plots 201, 203, 269/3/1. Hellenistic, Roman, and Mediaeval settlement (ca. 200 m. × 260 m.) located on western terrace and floodplain of Vasilikos River, ca. 300 m. north of Tenta.
- KALAVASOS-KOKKINOYIA II (19): LV.28.Plot 9/2. Small (less than 100 m. in diameter) pottery and ground-stone tool scatter in a recently ploughed field ca. 200 m. east of Kokkinoyia I (excavated by Dikaio as Kalavasos Site A). Hellenistic, Roman, and Mediaeval material represented.
- KALAVASOS-LATOMARI (38): LV.20.Plots 169, 302. Thin scatter of sherds including Middle Bronze Age (?), Hellenistic, and Roman on terrace overlooking side drainage of Vasilikos, 750 m. west of Tenta. Exact nature and dating of site to be determined.
- KALAVASOS-LOURES (26): LV.37.Plot 4. Thin scatter of Archaic and other pottery types; some non-diagnostic lithics. Located 2.3 km. southeast of Mari village on eroded slope overlooking eastern floodplain.
- KALAVASOS-MERSINIA (44): LV.11.Plots 149/1, 149/2. Roman settlement located on ridgetop overlooking two western branches of the Vasilikos River, ca. 1.75 km. sw of Kalavasos. Stone building rubble, brick, tile, and pottery are scattered over a 90 m. × 60 m. area. The rugged terrain and isolated nature of the site, on a prominent elevation with steep slopes on two sides, suggest that it may have been utilized for its strategic value as an outpost.
- KALAVASOS-PERIVOLIA I (50): LV.20.Plots 132–135. Mediaeval settlement on western terrace of the Vasilikos River ca. 1.75 km. south of Kalavasos. Thin but extensive scatter (300 m. × 250 m.) of pottery, little building material.
- KALAVASOS-PERIVOLIA II (33): LV.20.Plots 106–111. Geometric (?) and Archaic settlement on terraced hillside above steep slope across the Vasilikos River from Perivolia I. Part of site destroyed by construction of Kalavasos village road. Main concentration of artifacts (ceramic, lithic, ground stone) measures 70 m. × 80 m.; thinner pottery scatter over a 120 m. × 185 m. area.
- KALAVASOS-SOKOPRA (30): LV.28.Plots 549, 623. Hellenistic and Roman settlement, also some Archaic sherds; on terrace on west side of Vasilikos River, ca. 1.75 km. sw of Mari village. The site is located on slightly rolling terrain, and has concentrations of building rubble upon its more elevated areas. The very dense concentration of surface material includes pottery, tile, and brick, as well as shaped stone building blocks and two fragments of architectural sculpture. The building rubble is concentrated in a 180 m. × 130 m. area while the artifactual scatter extends over 250 m. × 230 m.
- KALAVASOS-VOUNARITASHI (43): LV.19.Plots 64–66. Middle-Late Bronze Age and Archaic settlement, some Roman pottery. The site can probably be subdivided into one Middle Bronze Age, one Late Bronze Age (?), and two Archaic settlement areas. It is located 1.3 km. sw of Kalavasos on a flat hilltop and the eroded slopes of a terraced western tributary of the Vasilikos River.
- KALAVASOS-VOUOMANDRA (31): LV.29.Plot 19. Archaic cemetery (at least 17 tombs) on a gentle slope overlooking the eastern Vasilikos valley, ca. 2.25 km. ESE of

- Mari village. Several tombs have been recently disturbed.
- KALAVASOS-YERAKIA (42): LV.20.Plots 138, 148, 149. Sherd scatter (150 m. × 60 m.) including ceramic Neolithic, Chalcolithic, Middle Bronze Age, Roman, Mediaeval, modern, and unidentified, on eroded slope west of the Vasilikos River, ca. 1.75 km. south of Kalavasos.
- MARI-ALONOTOPO (27): LV.28.Plot 432. Archaic cemetery (one tomb visible), Mediaeval sherd scatter; located on edge of flat ridge top on west side of Vasilikos River, on south edge of Mari village (ca. 500 m. south of center of village).
- MARI-KALOTSIKOUS (17): LV.28.Plots 26/2, 26/5. Small Archaic settlement (75 m. × 60 m.) located on edge of terrace overlooking Vasilikos floodplain, ca. 750 m. NE of Mari village. Disturbed by railroad cut.
- MARI-KREMNAS TOU SANI (32): LV.36.Plots 235, 236. Small Archaic settlement (55 m. × 70 m.) located on a gentle slope 40 m. east of the Vasilikos River and 800 m. north of the coast. Besides considerable quantities of sherds and small amounts of lithics and ground stone, building rubble noted on surface of site.
- MARI-SKALI I (40): LV.28.Plots 2–4. Thin lithic and pottery scatter; Roman and unidentified pottery, lithics of possible Ceramic Neolithic and Chalcolithic affiliation. Site measures 50 m. × 70 m. and is located at the junction of the Mari village road with the present Nicosia-Limassol road, 575 m. NW of Mari village. Eroded area, badly disturbed by bulldozing.
- MARI-SKALI II (41): LV.28.Plots 6–8. Thin scatter of Red Polished and Roman pottery immediately east of Skali I; also badly disturbed by bulldozing.
- MARI-VILLAGE (52): LV.28.Plots 245, 246. Extensive Mediaeval and modern pottery scatter on slopes immediately east of Mari village.

Geographical Studies, 1979

by MALCOLM WAGSTAFF

Most of this season's field work was devoted to the fluvial geomorphology of the Vasilikos valley and is the subject of a separate report by Gomez. These preliminary studies make abundantly clear the need to resolve several basic problems before any attempt is made to retrodict past environmental conditions in the area.

