

## **A Major New Study in the Works on Chalcolithic Shiqmim - 2005**

*Desert Chieftdom: Dimensions of Subterranean Settlement and Society in Israel's Negev Desert (ca. 4500-3600 BC) Based on New Data from Shiqmim*

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### Abstract

Excavations carried out at Shiqmim under the auspices of the University of California, San Diego and the Nelson Glueck School of Biblical Archaeology at the Hebrew Union College-Jewish Institute of Religion were conducted during the period 1987-1989 and 1993 with Thomas E. Levy (TEL) serving as the Principal Investigator. This field work was co-directed by TEL and David Alon. The results of that work produced a wealth of new data concerning the evolution of Chalcolithic settlement in Israel's northern Negev desert which began with enigmatic subterranean settlement made up of underground room and tunnel complexes and evolved into an extensive open-air village community. Using anthropological models, these data are examined in a new monograph publication (in preparation) to explain the emergence, consolidation and ultimate collapse of one of the earliest chieftdom level societies in the southern Levant. Funding for this research came from grants awarded to TEL by the National Endowment for the Humanities, the National Geographic Society, the C. Paul Johnson Family Charitable Foundation, the University of California Education Abroad Program and other sources.

### Introduction

Sometime around 4,500 BCE, the earliest farming societies penetrated into the foothill region of Israel's northern Negev desert and established the first permanent village settlements in this part of the ancient Near East. These pioneer settlers introduced a wide range of innovations to the Negev, including floodwater farming and craft specialization in pottery, ivory and bone and metalworking. In addition, a new type of social organization evolved based on a social hierarchy - what anthropologists refer to as chieftdoms or rank societies. The proposed book will explore the evolution of a Chalcolithic chieftdom in the Negev by focusing on the role of craft specialization, especially early copper production, in the emergence, maintenance and collapse of this new social institution.

Perhaps the most enigmatic innovation these people introduced to the Negev, and especially the Beersheva river valley, was in the realm of architecture. These late prehistoric Near Easterners initiated a new architectural tradition based on subterranean room and tunnel complexes dug deep into the

northern Negev hard-packed loessial desert soils. The underground systems consist of numerous rooms, large enough to stand in, interconnected by narrow tunnels that the inhabitants had to crawl through. Some of the subterranean complexes consist of ten or more rooms and resemble human "prairie dog towns." Usually there are one or two entrances which lead from the surface down into room groups, and air holes are occasionally found leading up to the surface. The function and developmental history of these subterranean complexes is hotly debated by researchers and is only now becoming clear. To clarify the extent and meaning of these subterranean prehistoric architectural units, the author initiated the Phase II inter-disciplinary investigations at Shiqmim and applied new geophysical survey methods at the site with Dr. Alan Witten of the University of Oklahoma. As, the largest known Chalcolithic settlement in the Beersheva valley and a pristine site undamaged by development, excavations at Shiqmim provided a unique opportunity to examine the social evolution of a Chalcolithic culture in the southern Levant.

### Early Research

Archaeologists have been carrying out field work in the northern Negev in search of late prehistoric sites since the late 1920's when Sir Flinders Petrie began excavating at Tel el-Far'ah south along the Wadi Gaza (Hebrew = Nahal Besor). The first late prehistoric sites (6th - 4th millennium) were discovered by one of Petrie's assistants, Eann Macdonald who was responsible for making a site survey along the drainage in the vicinity of the site on the Negev coastal plain. In the early 1950s, David Alon made the first surveys in the northern Negev foothill zone.

During initial surveys along the Wadi Beersheva (the main drainage system for the northern Negev), Alon discovered the first Chalcolithic (ca. 4500 - 3600 BCE) sites in the inland foothill zone of the Negev. In 1952, Alon suggested to the French prehistorian, Jean Perrot, that excavations at some of the newly discovered sites around the Negev town of Beersheva might prove fruitful. Perrot began his fieldwork at the site of Tell Abu Matar and was the first scholar to discover the enigmatic subterranean settlement complexes of the Negev. Later, he expanded his work to include a neighboring site of Bir es-Safadi. Around the same time, Moshe Dothan carried out excavations at Horvat Beter, a major Chalcolithic settlement several kilometers upstream from Abu Matar and Bir es-Safadi. During the late 1970s and early 80s, Thomas Levy and David Alon carried out the first systematic survey of the Beersheva valley, discovering a two-tier settlement hierarchy and a previously unrecorded Chalcolithic settlement center which they named Shiqmim. The two-tier settlement hierarchy, with site centers surrounded by smaller satellite villages, is typical of chiefdom organizations and Levy was the first scholar to identify and model this type of social evolutionary stage in Palestine. Earlier researchers did not appreciate the social evolutionary significance of the Chalcolithic. While the spectacular hoard of Chalcolithic metal work from Nahal Mishmar had been discovered in the early '60s (Bar Adon 1980), it was assumed that it was not

produced locally. Diffusion models were used to trace the hoard's origin to Anatolia and Azerbaijan, over 1200 km from southern Palestine.

