

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/284572509>

Plaster artifacts and the interpretation of Nahal Hemar Cave

Article · January 1993

CITATIONS

12

READS

21

3 authors:



Yuval Goren

Ben-Gurion University of the Negev

96 PUBLICATIONS 1,174 CITATIONS

[SEE PROFILE](#)



Irina Segal

Geological Survey of Israel

58 PUBLICATIONS 934 CITATIONS

[SEE PROFILE](#)



Ofer Bar-Yosef

Harvard University

316 PUBLICATIONS 11,595 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Jewish Tombs and Burial Customs during the Hellenistic, Roman and Byzantine Periods [View project](#)



Microarchaeological studies using portable laboratories [View project](#)

All content following this page was uploaded by **Yuval Goren** on 30 August 2016.

The user has requested enhancement of the downloaded file.

Plaster Artifacts and the Interpretation of the Naḥal Hemar Cave

YUVAL GOREN

Israel Antiquities
Authority
and the
Tel-Aviv University

IRENA SEGAL

Israel Antiquities
Authority
and the Geological
Survey of Israel

OFER BAR-YOSEF

Peabody Museum,
Department of
Anthropology,
Harvard University

INTRODUCTION

The excavations at the Naḥal Hemar Cave (Bar-Yosef and Alon 1988) revealed one of the most conspicuous Pre-Pottery Neolithic B (PPNB) assemblages ever found in the Levant. The remarkable preservation of wooden artifacts, fragments of baskets, linen twined pieces etc., is an extremely rare phenomenon in Levantine prehistoric sites. This assemblage is not homogeneous in nature and contains items which can be interpreted as belonging to variegated functions amongst which ritual purposes seem to constitute a major role (Bar-Yosef and Alon 1988: 27-8). The plaster assemblage, including beads, plastered basketry and fragments of a plaster statue (*ibid*: 19-21; Kingery 1988), seem to belong to this category.

Lime plaster was the first product that comprised an intentionally made chemical alteration of materials and a complete control over their properties. This action, which combined the four elements of air, water, earth and fire probably had a significance which was far beyond the practical production of better floors, containers and beads. The full consideration of its significance to Neolithic society can be made mostly on the basis of the efforts that had been invested in its production techniques (discussed in detail by Gourdin and Kingery 1975: 135-138).

The intensive production of lime plaster artifacts and architectural features during the PPNB attracted the attention of several scholars. An increasing amount of papers relating to this issue have appeared in the last two decades. In several cases attempts have been made to explain this phenomenon on both technological and socio-economic grounds (*e.g.* Frierman 1971; Gourdin and Kingery 1975; Blackman 1982; Garfinkel 1987; Kingery *et al.* 1988; Goren and Goldberg 1991).

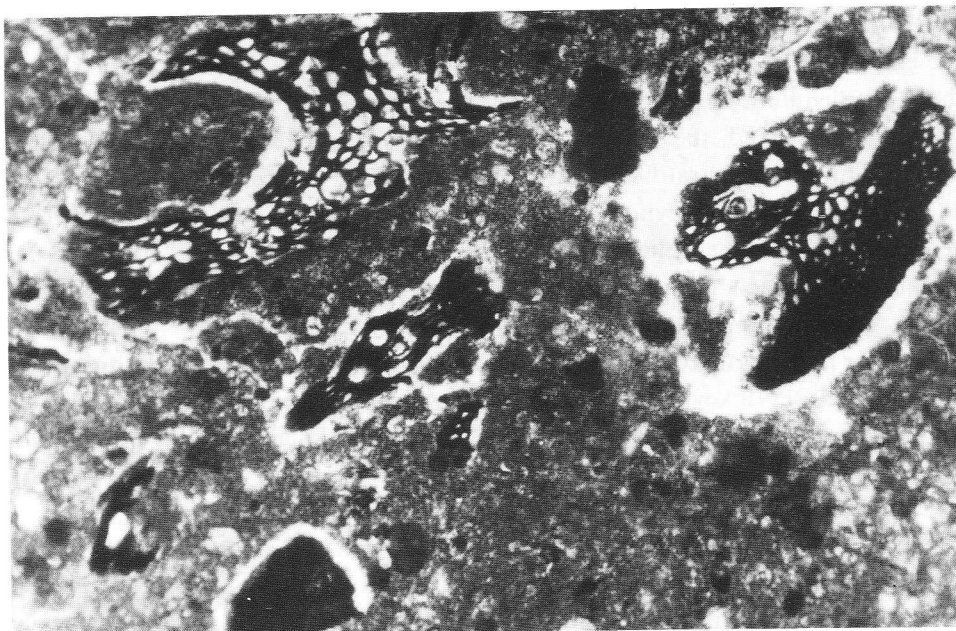


Figure 1: Plaster statue "C" (sample 1208-696), vegetal tissue fragments in burnt lime matrix.
Magnification: $\times 100$, plain polarized light.