Slope mapping was extended beyond the Vasilikos valley, the unit of last season's work.⁷⁵ Field plotting was completed for Sheets 55/IV, 55/XII, 55/XX, and 55/XXI of the Cyprus 1:5000 Topographical Series, 1978, covering the Tenta "Site Catchment" established earlier,⁷⁶ and drawing up is well advanced. Sheet 55/XII, covering the immediate vicinity of Tenta, is included with this report as an illustration of what has been pro-

75. J. M. Wagstaff, "Geographical Contribution to the Vasilikos Valley Project, 1978," in Todd (1979) 290–294.

duced (FIG. 20). It shows the breaks of slope that define terrain facets and indicate the general form of the slopes (concave, convex). Angle and direction of slope are included because they determine whether or not a particular facet could be ploughed in its natural state, that is without the building of terraces. In general, slopes above 5 or 6 degrees (9 or 10%) cannot be ploughed. Various features of fluvial origin are shown. These help to differentiate the bottom land, the deeper and moister soils of which are the most sought after for cropping. Fluvial features such as old channels are, in addition, important indicators of where streams once flowed and help in the reconstruction of past networks and regimes.

The main object of the morphological mapping is to provide data with which to assess land capability. The current stage in the program, therefore, is the simplification of the cartographic data by picking out the culturally important features—the critical breaks of slope separating, for example, valley-bottom and hillside, ploughable from unploughable slopes. Once this has been completed, it should be possible to combine data already collected in the field on soils and land use to assess land capabilities.⁷⁷ Here data on the irrigation potential of the southern part of the area, collected and mapped by the Department of Agriculture,⁷⁸ will prove of considerable value. When the different areas have been demarcated potential uses can be indicated. The next stage is to calculate possible yields along the lines explored in a previous report.⁷⁹ At this point, the “Site Catchment” already established for Tenta will be used to identify zones of different use intensity. An extension of the work would be to plot the areas of major human interference with the landscape—terraces, quarries—that have modified the character of the environment, with its ecological niches, since Neolithic times.⁸⁰ Such an exercise could assist in reconstructing conditions in the very early periods of human settlement in the region.

Observations on the Fluvial Geomorphology of the Vasilikos Valley, 1979

by BASIL GOMEZ

The fluvial geomorphological studies have resulted in

two principal contributions: 1) reconstruction of the Pleistocene geomorphological history of the lower Vasilikos valley, involving detailed field mapping and correlation of both river terraces and raised beaches; and 2) reconstruction of the palaeohydrologic regime of the streams in the Tenta locality. The latter reconstruction involves lithostratigraphical investigation of the floodplain deposits and an analysis of the contemporary drainage network and hydrologic regime.

Following the suggestion of Wagstaff⁸¹ reconstruction of the recent fluvial history of the lower Vasilikos valley commenced during the 1979 field season. A preliminary survey of the natural fluvial terrace systems of the Vasilikos valley between Kalavassos village and the sea was undertaken, along with a similar survey of the coincidental raised beaches around the mouth of the Vasilikos River.

Attempted reconstruction of the hydrologic regime that prevailed during the occupation of Tenta centered upon an examination of the contemporary drainage network and hydrologic regime, and an investigation of the lithostratigraphy of the floodplain deposits. The study aims to provide a description of the evolution of the lower part of the Vasilikos valley in terms of its geomorphology and hydrology.

Geomorphological History and Palaeohydrology

River terraces are the remnants of former floodplains, isolated above the present floodplain after periods of downcutting. The original surface may remain as a continuous feature along the entire length of the valley, or be present as isolated units. The surfaces may be paired on either side of the valley, or occur only occasionally on one side or the other.⁸²

Two fluvial terraces have previously been identified along most of the large rivers in the Vasilikos valley area⁸³ and throughout Southern Cyprus, at 1–2 m. and 11–14 m. above the present floodplain, although Pantazis⁸⁴ notes their heights as 2–3 m. and 8–11 m. above the floodplain. The higher of the two terraces may be clearly picked out above the floodplain of the lower Vas-

76. J. M. Wagstaff, “Geographical Contribution to the Vasilikos Valley Project, 1977,” in Todd (1978) 187–189.

77. Ibid.

78. G. C. Givas, *Report of the Soils and Plant Nutrition Section of the Department of Agriculture for the Years 1973–1976 (Annexure VII)* (Nicosia 1976) 15–22.

79. Wagstaff, op. cit. (in note 75).

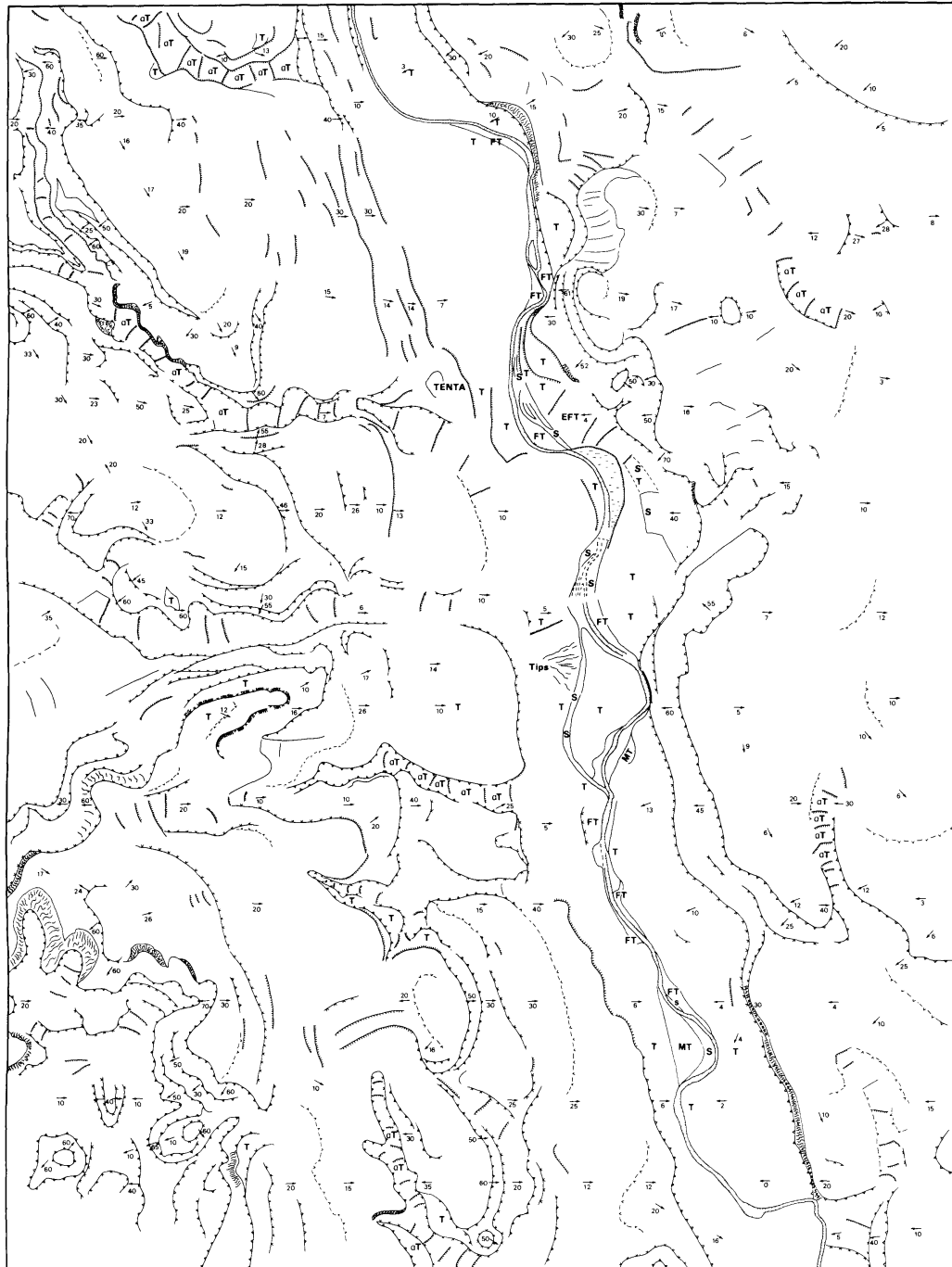
80. Ibid.; see also B. Gomez in this report.