Until the mid-1970s, Perrot's pioneer excavations had provided the foundation for understanding the nature of 4th millennium societies in the southern Levant. In the 1980s and early 1990s, salvage excavations were carried out at Abu Matar, Horvat Beter and Bir es-Safadi under the auspices of the Israel Antiquities Authority. The unusual architecture found at the Beersheva sites was taken as evidence of an egalitarian 'troglodyte' community living peacefully along the banks of the Beersheva valley with little evidence of social differentiation. In summarizing the excavations at the Beersheva sites, Perrot outlines the developmental sequence as consisting of three main stages: 1) the earliest phase consists of linked subterranean room and tunnel complexes; 2) the middle phase reflects the widespread use of semi-subterranean architecture, and 3) the late phase is characterized by an aboveground village made up of rectilinear buildings made of mudbricks. Perrot explained the presence of subterranean architecture in the Beersheva valley as an innovative answer to the problem of living in a hot arid environment. In a critical review based on a reexamination of plans and sections from the Beersheva sites, Isaac Gilead refuted Perrot's developmental model and suggested that the Chalcolithic occupation in the Beersheva valley was of a very short, single period duration. Gilead (ibid.) suggests that the subterranean room and tunnel complexes discovered by Perrot were in fact all contemporary with the aboveground open-air villages and were used primarily for storage. Thus, during the 1980s, two conflicting models existed concerning the development of the Beersheva Chalcolithic culture and the function of the enigmatic subterranean room and tunnel complexes. The two scholars agreed only on the perceived egalitarian nature of the Chalcolithic cultures of the southern Levant.

#### Shiqmim: New Excavations in the Beersheva Valley and New Models

The discovery of Shiqmim in the late 1970s, a pristine Chalcolithic settlement center untouched by contemporary farmers or the blade of developers, has provided a unique opportunity to investigate many of the developmental and social issues outlined above. The site is located some 16 kilometers downstream and west of the Beersheva sites. In 1979 long-term interdisciplinary archaeological excavations were initiated at Shiqmim that were completed in 1993. Shiqmim provides scholars with a perfect open-air laboratory for studying all the problems concerning social and economic change in the Beersheva culture. The Phase I excavations at the site (1979, 1982-84) demonstrated the changing environmental parameters which faced these early farmers, as well as the intricacies of the earliest floodwater farming in this region. These excavations also showed the complexities and nature of 4th millennium domestic households in this region, the technical dynamics of the earliest Levantine metal industries and some of the social, economic and ritual functions of an early chiefdom center.

The Phase I excavations at the site revealed one of the earliest planned village sites in western Palestine and important new information concerning the

physical layout of a Chalcolithic chiefdom center. Remarkably, after four years of extensive excavations at Shiqmim, not one subterranean feature came to light. While the Phase I excavations demonstrated the presence of an extensive network of large (ca. 5 x 12 m) and small (3 x 6 m) buildings interconnected by alleys and courtyards, no evidence for centralized food storage was found. As many anthropologists have shown, the ability to control and provision food storage is a hallmark of early complex societies. The marked absence of such facilities highlighted the need for additional exploration of the site. Given the widespread occurrence of subterranean architecture found upstream around the city of Beersheva, in 1987 the Phase II (1987 - 1989, 1993) investigations were planned for Shiqmim with the aim of examining the entire issue of subterranean architecture in the Beersheva valley. These excavations represent the first time this issue was systematically investigated on a large scale since Perrot's hallmark excavations in the 1950s.

### Testing Developmental Models of a Prehistoric Culture

Beginning in 1987, deep soundings were initiated at Shiqmim with the support of the National Endowment for the Humanities, the National Geographic Society, and the C. Paul Johnson Family Charitable Foundation (Chicago). One of the principle aims of the new work at Shiqmim was to obtain clear stratigraphic evidence and material suitable for radiocarbon dating to test the Beersheva culture developmental models initiated by Perrot's original field work. Our strategy began with the excavation of two long trenches, each over 60 meters long and 2.5 meters wide, across the western sector of the site where our earlier excavations and probes produced extensive evidence of Chalcolithic building activities. These trenches were cut down to virgin soil and reached depths of over 6 meters demonstrating that Shiqmim had the deepest stratigraphic sequence of any of the Beersheva sites. When the sections of the eastern most trench were scraped and cleaned, for the first time the outlines of what appeared to be a subterranean storage facility with a tunnel leading from the surface came to light.