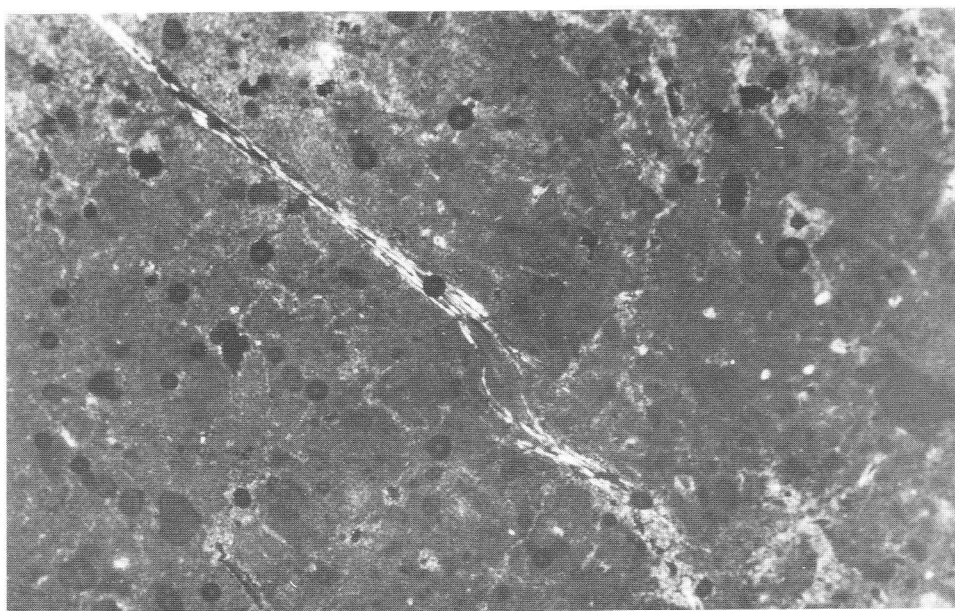


Figure 2: Plaster statue "V" (sample 1208-712), a vegetal fiber (linen?) embedded in burnt lime matrix. (The spherical bodies are air bubbles within the slide).
Magnification: $\times 40$, crossed polarizers.

Furthermore, the environmental implications of this industry were recently used for the explanation of the collapse of the Pre-Pottery Neolithic cultures at the end of the 7th millennium B.C. (Rollefson and Köhler-Rollefson 1989; Rollefson 1990).

On the one hand, the importance of this issue for explaining Neolithic social structure in terms of stratification and craft specialization emphasizes the need for an intensive body of analytical data. Yet on the other hand, the studies that have been made so far either relied on one analytical method, or comprehended a casual sampling of artifacts from numerous sites which spread across broad geographical zones. Though being very valuable as preliminary data, it is now imperative to investigate in detail the variability of complete assemblages of lime plaster products in individual PPNB key sites. In fact, studies which have dealt with several samples from each site (*e.g.* Gourdin and Kingery 1975; Blackman 1982; Kingery *et al.* 1988; Goren and Goldberg 1991), demonstrated the great inter and intra site variability which characterizes this technology.

In the present paper we intend to present the results of analytical examinations which were carried out to the full extent of plaster artifacts from a single PPNB site, namely the Naḥal Hemar Cave. This was done as a completion to a previous study of the plaster beads, carried out by Kingery (1988). In addition, we attempted to employ a combination of several complementary analytical methods for providing precise results for a better interpretation of the complete assemblage of plaster artifacts.

METHOD

The technological examination of the Naḥal Hemar plaster artifacts consisted of the following stages:

1. All the plaster statue fragments and the plaster beads from the site were examined under a Wild M-8 stereoscopic microscope under oblique illumination, in order to roughly define the homogeneity of the assemblage. Samples were then chosen for further mineralogical and chemical analyses. (An inventory of the examined samples is presented in Tables 1-2).
 2. Tiny lumps of plaster were removed from the selected items at several locations using a dental diamond saw, delicate spatulas and fine drill bits. Tiny chips containing films of the coating pigments were sampled in several cases for chemical analyses of the staining materials. In sampling the beads, broken items were preferred in order to prevent the damage of the complete artifacts.
 3. Bulk samples were subjected to Thin-Section Petrographic Analysis (TSPA), employing preparation and description methods advocated by Courty *et al.* (1989). The advantages of applying this method for a primary study of Neolithic plaster
-