81. Wagstaff, loc. cit. (in note 76).

82. L. B. Leopold, M. G. Wolman and J. P. Miller, *Fluvial Processes in Geomorphology* (San Francisco 1964) 465.

83. P. S. Bagnall, *The Geology and Mineral Resources of the Pano Lefkara-Larnaca Area* (Nicosia 1960) 61.

84. T. M. Pantazis, *The Geology and Mineral Resources of the Pharmakas-Kalavassos Area* (Nicosia 1967) 85–86.



SLOPES:

- Angle and direction of slope
- Convex break of slope with concave break/inflexion below: Face of artificial terrace
- Convex break of slope
- Convex inflexion

- Concave break of slope
- Concave inflexion
- Precipitous slopes, cliffs

FLATS:

- FT Floodplain, inundated by annual floods
- EFT Floodplain, inundated by extraordinary floods
- T River Terrace
- OT Artificial Terrace
- MT Meander Terrace
- M Mortlake

CHANNELS:

- Current channel
- Former/Alternative channel
- S Filled channel

Figure 20. Morphological map of the Kalavasos-Tenta area showing the location and nature of slopes, flats, and channels. Designed by J. M. Wagstaff, and drawn by the Cartographic Unit, University of Southampton.

ilikos valley (e.g., FIGS. 21.1–21.3, 21.5). The lower terrace is also in evidence throughout the lower reaches of the valley, and borders the contemporary floodplain of the Vasilikos. The elevation of both terrace levels varies considerably from place to place; this variation undoubtedly accounts for the height discrepancy between Bagnall's and Pantazis' reports. It should be noted that in this respect neither of the two reports refers specifically to the Vasilikos valley.

A series of four fluvial terraces was identified on the east side of the Vasilikos valley in the vicinity of Kalavasos, there being two higher terraces above those previously identified. Each terrace is marked by a deposit of poorly sorted igneous sands and gravels. Synchronous breaks of slope on the valley sides were also noted (e.g., FIGS. 21.4, 21.6). None, however, proved to be conclusively the result of fluvial activity, since no sediments of fluvial origin were in evidence at these points. Table 3 summarizes the characteristics of these four terrace sequences and of the contemporary channel deposits, for comparison.

Wagstaff⁸⁵ has previously described the form of the lower Vasilikos valley, and the superimposed profiles presented in Figure 21 serve to emphasize his description. In addition to the two terraces noted by Bagnall⁸⁶ and Pantazis⁸⁷ and confirmed by field observation during the present study, several other consistent breaks of slope may be noted below Kalavasos. Like those above the village, their existence as terraces is doubtful and has yet to be substantiated. The gorge-like form of the valley in the vicinity of Kalavasos⁸⁸ helps effectively to mask terrace deposits, as slopes are steep and tend to be mantled with scree, which smooths their profiles (FIGS. 21.4, 21.5). The two new terrace deposits exposed in the area have only been revealed by excavations into the hillsides. Terrace deposits exposed at the mouths of tributary valleys exhibit different characteristics from those of the main valley sequences, in that bedded deposits of chalk and limestone form substantial portions of these units (TABLE 3).

Three marine terraces have been identified in the area by Pantazis,⁸⁹ at ca. 70 m., 40 m., and 10 m. above sea level. The lower two terraces coincide with those identified by Bagnall.⁹⁰ The Cape Dolos peninsula (4089

2482) exhibits remnants of each terrace, as shown by the superimposed profile presented in Figure 22. The lower (10 m. Tyrrhenian II) marine terrace is in evidence and easily distinguished on either side of the mouth of the Vasilikos and has been previously well documented.⁹¹ Some confusion was encountered in locating and differentiating between the higher (70 m. Villafranchian) and the intermediate (40 m. Tyrrhenian I) terraces described by Pantazis,⁹² in the locality of Mari. The higher marine terrace was described as consisting of a variably cemented, poorly sorted igneous conglomerate, while the intermediate terrace is generally uncemented. Excavations by the Hellenic Mining Co. on the coast to the east of Kannourka have exposed a considerable thickness of marine clays, sands and gravels. The sands and gravels, in part, presumably constitute the intermediate marine terrace. The upper sections of the deposit are cemented and can be seen to grade gradually from uncemented to cemented conglomerate, through a thickness of several meters. Many hilltops in the vicinity of the Vasilikos valley also exhibit similar conglomeritic cappings. Previously, the only cemented conglomerates, other than those at Mari cliff,⁹³ were noted by Bagnall⁹⁴ as occurring on two hilltops to the south of Kalavasos and were termed "Fanglomerates."

A considerable amount of further investigation needs to be undertaken before a correlation and chronology, along the lines of that established by Ducloz⁹⁵ for the Central Kyrenia Range, can be contemplated. The present report only presents a cursory examination of the field data.

In its lower reaches, below Kalavasos village, the Vasilikos river flows over sedimentary rock formations, mantled by shallow calcareous soils and occasional Terra Rossas. Vegetation varies between scrub on the steep upper portions of the hill-slopes and scattered carob and olive groves, intercropped with cereals, on the lower, gentler sloping valley sides and floor.⁹⁶ This portion of the valley is typically U-shaped (FIGS. 21.1–21.3) and the floor has a 1% slope.

Precipitation distribution closely follows the topography and predominantly falls in the form of rain. The

85. Wagstaff, loc. cit. (in note 76).

86. Bagnall, loc. cit. (in note 83).

87. Pantazis, loc. cit. (in note 84).

88. Wagstaff, op. cit. (in note 76).

89. Pantazis, loc. cit. (in note 84).

90. Bagnall, loc. cit. (in note 83).

91. E.g. Bagnall, loc. cit. (in note 83); Pantazis, loc. cit. (in note 84).

92. Pantazis, loc. cit. (in note 84).

93. Ibid.

94. Bagnall, loc. cit. (in note 83).

95. C. Ducloz, "The Geology of the Bellapais-Kythrea Area of the Central Kyrenia Range," *Bulletin of the Geological Survey Department* 6 (1972) 1–75.

96. Wagstaff, loc. cit. (in note 76).

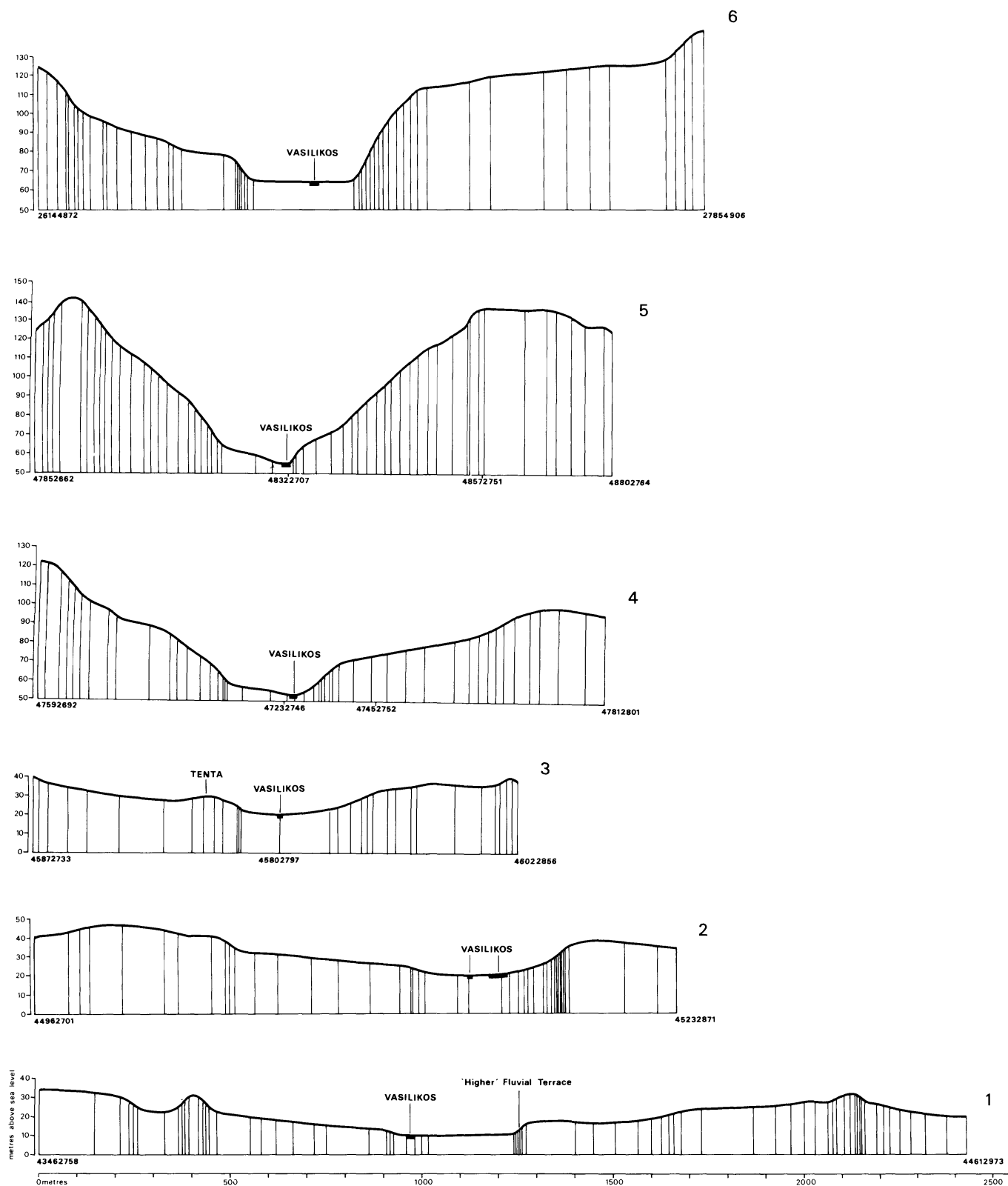


Figure 21. Superimposed profiles of the lower Vasilikos valley. 8-figure map references refer to the 1:5,000 Topographical Series (Department of Lands and Surveys, D.L.S. 17). Drawing by B. Gomez.

Table 3. Generalized stratigraphy of the terrace and channel deposits of the Vasilikos valley.

<i>Sequence</i>	<i>Main Valley Terrace</i>	<i>Main Valley Terrace</i>	<i>Tributary Valley Terrace</i>	<i>Lowest Alluvial Terrace</i>	<i>Channel</i>
Approximate Height of Base above Sea Level	80 m.	65 m.	65 m.	75 m.	30 m.
Thickness of Exposure	2.5 m.	2 m.	4.7 m.	2 m.	4 m.
Location	4835 2710	4810 2728	4665 2744	4866 2677	4496 2826
Upper Unit	Bedded sands and gravels	Poorly sorted fine-coarse sand	Loosely cemented chalky silt with poorly sorted, rounded chalk gravels	Sorted fine-medium sand with occasional discontinuous layers of poorly sorted sands and gravels	Bedded sands and gravels overlain by laminated silty clay
Main Unit	Poorly sorted, rounded igneous sands and gravels with angular limestone gravel	Poorly sorted, rounded igneous sands and gravels with angular limestone gravel	Medium-coarse rounded chalk gravel in chalky silt matrix with occasional angular chalk and rounded igneous gravels	Poorly sorted, rounded igneous sands and gravels with occasional igneous boulders and rounded and sub-rounded chalk gravel	Poorly sorted, rounded igneous sands and gravels with occasional igneous boulders and rounded and sub-rounded chalk gravel
Basal Unit	?	?	Poorly sorted, rounded igneous sands and gravels with occasional igneous boulders and rounded and sub-rounded chalk gravel	Poorly sorted, rounded igneous sands and gravels	?
Basal Surface	Fragmented and weathered chalk	Truncated chalk	Truncated chalk	Channel lag deposit	?
Additional Comments/ Interpretation	Few boulders present, no secondary cementation. Marginal channel bar/bed deposit	No secondary cementation, few boulders present. Marginal channel bar/bed deposit	Basal unit represents main channel deposit while upper and main units represent a deposit derived from the tributary valley	Floodplain and main channel deposits	—

coastal region receives 400 mm. of precipitation per year; some 200 mm. below the average for the whole catchment; while the higher upper reaches receive 800 mm. per year.⁹⁷ The majority of the precipitation falls during

the months from October to May, with occasional summer thunderstorms. The climate may, therefore, be described as semi-arid.

The Vasilikos, in common with all other Cypriote rivers, exhibits an ephemeral flow pattern. All runoff occurs during the winter and early spring, commencing in late October and continuing until late May. The occasional

97. Department of Water Development, Cyprus, *Vasilikos-Pendaskinos Project Feasibility Study, Vol. 3. Water Resources* (Nicosia 1977) 6, Fig. 21.

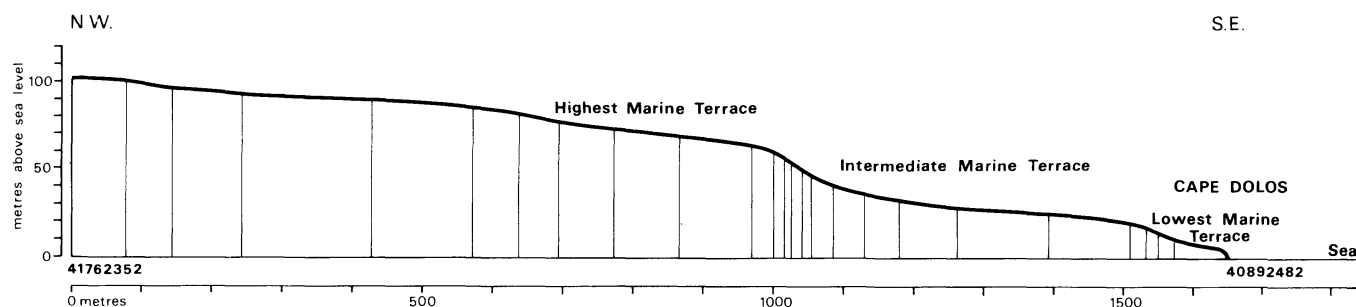


Figure 22. Superimposed profile of the Cape Dolos Peninsula. Drawing by B. Gomez.

summer storms do not generally contribute to streamflow. The river is typically flashy with sharp rising and recession limbs superimposed upon the baseflow hydrograph.⁹⁸ Peak flows reach 13 cu. m. per sec. at the Vasilikos coastal gauge (Water Year 1973/4), while mean daily flows range from 0.18 cu. m. per sec. to less than 0.002 cu. m. per sec. The total discharge for the year was 0.465×10^6 cu. m. per sec., which was 0.7% of the precipitation. Infiltration losses in the lower reaches of the Vasilikos, where considerable depths of alluvial deposits are found, severely deplete all flows. For instance, the same peak flow was 18 cu. m. per sec. as recorded at the Kalavassos gauge, 5 km. upstream of the coastal gauge, while mean daily flows ranged from 0.86 cu. m. per sec. to less than 0.11 cu. m. per sec.; the total discharge for the year amounted to 1.75×10^6 cu. m. per sec.

River flow depends solely upon precipitation, there being a negligible groundwater contribution to streamflow. Likewise, groundwater recharge, with the exception of the gravel aquifer, also depends upon precipitation rather than streamflow.

Three aquifers exist in the area. The gypsum and sandstone aquifers provide major sources of groundwater, although a significant contribution is also made by pumping the alluvial gravels. Overpumping has, however, severely depleted flows from all three aquifers in recent years. For example, until 1967 when deep boreholes were drilled in the confined gypsum aquifer, the system was saturated under pressure, and a spring just south of Maroni village acted as an overflow. At the present time the spring does not exist, as a result of the considerable reduction in the piezometric pressure promoted by overpumping.⁹⁹

The drainage network becomes discontinuous towards the mouths of the tributary streams (e.g., to the west of Tenta in the Kafkalla-Skhisti-Petra Terakia area). This discontinuity appears to be a result of agricultural terrace

construction. Terraces have previously been noted as being significant factors in shaping the landscape of the lower Vasilikos valley by Wagstaff.¹⁰⁰ Three categories of agricultural terrace exist in the Vasilikos valley: (1) terraces constructed to prevent or slow down soil loss and which are consequently to be found upon the steeper valley sides; (2) terraces constructed to trap sediment and create new cultivable land (such terraces are most commonly found across the lower sections of tributary valleys); (3) terraces that are constructed as part of an irrigation scheme, these being found on the lower slopes and floor of the main valley. This last form of terrace may also be associated with those of the second category and may in certain circumstances be regarded as a subtype of it.

It is the second category of terrace that is primarily associated with dissection of the drainage network. Retaining walls are constructed across the tributary valley. Sediment production is high in semi-arid areas¹⁰¹ and alluvium quickly builds up behind the wall, creating a bench of cultivable land. In this manner several sequences of terraces may be progressively constructed up the tributary valley. The build-up of sediment behind the terrace wall eventually blocks the tributary channel, either diverting and spreading the flow across the terrace surface where it is dispersed, or forcing it underground. The former would appear, from field observation, to be the most usual course. In the same way, terraces constructed primarily for irrigation purposes may also disrupt the flow pattern of minor tributaries. In either case the same result is achieved, in that water from the tributary stream is prevented from reaching the main channel, being effectively dispersed before reaching it, and the drainage network is therefore dissected. It is of interest to note

100. Wagstaff, loc. cit. (in note 75).

101. S. A. Schumm, "Geomorphologic Implications of Climatic Changes," in R. J. Chorley, ed., *Water, Earth and Man* (London 1969) 525–534.

98. Ibid. 13.

99. Ibid. 33, 42.

that, in spite of the dissection, gullying and extension seem prevalent in the headwaters of the network's tributaries. Goudie¹⁰² has also examined drainage networks in Cyprus and found that discontinuous networks may be caused by duricrust development. No dissection has so far been attributed to this particular cause in the study area.

Gravel quarrying in the lower reaches of the Vasilikos below the present Nicosia-Limassol road¹⁰³ has also dramatically altered the channel characteristics and several earth dams in the vicinity of Kalavassos combine to restrict the flow of the main river. Water is also abstracted from the tributary streams and diverted into an irrigation canal upstream of Kalavassos. The increased abstraction of groundwater from the river gravels increases the proportion of streamflow contributing to the recharge of the gravel aquifer through infiltration. The dissection of the drainage network by terracing, channel modification by quarrying and dam construction, and diversion of water for irrigation purposes, also promote reduced flows in the lower reaches of the main channel. Infiltration losses appear to have shortened the period of streamflow in the coastal zone by some 30 days per year.¹⁰⁴

Difficulty in obtaining permission for large-scale excavations across the cultivated Vasilikos floodplain prevented a similar approach to that of Cherkauer¹⁰⁵ being adopted, as originally intended, for the examination of the floodplain deposits.¹⁰⁶ Permission was obtained, however, to excavate a small trial pit at the base of the cliff below the Tenta site (cadastral plan, sheet LV.20, plot number 353/6/3). The pit revealed a series of fluvial silts, sands, and gravels beneath a soil profile, as well as a carbonized horizon 0.9 m. above the top of the gravels. It is hoped that a ¹⁴C date obtained from the material within this horizon will provide a date for the formation of this portion of the floodplain, as well as the basis for an attempted correlation with other similar deposits exposed on the coast to the west of Zyyi. The detailed stratigraphy of the pit is given in Table 4.

Several of the fluvial terrace sequences and contemporary floodplain deposits exhibit sand and laminated gravel horizons. Little silt is in evidence in the older terrace deposits, although it constitutes the bulk of the

Table 4. Stratigraphy of the floodplain deposits exposed in the trial pit excavated at the base of Tenta cliff.

<i>Depth from surface (m.)</i>	<i>Description of Unit</i>
0.0–0.6	Made ground and light brown, clayey calcareous soil
0.6–1.5	Light brown, clayey calcareous soil with scattered, poorly sorted, decomposing chalk/limestone gravel throughout
1.5–1.7	Sorted khaki silt and scattered, coarse, rounded igneous gravel
1.7–1.85	Sorted khaki silt with large quantities of charcoal and fragmented molluscan remains
1.85–1.9	Calcareous, khaki silty clay with scattered, decomposing chalk/limestone gravels and fragmented molluscan remains
1.9–2.0	Sorted, khaki silty fine sand
2.0–2.1	Sorted, khaki fine sandy silt
2.1–2.15	Sorted, khaki calcareous silty clay and scattered, decomposing chalk/limestone gravels
2.15–2.6	Sorted, khaki silty clay with scattered charcoal fragments at 2.25 m., occasional fine silty sand lenses and isolated pieces of decomposing chalk/limestone gravel
2.6–2.75	Sorted, khaki silty clay with lenses of sorted fine-coarse, rounded igneous gravel and isolated pieces of coarse, angular chalk/limestone gravel at base
2.75–2.8	Poorly sorted, rounded igneous sands and gravels with occasional igneous boulders and rounded and sub-rounded chalk/limestone gravels

material forming the lowest terrace, which marks the present Vasilikos floodplain. The contemporary channel deposits of the Vasilikos are composed of poorly sorted sands and gravels (TABLE 3).

The prevalence of fine sediments in the form of silt and sand horizons and the relatively fine appearance of the gravels tend to support the view that these upper horizons were not deposited within the main channel. In places the depth of alluvial material exceeds 15 m. in the Vasilikos valley¹⁰⁷ and it seems reasonable to assume that

102. A. S. Goudie, *Duricrusts in Tropical and Subtropical Landscapes* (Oxford 1973) 53.

103. Wagstaff, op. cit. (in note 75).

104. Department of Water Development, op. cit. (in note 97) 13.

105. D. S. Cherkauer, "The Stratigraphy and Chronology of the River Treia Alluvial Deposits," in T. W. Potter, ed., *A Faliscan Town in South Etruria: Excavations at Narce* (London 1976) 106–120.