The appearance of what seemed to be large-scale subterranean architecture in the walls of the deep trenches led us to make careful deep soundings around the northern aspect of the trenches. During the 1988 season for the first time we found conclusive evidence in support of the general outlines of Perrot's developmental model positing a pioneer phase of subterranean occupation, followed by a later open-air village. By 1989, an even larger exposure was opened up extending over an area of 150 m<sup>2</sup>. Excavations from the surface down to a depth of ca. 60 centimeters revealed a series of ash pits with widespread evidence of metal work (primarily slags). These pits averaged less than 1 meter in diameter and 50 centimeters in depth. However, one of these 'pits' had no bottom but rather extended deep through the hard packed loessial sediments of the site until it bottomed out some 4 meters below the surface. We had found our first tunnel leading into an extensive subterranean room complex.

### Subterranean Shiqmim

The deep soundings at Shiqmim have revealed at least three architectural building strata that give conclusive support for the general stratigraphic model originally proposed by Perrot. Geomorphologic studies by geologist Paul Goldberg in the deep trenches and in the vicinity of Shiqmim illustrate thick (ca. 2-3 m) gravel deposits below and contemporary with the earliest pioneer occupations phases (strata III and IV). During this phase the Wadi Beersheva was extremely active, compelling the pioneer settlers to build along the margins of the valley away from the active wadi channel. To cope with this geomorphological constraint, the pioneer Beersheva valley settlers at Shiqmim and other sites devised a new architectural adaptation - the enigmatic systems of subterranean room and tunnel complexes. The hard packed re-deposited loessial hills that border the Beersheva valley provided the context for the Chalcolithic excavation of these subterranean room and tunnel complexes away from the active wadi channel. The new Shiqmim environmental data indicate that these subterranean systems flourished during the wettest phase of the late fifth millennium. Instead of viewing these enigmatic architectural features as an adaptation to a hot desert environment, in the pioneer phase, these structures provided an answer to settlement in an area that was devoid of extensive flat ground suitable for a planned open-air village.

The complete subterranean system excavated at Shiqmim in 1989 is remarkably similar to the ones found by Perrot at Bir es-Safadi. The Shiqmim underground complex, labeled Subterranean Room Complex 1, includes 10 rooms interconnected by several tunnels. All of these are found in the northern aspect of the site beneath the loessial hills. The main rooms are large enough for an adult. Not all of the rooms were occupied contemporaneously in this system; four phases of utilization were defined. A corrected accelerator radiocarbon date (OxA-2524) from charcoal collected on the floor of room no. 7 dates to 4714 to 4350 BC, which firmly ties the early use of the subterranean rooms to the pioneer phase. A number of prestige objects were found inside the subterranean rooms including hematite mace heads, beads, and ivory artifacts. The most impressive ivory was a vial carved from a hippopotamus canine. A complete corpus of prestige objects made of ivory have come to light at Shiqmim, adding significantly to our knowledge concerning Chalcolithic craft specialization which was first defined by Perrot.

At the close of the 1989 season, an additional subterranean room was found which seemed to mark the presence of a new underground room complex. This room, labeled sub-room 8, was only partially excavated by our team. Penetrating through the floor of the room was a tunnel that we had great difficulty tracing. After following it for 5 meters, it was impossible to define the tunnel wall edges. With the possibility of collapse quite imminent, a decision was made to abandon the excavation of this most promising subterranean feature. Perhaps the most extraordinary factor concerning this structure was the radiocarbon determination obtained from a sterile layer above the floor of the room. The date (RT-1322) yielded a determination of 5190 ± 75 BP. When calibrated this is equivalent to a range of 4212 - 3829 BCE. Given our earlier

assumption that all of the subterranean features dated to the pioneer phases of occupation at Shiqmim, this date indicated that Sub-room 8 was indeed contemporary with the planned (Stratum II) open-air village. These issues made it incumbent for our team to return to the site in 1993 to test these problems related to the evolution, use and extent of the subterranean architecture at Shiqmim.