Table 1: Petrographical description of the plaster objects from the Nahal Hemar Cave

Object	Cat. No.	Petrographic description & XRF results
Bead	1208–268	A mixture of idiomorphic, well sorted calcite crystals with fibrous to prismatic crystals of anhydrite embedded in a matrix of burnt lime.
Bead	84–1953	Idiomorphic, well sorted calcite crystals sizing 100–450 microns, embedded in an almost pure matrix of burnt lime.
Bead	84–1892	As 84–1953.
Bead	84–1894	As 84–1953.
Bead	84–1971	As 84–1953.
Bead	84–1941	As 84–1953.
Bead	84–1968	As 84–1953.
Bead	84–343	As 84–1953.
Bead	84–1950	As 84–1953.
Bead	84–1965	As 84–1953.
Mat	217/D/1	As 84–1953. XRF indicates a coating of Cu and Fe minerals.
Statue	1028–698	A fragment of natural, sparitic limestone with no traces of anthropogenic interferences.
Statue “Q”	1208–56	Matrix: mostly burnt lime with the addition of some clay. Temper: well sorted, spherical sandy grains of quartz (about 20%–30%) with the addition of feldspars, hornblende, zircon and augite with few vegetal fibers. XRF indicates a coating of mainly Fe with lesser Cu minerals.
Statue “Q”	84–1772	As 1208–56.
Statue “Q”	1208–11	Similar to 1208–56 but richer in vegetal material.
Statue “Q+V”	1208–NN1	Matrix: burnt lime mixed with lumps of partly decalcined limestone. Temper: sparse (2%) grains of spherical to sub-angular quartz sand with the addition of some vegetal fibers. XRF indicates a coating of Cu and Fe minerals.
Statue “C”	1208–696	Matrix: burnt lime with numerous foraminifera, most of which exhibit partial anomalous interference colors resembling partial decalcination. Temper: A. grains of foraminiferous chalk, partly decalcined. B. Scattered vegetal, herbaceous tissue fragments. XRF indicates a coating of Fe and Cu minerals.
Statue “V”	84–1775	Matrix: burnt lime, completely decalcined. Temper: sparse vegetal fibers (linen?) + few quartz grains
Statue “V”	1208–712	As 84–1775.
Statue “V”	1208–709	Similar to 84–1775, but the matrix contains some partly decalcined foraminifera. XRF indicates a coating of Cu and Fe minerals.
Statue “V”	1208–NN2	As 1208–709.
Statue “V”	1208–704	As 1208–709.

products were discussed in detail by Goren and Goldberg (1991). The thin-sections were prepared using about 0.5×0.5 cm. sized lumps from the beads, and about 10×5 sized lumps from the statues. In case of the latter, the use of these relatively large samples was due to the possible complexity of such statues, which were constructed in slabs (Kingery *et al.* 1992). The laboratory preparation for sliding consisted of gradual oven-drying in 60° centigrade, impregnation with epoxy-resins, slicing and grinding, to prepare the thin sections themselves. These were examined under a Nikon Labophot petrographic (polarizing) microscope, at magnifications ranging between $40\times$ and $400\times$. In several cases the staining methods for the identification of the carbonate component, proposed by Friedman (1959), were employed in order to highlight the non-calcareous constituents.

4. Mineralogical analyses of the non-calcareous components were carried out to some samples, in which the admixture of clay was observed by the TSPA analysis. The samples were powdered and soaked in a diluted (3%) HCl in order to remove the carbonate ingredient. The mineralogy of the clay was then determined using X-Ray Diffraction analyses (XRD).

5. Chemical analyses were carried out to most samples, using Inductively Coupled Plasma Atomic Emission Spectrometry (ICP–AES). This method has considerable benefits, namely simultaneous multielement analysis, high accuracy and low limits of detection. The sample preparation and analyses followed the methods advocated by Thompson and Walsh (1983). The standard reference materials, employed for checking the accuracy of the procedure, were prepared in a similar way. Precision for major elements was 0.005–0.34%, for traces: 0.3–0.95%. The values received by the chemical analysis were corrected in Table 2 to 100% from the incomplete percentage of the values obtained due to loss of ignition (L.O.I.) and the presence of organic matter in some of the samples.

6. Small lumps coated with yellow, green, red or dark pigments were removed from the plaster statues and beads and used for X-Ray Fluorescence (XRF) analysis, which provided a chemical definition of the pigment materials.

RESULTS

The results of the TSPA, XRF and ICP–AES analyses are presented in Tables 1–2. The following discussion summarizes the principal conclusions:

The beads and the plastered basketry: Excluding one bead (No. 1208-268) all these artifacts were produced from a mixture of burnt lime and calcite crystals. In the case of the exceptional bead, anhydrite crystals also appear within the burnt lime, as indicated by both TSPA and ICP–AES analyses. This exception seems to be meaningless in the overall technological homogeneity of these artifacts as an

Table 2: Composition of the plaster objects from the Nahal Hemar Cave (values are in weight percent)

Artifact		Values in weight percent								Totals		Corrected values after normalization to 100%							
Object	Cat. No.	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	TiO ₂	P ₂ O ₅	SO ₃	TOTAL	L.O.I	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	TiO ₂	P ₂ O ₅	SO ₃
Bead	1208-234	0.26	N.D.	N.D.	61.02	1	0.02	0.11	0.57	62.98	37.02	0.41	0.00	0.00	96.89	1.59	0.03	0.17	0.91
Bead	1208-268	0.42	N.D.	N.D.	54.20	0.28	0.03	0.16	40.4	95.49	4.51	0.44	0.00	0.00	56.76	0.29	0.03	0.17	42.31
Bead	1208-269	0.14	N.D.	N.D.	63.20	0.34	0.01	0.05	1.52	65.26	34.74	0.21	0.00	0.00	96.84	0.52	0.02	0.08	2.33
Bead	1208-272	2.45	N.D.	N.D.	56.93	1.22	0.04	0.16	0.83	61.63	38.37	3.98	0.00	0.00	92.37	1.98	0.06	0.26	1.35
Bead	84-343	1.76	N.D.	N.D.	61.26	0.66	0.05	0.27	2.3	66.30	33.70	2.65	0.00	0.00	92.40	1.00	0.08	0.41	3.47
Bead	84-1892	0.26	N.D.	N.D.	63.40	0.82	0.03	0.11	0.57	65.19	34.81	0.40	0.00	0.00	97.25	1.26	0.05	0.17	0.87
Bead	84-1894	0.15	N.D.	N.D.	60.00	0.67	0.05	0.04	0.93	61.84	38.16	0.24	0.00	0.00	97.02	1.08	0.08	0.06	1.50
Bead	84-1941	0.4	N.D.	N.D.	63.34	0.46	0.03	0.06	2.33	66.62	33.38	0.60	0.00	0.00	95.08	0.69	0.05	0.09	3.50
Bead	84-1950	1.23	N.D.	N.D.	60.15	0.65	0.02	0.17	0.95	63.17	36.83	1.95	0.00	0.00	95.22	1.03	0.03	0.27	1.50
Bead	84-1953	0.5	N.D.	N.D.	63.60	1.34	0.07	0.28	0.85	66.64	33.36	0.75	0.00	0.00	95.44	2.01	0.11	0.42	1.28
Bead	84-1965	0.97	N.D.	N.D.	62.90	1.09	0.05	0.31	1.7	67.02	32.98	1.45	0.00	0.00	93.85	1.63	0.07	0.46	2.54
Bead	84-1968	0.37	N.D.	N.D.	57.60	0.76	0.07	0.09	3	61.89	38.11	0.60	0.00	0.00	93.07	1.23	0.11	0.15	4.85
Bead	84-1971	0.72	N.D.	N.D.	63.16	1.04	0.02	0.06	1.32	66.32	33.68	1.09	0.00	0.00	95.24	1.57	0.03	0.09	1.99
Mat	217-2/1	0.29	N.D.	N.D.	59.27	0.45	0.02	0.13	0.78	60.94	39.06	0.48	0.00	0.00	97.26	0.74	0.03	0.21	1.28
Statue Q	1208-11	49.90	2.40	1.18	22.40	0.42	0.31	0.04	0.01	76.66	23.34	65.09	3.13	1.54	29.22	0.55	0.40	0.05	0.01
Statue Q	1208-56	45.80	2.30	1.20	23.60	0.45	0.31	0.10	0.01	73.77	26.23	62.08	3.12	1.63	31.99	0.61	0.42	0.14	0.01
Statue Q+V	1208-NN1	12.60	1.30	0.45	36.00	1.30	0.08	0.08	0.02	51.83	48.17	24.31	2.51	0.87	69.46	2.51	0.15	0.15	0.04
Statue V	1208-NN2	1.55	0.47	0.07	50.20	1.06	0.03	0.11	0.02	53.51	46.49	2.90	0.88	0.13	93.81	1.98	0.06	0.21	0.04
Statue V	1208-704	1.66	0.43	0.04	47.20	0.93	0.04	0.17	0.04	50.51	49.49	3.29	0.85	0.08	93.45	1.84	0.08	0.34	0.08
Statue V	1208-709	1.55	0.48	0.08	53.40	1.08	0.03	0.13	0.02	56.77	43.23	2.73	0.85	0.14	94.06	1.90	0.05	0.23	0.04
Statue V	1208-712	1.00	0.27	0.00	49.70	1.09	0.02	0.09	0.03	52.20	47.80	1.92	0.52	0.00	95.21	2.09	0.04	0.17	0.06
Statue C	1208-696	1.63	0.36	0.02	54.50	1.15	0.03	0.20	0.02	57.91	42.09	2.81	0.62	0.03	94.11	1.99	0.05	0.35	0.03

assemblage, bearing in mind the fact that the whole bead assemblage contains also wooden and lithic ones. As previously noticed by Kingery (1988), the important trait of all these beads is the dense contents of calcite crystals. The TSPA analysis indicates that the calcite crystals are clear, exhibit typical twinning and zoning features and split by their cleavage plains (Figure 4), designating that they were intentionally crushed by the craftsman prior to their mixture in the body of clay. The mixture of crushed calcite in the lime matrix does not have any technical benefit over the use of any other calcareous binder. The bother of mining the mineral, usually from naturally-occurring veins in limestones, carefully crushing it and mixing it in the matrix was probably preferred upon the use of the more available sieved wadi sand. This is probably due to the glittering appearance that the calcite crystals provide when exposed to direct light. Therefore, this technology was probably aimed at providing a lustrous material rather than supplying any technical advantage.

The plaster statue fragments: As opposed to the homogeneity of the beads and basketry, the statue fragments vary significantly in their technology and composition. Based on their mineralogical and chemical affinities, presented in Tables 1-2 several fragments could be attributed to several statues. The statue fragments were thus coded as follows:

Statue "Q" (quartzitic sand): The sand temper of this statue contains spherical grains of quartz (Figure 3), with minor quantities of feldspars and a combination of heavy minerals, typical in Levantine sediments only to the southern and central coastal sands of Israel (Slatkine and Pomerancblum 1958, Goren 1988). The high quartz contents is also reflected in the chemical composition of this statue (Table 2), in which it composes about 60% of the material.

Statue "Q+V" (quartzitic sand + vegetal tissue fragments): The sparse quartzitic sand of this statue is devoid of the accessory minerals which appear in statue "Q". Its provenance cannot be determined, yet it clearly differs from statue "Q". It also differs from statue "V" in its chemical composition and the existence of herbaceous tissue fragments.

Statue "V" (vegetal fibers): The vegetal fibers are very fine (Figure 2) and positively identified as belonging to the *Linum sp.* according to the microscopic criteria suggested by McCrone and Delly (1973: 354). The four chemically examined fragments of this statue (Table 2) are nearly identical in their composition.

Statue "C" (chalk sand): This statue fragment is characterized by the use of insufficiently decalcined lime plaster, indicated by the existence of many partly decalcined grains of foraminiferous chalk. Vegetal tissue fragments form the secondary non plastic component (Figure 1).

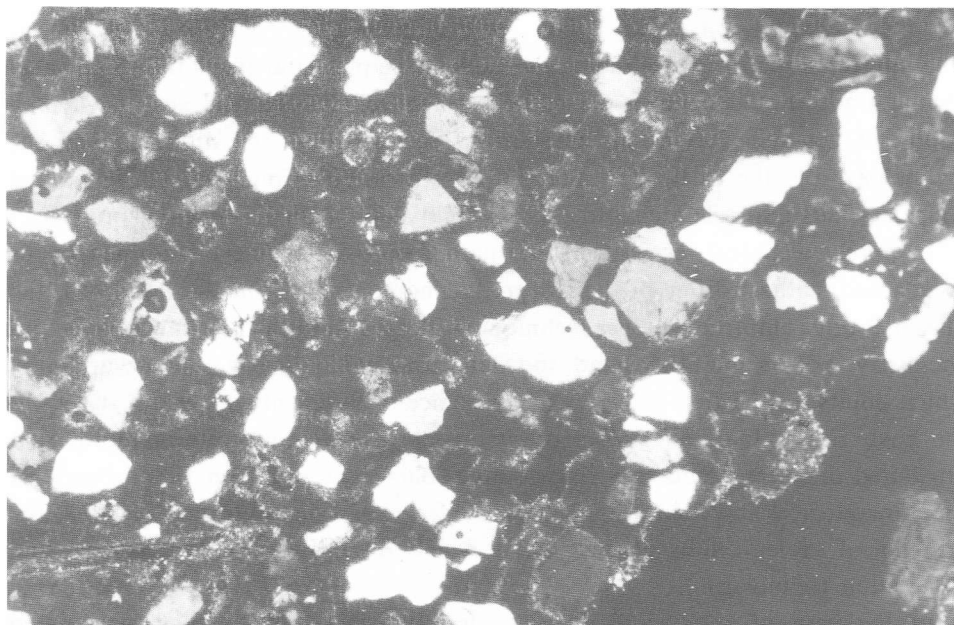


Figure 3: Plaster statue "Q" (sample 1208-56), spherical quartz grains (coastal sand) in burnt lime matrix. Magnification: $\times 40$, crossed polarizers.