106. Wagstaff, loc. cit. (in note 76).

107. Department of Water Development, op. cit. (in note 97) 52.

the Tenta cliff was cut, like its counterpart across the valley, by the Vasilikos.

Summary

The study has revealed the existence of two river terraces in the vicinity of Kalavasos, above the level of those previously documented. Further investigation is required before correlation on anything other than a local scale can be undertaken, and the fluvial terrace sequence related to that of the marine terraces.

Anthropogenic factors and their effects upon the hydrologic regime of the Vasilikos may be divided into two categories: ancient and contemporary. Ancient factors, which have apparently influenced the drainage network and hydrology of the region for hundreds of years, are principally those associated with agricultural terrace construction. Contemporary factors are associated with the construction of major irrigation canal networks, gravel quarrying, and groundwater abstraction. Before patterns of change can be inferred, the magnitude of the effect of these three factors on the hydrologic regime must be clearly established.

The excavation of a trial pit in the floodplain floor has shown that lithostratigraphical investigations will provide a useful avenue of approach, although, in common with all of the other fluvial deposits examined in the Vasilikos valley, the sediments contain few identifiable structures and are largely composed of poorly sorted sands and gravels. Several additional pits need to be excavated across the floodplain and it is hoped that a ^{14}C date obtained from the exposed carbonized horizon will provide the basis for a correlation with similar deposits now exposed on the coast.

Conservation and Preliminary Scientific Examination of the Kalavasos-Tenta Human Burials

by EUPHEMIA PHOTOS

During the 1978 season, Schulte-Campbell undertook a preliminary examination of the human skeletal remains of Burials 1–5 excavated at Kalavasos-Tenta.¹⁰⁸ The bones were still interred in the calcrete blocks in which the burials had been removed from the ground, and attempts were made to free them from the surrounding deposits. Various physical and chemical methods were tested, but, because of the amount of time required and the specialized nature of the work, it was decided that this task should be undertaken as a special study in 1979.

During the 1979 summer season, the writer undertook

the task of removing the bones of four skeletons from their blocks employing chemical and mechanical means in order to prepare them for a detailed physical anthropological examination. The difficulty involved in the removal of the material surrounding the bones, however, suggested that analysis of the material itself would be of considerable value in determining the best conservation procedures. Various physicochemical and petrographic techniques were therefore enlisted to this end. Since there was a distinct difference in color and texture between the hard pit soil enveloping the bones and the soft underlying *havara* in which the burial pits were cut, each was analyzed separately. An attempt was made to establish whether the cement-like nature of the pit soil was possibly a result of human activities pertaining to burial customs, or was the outcome of natural processes. In this report an account will first be given of the cleaning procedure undertaken while the author worked on the site, followed by a discussion of the results based on data from atomic absorption and X-ray diffraction, as well as from the examination of thin sections.

Burials 2, 3, 5, and 7 had been removed from the site en bloc and were chosen for treatment in this study. The blocks consisted not only of the gray cement-like soil formation that filled the burial pit, but they also included a layer of the underlying *havara*. This *havara*, which is a compact surface limestone of pink or cream color, was easily removed with minimal scraping when immersed in hot distilled water.¹⁰⁹ The immersion time varied according to the thickness of the layer. The cement-like formation around the bones varied in color from light to dark gray, and was hard to remove by conventional methods. Thus a 10% warm solution of hydrochloric acid applied locally proved ineffective, since it only dissolved the calcitic inclusions in that layer. Various other chemicals were used in an attempt to overcome this problem. Since ammonium salts are known to be good reagents for dissolving gypsum, which was assumed to be present because of its abundance in the nearby area, ammonium sulphate was used as an alternative solution. This process, however, involves the inundation of the encrustation and the bone in the appropriate solution, a process that weakens or destroys the bone completely. Bone encrustation is defined as the segment of the cementing material in direct contact with the bone.

Subsequent to chemical treatment, emphasis was laid on the mechanical cleaning of the bones and removal of the pit soil. Dentist's tools and a high-speed drill with

108. C. Schulte-Campbell, "Preliminary Report on the Human Skeletal Remains from Kalavasos-Tenta," in Todd (1979) 298–299. See also Todd (1978) 177–178, and Todd (1979) 277 for publication of Burials 1–5. Notes on Burials 6–10 are provided earlier in this report.

109. For a description and discussion of the formation of *havara* and *kafkalla* see T. M. Pantazis, "The Study of Secondary Limestones (Havara and Kafkalla) of Cyprus," *Geographical Chronicles* (Nicosia) 2:4 (1973) 12–39.

Table 5. Analyses of *havara* and pit soil samples from burials at Kalavasos-Tenta.

Sample no.	SiO ₂ %	Al ₂ O ₃ + Fe ₂ O ₃	CaO %	MgO %	SO ₃ %	P ₂ O ₅ %	Loss on Ignition	NA ppm	K ppm	Cl ppm
B3P	11.14	2.95	34.28	1.91	25.40	.38	13.92	100	11	143
B3H	4.72	2.95	34.05	1.01	34.60	.16	17.61	80	80	179
B7P	1.38	.60	34.65	1.73	39.20	.29	19.24	110	44	107
B2P	2.78	1.10	33.90	1.38	41.40	.68	17.14	110	120	465

a variety of bits were used interchangeably. Such methods, however, were tedious and time consuming, and frequently unsuccessful.

Following cleaning, the bones were consolidated by brushing with two thin layers of polyvinyl acetate (PVA) in toluene (5% solution), and stored in boxes containing an adequate supply of silica gel. Only the skull and pelvis of Burial 2 were cleaned and treated since the long bones were in a poor state of preservation. The skeletons of Burials 3, 5, and 7 were cleaned and preserved *in toto*.