### Geophysical Diffraction Tomography: A Window on Subterranean Shiqmim

To help answer the developmental and functional questions concerning the subterranean architecture at Shiqmim, we decided to implement remote sensing methods to detect the location of these subsurface features and the most likely locale to excavate during the final field season in 1993. Remote determination of the extent of these subterranean rooms was important because they have almost completely filled in with fine sediment as a result of rain, wind and human activities over the past five millennia since their abandonment. Using traditional excavation techniques would take years to determine the limits of the subterranean room complexes at Shiqmim. In the summer of 1992 and the fall of 1993, an emerging technology, known as geophysical diffraction tomography (GDT), was employed at Shiqmim to reconstruct high-resolution images of the areas surrounding the previously discovered room complexes and in a new area (Area X) never before investigated on the site. GDT is a generalization of the more commonly used imaging algorithms of geotomography, based on those employed in CT scanners of diagnostic medicine that more rigorously accounts for the ray bending that occurs at the longer wavelengths characteristic of geophysical studies. The technology has been applied to a number of shallow geological settings to image a variety of subsurface features including buried waste, tunnels in the Korean De-Militarized Zone (DMZ), and the buried skeletal remains of 'Seismosaurus' in New Mexico, the longest dinosaur yet discovered and fictionalized in the film 'Jurassic Park.'

GDT can be implemented with many types of waves and several measurement geometries; however, at Shiqmim acoustic waves were used in order to resolve the subtle mechanical differences between the host soils and the more recent desert depositions filling the subterranean complexes. A more technical description of the application of GDT at Shiqmim was published in the journal *Geoarchaeology* [Witten, 1995 #2024]. Images obtained near one of the underground rooms indicated the continuation for a total of 11 meters of a tunnel we had abandoned during the 1989 season because of the danger of collapse.

To test the ground truth of these observations, the tunnel entrance leading beneath this room was re-located in 1993. Armed with shoring devices and an adequate light source, we began to re-excavate the tunnel. After two weeks of work, the grueling excavation confirmed the extent of the GDT imaging for the tunnel. Over 11 meters long, this tunnel had been constructed in antiquity as a secret entrance to the underground room. When the Chalcolithic inhabitants sealed off the access to this tunnel they placed an offering of a miniature ceramic churn, a model of a typical type of Chalcolithic pottery

vessel, at the closed entrance. Over 4,000 beads, most made of steatite, were found inside the churn. An additional hill top (Area X), over 300 meters from the old excavation, was imaged and proved to be 'honey-combed' with subterranean rooms and tunnels confirming the extensive spread of these structures at the site. A chapter in the proposed book will be devoted to the innovative GDT study.

#### New Models for Understanding Subterranean Settlement and a New Book

The astounding GDT images (some published in professional and popular journals) highlight a number of issues associated with the Chalcolithic subterranean architecture found at Shiqmim: 1) the extent of subterranean architecture at Shiqmim extends for over 400 meters across this early village settlement center; 2) based on the sampling of Area X, it can be assumed that all of the loessial hillocks at the site are permeated with subterranean features; and 3) while the function of the subterranean features identified in geophysical surveys can only be confirmed by excavation, ground truth tests and the widespread distribution of these features leads us to suggest that many were linked to storage and defensive needs.

Whereas Perrot suggests that subterranean architecture went out of use when the open-air village settlements thrived in the Beersheva valley and Gilead believes that these enigmatic structures were all contemporary with the open-air villages, the new Shiqmim data indicates a more complicated picture. The stratigraphy and radiocarbon dates already published from Shiqmim indicate that the earliest settlement process was indeed characterized by subterranean architecture. In this pioneer phase, the subterranean architecture was an adaptive response to both the natural and cultural environment. Unlike Perrot who suggests that the subterranean room complexes were an adaptation to the hot desert environment, our team has shown that climatic conditions during the pioneer settlement phase were more humid. The underground room complexes from this phase (Strata III - IV) were established on the margins of the valley, inside the loessial hills, because there were no extensive flood plains on which to build an open-air village. The construction of the planned village at Shiqmim happens in Stratum II, toward the end of the Chalcolithic sequence when the natural flood plain in the Beersheva valley built up.

The hypothesis that the earliest subterranean room and tunnel complexes were used for defense is based on remarkable ethnographic parallels from east Africa. In northeastern Tanzania, Fosbrooke has shown how a number of tribes (including the Gweno, Iraqw, Chagga, and Sonjo) in the early 1950s still excavated subterranean bolt holes connected to underground room and tunnel complexes for defense. Fosbrooke's ethnographic descriptions, plans, and photographs show that the east African examples are virtually identical to those in Chalcolithic Palestine and will form the basis for a comparative ethnographic study with Shiqmim.

In summary, the construction of subterranean architecture was a feature of Chalcolithic settlement in the Beersheva valley from the earliest pioneer phase and throughout the sequence. Underground room and tunnel complexes

were a local innovation and a response to both the natural and cultural environment of the northern Negev region. The proposed volume will present a series of interdisciplinary studies concerning the evolution of the Shiqmim Chalcolithic chiefdom. Central to this will be the presentation of a full excavation report including site and strata plans, photographs, and artifact illustrations. Contributors to this forthcoming volume are listed below.

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