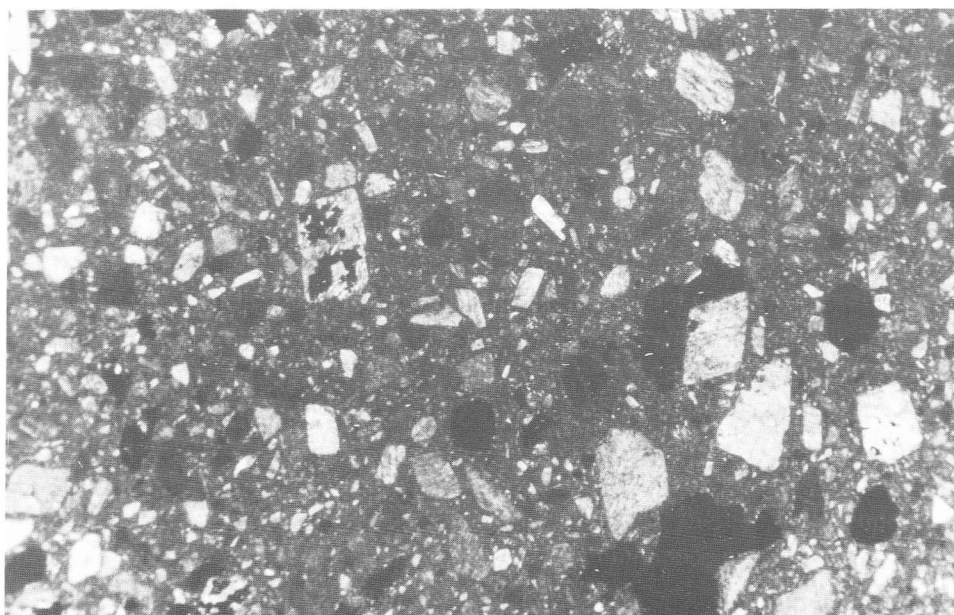


Figure 4: Plaster bead 84-1941, angular, pure calcite crystals embedded in burnt lime matrix. Magnification: $\times 40$, crossed polarizers.

DISCUSSION

The interpretation of the technological traits of the plaster artifacts from the Nahal Hemar Cave should comprise also the typology of the artifacts and the overall nature of the site. Having an emphasized ritual nature, the discussion on the technology of the artifacts should be abstracted from purely functional considerations and relate also to the possibility of spiritual or mental practices.

In purely technical terms, the two main groups of artifacts examined by us (beads and statues) differ in their degree of homogeneity. On the one hand, the plaster beads exhibit a uniform technique, reflected in both their mineralogy and chemistry. Yet on the other hand, the statue fragments display a great variability which points, in the first place, to the existence of fragments of several statues at the cave rather than one. This differs from the previous interpretation that attributed these fragments to a single statue (Bar-Yosef and Alon 1988). Based on the mineralogical and chemical analyses, the fragments should be considered as the remains of at least four distinct items which differ in their composition and production technology.

In the case of the beads, it is evident that their technology was aimed predominantly at providing lustrous, glittering objects. This special technique and the homogeneity of the coating pigments, the latter all originating from a specific origin of the Arava valley (Kingery 1988), hint in our opinion to a single provenance and function. In other words, it is evident that the plaster beads (and the other beads as well) compose an assembly of artifacts which were produced at a single place, and probably were parts of costumes or garments used for specific events (Bar-Yosef and Schick 1989: 186).

The plaster statues represent another phenomenon. Belonging to at least four different statues, these fragments differ significantly in their technology and at least in one case (statue "Q") the raw materials clearly point to a possible origin near the Mediterranean shore. These data raise the question of the circumstances that might have brought about the destruction of these statues and the reason for the preservation of only a few fragments.