Elemental analysis by atomic absorption was performed on four samples from three different burials.¹¹⁰ The resulting data are given in Table 5. The sample number indicates both the burial number and the nature of the deposit from which the sample was taken. Thus B3H denotes a sample taken for the *havara* layer underlying Burial 3, and B3P indicates a sample taken from the pit soil around the bones of the same burial. Only the elements presented here were tested for; they are listed in their oxide form according to standard convention, with calcium and sulphur being the predominant elements. In most ores calcium occurs as the constituent of two minerals, calcite (CaCO₃) and calcium sulphate (CaSO₄) and/or gypsum (CaSO₄·2H₂O). CaO concentrations remain stable while the range of those of SO₃ is broader. The average percentage, however, is approximately the same for both oxides. The range of concentration of silica and clays is also quite broad. Given the small number of samples examined, the main conclusion deduced from Table 5 is the substantial presence of sulphatic deposits. The amount of phosphates is exceedingly low (below 1%), while the concentration of sodium, chlorine, and potassium are all in the ppm level. High chlorine values in sample B2P were the result of contamination by hydrochloric acid.

Table 6 shows the results of elemental analysis performed on two samples of *havara* and six of pit soil from Burials 2, 3, 6, 7, 8, and 9. In addition to these, three samples from Kalavasos-Ayious were also included for purposes of comparison. In all six pit-soil samples the calculated amount of gypsum exceeds that of calcite by a ratio of ca. 3:1. The two *havara* samples were not considered in the calculation of that ratio since they differ substantially in their numerical values. In addition, no pronounced difference seems to exist in the calculated composition of the above minerals among samples taken from outside structures and those from underneath house floors. From Table 6 it is hard to conclude whether or not any real variations exist in the elemental composition of the *havara* and pit-soil samples. The answer to this question has to be deferred until X-ray diffraction data are examined. Gypsum-rich deposits are inherent to the site of Tenta, as shown by comparison with the samples from Ayious.

X-ray diffraction (XRD) spectra of only four samples were obtained. These include *havara* from Burial 3, pit soil as well as bone encrustation from Burial 7, and finally

Table 6. Percentages of gypsum and calcite in samples from the Kalavasos-Tenta burials, including three samples from Kalavasos-Ayious for comparison.

Sample No.	CaSO ₄ ·2H ₂ O %	CaCO ₃ %
B2P	70.4	3.5
B3H	58.8	10.9
B3P	43.8	22.7
B6P	49.0	20.0
B7P	66.6	6.3
B8H	91.0	2.0
B8P	58.0	20.0
B9P	59.0	16.0
A1S	1.0	36.0
A2S	.3	39.0
A3S	.4	59.0

110. The writer is greatly indebted to Mr. Sophocleous of the Ministry of Agriculture and Natural Resources of the Republic of Cyprus for the elemental analyses, and to Dr. C. Xenophontos of the Geological Survey of the same Ministry for the preparation of thin sections. Facilities for XRD were kindly provided by Dr. S. Filippakis of the Demokritos Nuclear Research Center, Aghia Paraskevi, Greece.

a section from a long-bone fragment from Burial 7. The spectra from the first three samples gave identical patterns varying only in the relative peak intensities. This result was quite unexpected, given the assumed difference in texture between the two different types of deposit. All scans showed a preponderance of gypsum, with calcite being second. No quantitative measurements were obtained. Very small amounts of sodium chloride (NaCl) and sericite ($\text{KAl}_2(\text{OH})_2\text{AlSi}_3\text{O}_{10}$) were also found in the *havara*, hence the higher concentrations of silica and alumina in B3H than in B7P. Study of the XRD spectrum of the Burial 7 long bone revealed hydroxyapatite ($\text{Ca}_5(\text{PO}_4)_3(\text{OH})$), the characteristic mineral found in bone together with gypsum. No calcite was present.

XRD data were complemented by the study of thin sections obtained from cross sections of bone-pit soil from Burials 2, 3, and 7. There was extensive primary deposition of gypsum within and around the bones. Hydrated calcium sulphate crystals are lens-shaped, while those of the anhydrous form (secondary deposition) are granular. It should be mentioned here that naturally occurring gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) when heated to 128°C readily loses one and a half water molecules and becomes plaster of Paris ($\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$), which is used extensively in the plastic arts. At 165°C the remaining water is lost and gypsum converts to the anhydrous form (CaSO_4). Calcium sulphate loses its ability to absorb water if heated between 400° and 600°C , but regains it gradually only after being heated to a glow at 1000°C . The absence of any calcium sulphate in both the XRD and thin sections indicates that no heating of the naturally occurring gypsum was taking place, at least for the samples examined. Burning, however, as evidenced by powdered charcoal found around bones buried outside structures, may have caused local formation of calcium sulphate.

An interesting point revealed by thin sections was the deep impregnation of the hydroxyapatitic bone by gypsum crystals, which were deposited there after crystallization. The reason for the deep penetration of the gypsum into the osteological fabric may lie in the dissolving power of the ground water which, upon evaporation, left behind precipitated gypsum. The added action of ammonia, however, produced during flesh decomposition and dissolved in ground water, can cause a more effective dissolution of the gypsum via the formation of ammonium salts. Upon evaporation of the ground water, the gypsum is redeposited onto and within the bone at places previously occupied by organic matter. This reprecipitated gypsum is much harder than the primary formation, hence its tenacious hold on the bone.

From the above observations it can be concluded that the hardness of the pit soil around the Kalavasos-Tenta

skeletons was the outcome of a natural process rather than the result of human activity. It is true, however, that had the bones been brushed with a layer of naturally occurring gypsum no difference would be detected in the XRD and petrographic data. More precisely, these techniques cannot differentiate between primary and secondary burials (presence/absence of flesh at the time of interment). Proof of secondary burial has primarily relied on disarticulated remains. Thus it is only the presence of organic matter that could irrevocably distinguish between the two types of burial. Contrary to general belief, organic matter in the form of amino acids, fats, and steroids remains in the soil long after the flesh is gone, and can be detected by analytical tools such as gas and thin-layer chromatographies. Before such an analysis is undertaken, however, it is advisable that the samples first be examined for their carbon dioxide content and the presence of nitrogen in collagen and its breakdown products.¹¹¹

The writer plans to verify the preliminary observations made in this study, and to continue the research with further scientific analyses.

111. R. C. A. Rottlander, personal communication.

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