Post depositional disturbances such as those caused by hyaena activities, the rockfall of a few small limestone blocks and the plundering of the site by Bedouin (Bar-Yosef and Alon 1988) are insufficient for explaining the absence of the numerous parts of these statues. Therefore we conclude that these statue fragments were brought into the cave in more or less their present state. Whether this activity took place during a single event or over a long time span, it seemingly points to the significance of these statues even as fragments. Such importation might have been a

desirable benefit. This sort of magic is also being executed on figurines representing the beings to which the magic is directed (Birket-Smith 1965: 362-363).

This brief eclectic discussion suggests that sites where magic was performed can be archaeologically recognized. Such places that accommodate individuals or groups of limited size were small and could have even been a part of a domestic unit. There might have been artifacts that were used by healer-magicians, by members of a secret society, or that were donations to a sacred place. These might have been containers, drums, scepters, rings, masks, jewelry, ornaments, remains representing the ancestors or even daily performing artifacts serving for imitative magic. Such artifacts were perhaps valued and stored and can be recovered by archaeologists. As we suggest here, the contents of the Naḥal Hemar Cave comprises many of these elements and thus should be implied as a site which served principally for magical purposes. These include masks, decorated skulls which probably acted as artifacts for the exaltation of the ancestors (Arensburg and Hershkovitz 1988; Yakar and Hershkovitz 1988; Bienert 1991: 20), anthropoid and animal figurines, parts of garments including a "headgear" (Schick 1988), the unique "Naḥal Hemar knives" (Bar-Yosef and Alon 1988), as well as some mundane artifacts including a sickle and weaving spatulae. The plaster statue fragments reconcile with this picture. These might have been performed as part of a ritual in which parts of statues were brought from distant locations and performed as idioms representing donations of an unknown character.

ACKNOWLEDGMENTS

We would like to thank Tamar Schick and Ruth Peled from the Israel Antiquities Authority and Tamar Noy from the Israel Museum for their collaboration. Gary O. Rollefson, Avi Gopher, Tamar Schick, Erella Hovers and Nigel Goring-Morris read the draft and made useful comments.

REFERENCES

- Arensburg B. and Hershkovitz I. 1988. Naḥal Hemar Cave, Neolithic human remains. *Atiqot* 18: 50-58.
- Bar-Yosef O. and Alon D. 1988. Naḥal Hemar Cave, the excavations. *Atiqot* 18: 1-30.
- Bar-Yosef O. and Schick T. 1989. Early Neolithic organic remains from Naḥal Hemar Cave. *National Geographic Research* 5(2): 176-190.
- Bienert H.D. 1991. Skull cult in the prehistoric Near East. *Journal of Prehistoric Religion* 5: 9-23.
- Birket-Smith K. 1965. *The Paths of Culture*. Madison and Milwaukee: The University of Wisconsin Press.

part of a ceremonial or ritual activity, in which fragments of plaster statues were used as symbols. In our opinion, the full interpretation of the analytical data should relate to the characteristics of formative cult in its broadest view. The full treatment of this issue is of course far beyond the scope of this paper, but is briefly presented here.

In formative societies the world is conceived as a magical–mythological entity with no separation between what the moderns regard as sacred and as profane. This is due to the belief that the world, and human life, are dominated by supernatural powers, gods and spirits. Religion is practiced, among other things, to understand and influence these powers by expressing dependence, by worshipping and serving them. Another set of actions, more common in hunter–gatherer societies, is based on manipulating and even dominating the powers by magic, an action performed by magicians (Sabourin 1973: 1–3; Lessa and Vogt 1979: 301–380, Campbell 1988). The magician's activity is attributed to his power over the spirits and forces, while the priest is the servant of the deity.

Magic is practiced in several ways. The organization of secret societies for example, in which magic is performed for the purpose of achieving benefits such as rain or fertility, is a common trait in formative societies (Weckman 1987). In these rituals the spirits of the ancestors are commonly called for fulfilling these purposes. Masks and belongings or remains of the ancestors are very frequently used in this context.

Another important aspect of magic is healing. Disease is believed to be caused by supernatural powers or spirits that steal or damage the soul of the sick and, hence, affect his body. The magician–healer, being able to communicate with supernatural powers, has the ability to diagnose the state of the soul and cure it. The best known examples of such healers in anthropology are the shamans of Inner Asia, a label that is also used to describe magician–healers in other parts of the world. A common technique of such healers is based on being in a state of ecstasy while communicating with the supernatural during the process of healing. The healers wear special garments coated with rattle, beads and representations of mythical animals. As accessories they use drums, sticks, masks and other artifacts (Eliade 1964, Campbell 1988). Healers have been active since the Palaeolithic period (Lewis–Williams and Dowson 1988), and it is very probable that during the Neolithic period they played a major role in the spiritual and mental life of the society (Lewis–Williams and Dowson 1993).

Imitative magic is also a method which relates in many cases to healing, or conversely to cursing. Dieties resembling the required action are frequently used for this purpose as offerings or parts of a demonstrative ritual which imitates the

- Blackman J.M. 1982. The manufacture and use of burned lime plaster at Proto-Elamite Anshan (Iran). In Wertime T.A. and Wertime S.F. (eds.): *Early Pyrotechnology, the Evolution of the First Fire-Using Industries*, pp. 107-116. Washington D.C.: Smithsonian University Press.
- Campbell J. 1988. *Historical Atlas of World Mythology, Vol. 1: The Way of the Animal Powers; Part 2: Mythologies of the Great Hunt*. New York: Harper & Row.
- Courty M.A., Macphail R. and Goldberg P. 1989. *Soils and Micromorphology in Archaeology*. Cambridge: Cambridge University Press.
- Eliade M. 1964. *Shamanism, Archaic Techniques of Ecstasy*. Princeton: Princeton University Press.
- Friedman G.M. 1959. Identification of carbonate minerals by staining methods. *Journal of Sedimentary Petrology* 29: 87-97.
- Frierman J.D. 1971. Lime burning as the precursor of fired ceramics. *Israel Exploration Journal* 21: 212-216.
- Garfinkel Y. 1987. Burnt lime products and social implications in the Pre-Pottery Neolithic B villages of the Near East. *Paleorient* 13(1): 69-76.
- Goren Y. 1988. A petrographic analysis of pottery from sites P14 and DII. *Mitekufat Haeven, Journal of the Israel Prehistoric Society* 21: 131*-137*.
- Goren Y. and Goldberg P. 1991. Petrographic thin-sections and the development of Neolithic plaster production in Northern Israel. *Journal of Field Archaeology* 18(1): 131-138.
- Gourdin W.H. and Kingery W.D. 1975. The beginnings of pyrotechnology: Neolithic and Egyptian lime plaster. *Journal of Field Archaeology* 2(1/2): 133-150.
- Kingery D.W. 1988. Nahal Hemar Cave, plaster beads. *Atiqot* 18: 45-46.
- Kingery D.W., Vandiver P.B. and Pickett M. 1988. The beginnings of pyrotechnology, part II: production and use of lime and gypsum plaster in the Pre-Pottery Neolithic Near East. *Journal of Field Archaeology* 15(2): 219-244.
- Kingery W.D., Vandiver P.B. and Noy T. 1992. An 8,500-year-old sculpted plaster head from Jericho (Israel). *MRS Bulletin* 17(1): 46-52.
- Lessa W.A. and Vogt E.Z. 1979. *Reader in Comparative Religion, an Anthropological Approach*. Fourth edition. New York: Harper and Row.
- Lewis-Williams J.D. and Dowson T.A. 1988. The signs of all times, Entopic phenomena in Upper Palaeolithic art. *Current Anthropology* 29(3): 201-245.
- Lewis-Williams J.D. and Dowson T.A. 1993. On vision and power in the Neolithic: Evidence from the decorated monuments. *Current Anthropology* 34(1): 55-65.
- McCrone W.C. and Delly J.G. 1973. *The Particle Atlas Vol. II*. Ann Arbor: Ann Arbor Science Publishers.
- Rollefson G.O. and Köhler-Rollefson I. 1989. The collapse of early Neolithic settlements in the southern Levant. In Herskovitz I. (ed.): *People and Culture in Change, Proceedings of the Second Symposium on Upper Palaeolithic, Mesolithic and Neolithic Populations of Europe and the Mediterranean Basin*, pp. 73-89. Oxford: BAR International Series 508(i).
- Rollefson G.O. 1990. The uses of plaster at Neolithic 'Ain Ghazal, Jordan. *Archaeomaterials* 4: 33-54.
- Sabourin L. 1973. *Priesthood, a Comparative Study*. Leiden: E.J. Brill.
- Schick T. 1988. Nahal Hemar Cave, cordage, basketry and fabrics. *Atiqot* 18: 31-43.
- Slatkine A. and Pomerancblum M. 1958. Unstable heavy minerals as criteria of depositional environment. *Geological Survey of Israel* 19: 1-11.
- Tompson M. and Walsh T.N. 1983. *A Handbook of Inductively Coupled Plasma Spectrometry*. Glasgow and London: Blackie.
- Weckman G. 1987. "Secret societies". In Eliade M.: *The Encyclopedia of Religion, Vol. 13*, pp. 151-154. Princeton: Princeton University Press.
- Yakar R. and Herskovitz I. 1988. Nahal Hemar Cave, the modelled skulls. *Atiqot* 18: 59-63.

