

# Israel Exploration Journal

VOLUME 61 • NUMBER 1  
JERUSALEM, ISRAEL • 2011

## ISRAEL EXPLORATION JOURNAL

Published twice yearly by the Israel Exploration Society and the Institute of Archaeology of the Hebrew University, with the assistance of the Nathan Davidson Publication Fund in Archaeology, Samis Foundation, Seattle WA, and Dorot Foundation, Providence RI

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ISSN 0021-2059

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## ABBREVIATIONS

- AASOR Annual of the American Schools of Oriental Research  
*ADAJ* Annual of the Department of Antiquities of Jordan  
*AJA* American Journal of Archaeology  
*AfO* Archiv für Orientforschung  
*ANET* Ancient Near Eastern Texts Relating to the Old Testament<sup>3</sup>, ed. J.B. Pritchard, Princeton, 1969  
*BA* The Biblical Archaeologist  
*BASOR* Bulletin of the American Schools of Oriental Research  
*BT* Babylonian Talmud  
*CAD* Chicago Assyrian Dictionary  
*CIS* Corpus Inscriptionum Semiticarum  
*DJD* Discoveries in the Judaean Desert  
*DSD* Dead Sea Discoveries  
*EI* Eretz-Israel: Archaeological, Historical and Geographical Studies  
*ESI* Excavations and Surveys in Israel  
*IAA Reports* Israel Antiquities Authority Reports  
*IEJ* Israel Exploration Journal  
*JAOS* Journal of the American Oriental Society  
*JBL* Journal of Biblical Literature  
*JCS* Journal of Cuneiform Studies  
*JEA* Journal of Egyptian Archaeology  
*JNES* Journal of Near Eastern Studies  
*KAI* W. Donner and W. Röllig: *Kanaanäische und aramäische Inschriften* 1–3, Wiesbaden, 1962–1964; 1<sup>s</sup>, 2002  
*NEAEHL* The New Encyclopedia of Archaeological Excavations in the Holy Land (English Edition), Jerusalem, 1993  
*PEQ* Palestine Exploration Quarterly  
*PT* Palestinian Talmud  
*QDAP* Quarterly of the Department of Antiquities in Palestine  
*RA* Revue d'Assyriologie et d'Archéologie Orientale  
*RB* Revue Biblique  
*RE* Pauly-Wissowa's Realencyclopädie der classischen Altertumswissenschaft  
*RQ* Revue de Qumran  
*VT* Vetus Testamentum  
*ZA* Zeitschrift für Assyriologie  
*ZDPV* Zeitschrift des Deutschen Palästina-Vereins

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### ANNUAL SUBSCRIPTION RATES

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# The Ossuary of ‘Miriam Daughter of Yeshua Son of Caiaphas, Priests [of] Ma‘aziah from Beth ʿImri’

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**ABSTRACT:** The Israel Antiquities Authority recently acquired a decorated limestone ossuary purportedly from a burial cave in the area of the ʿElah Valley. An inscription, incised on the front of the ossuary, reads: מרים ברת ישוע בר קיפא כהנמ מעזיה מבית אמרי (‘Miriam daughter of Yeshua son of Caiaphas, priests of Ma‘aziah from Beth ʿImri’). The script is formal, of the style common in ossuary inscriptions in Jerusalem of the late Second Temple period. On palaeographic grounds, it should be dated to the late first century BCE or to the first century CE. The prime importance of the inscription lies in the reference to the ancestry of the deceased — the well-known family of Caiaphas priests active in the first century CE. The article discusses whether Beth ʿImri is a toponym or the name of a priestly family that settled there. The relatively careless execution of the design suggests that this ossuary was produced in a Judaeon workshop and can be dated to 70–135 CE, a dating supported by two pottery oil-lamps apparently found in the burial cave.

Since the ossuary in question was not found in a controlled excavation and due to its importance, it was subjected to scientific analyses in order to address the question of authenticity. The examinations focused on the patina coating the stone surface, with emphasis on the inscribed area. The patination of the stone, in and around the inscription, indicates a complex process that occurred over a prolonged sequence of time, which is extremely difficult, if not impossible, to replicate in laboratory conditions. It may be concluded, therefore, that the patina and the inscription should be considered authentic beyond any reasonable doubt.

THE Israel Antiquities Authority recently acquired an unprovenanced ossuary purported to be from a burial cave in the area of the ʿElah Valley. The ossuary bears an inscription, deemed significant enough to study despite the object’s doubtful origin. Two oil-lamps were apparently found in association with the ossuary in the cave, which consisted of a single small chamber with *kokhim* (niches).<sup>1</sup>

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1 We would like to thank the late Prof. Dan Barag and the late Prof. Hanan Eshel, as well as Prof. Zeʿev Safrai, Mrs. Nili Graicer and Mrs. Debby Stern for their assistance. Special thanks are due to Amir Ganor, director of the Unit for the Prevention of Antiquities Looting at the Israel Antiquities Authority. Needless to say, the authors bear sole responsibility for this article. Financial support was received from the Krauthammer Fund at the Martin (Szusz) Department of Land of Israel Studies and Archaeology at Bar-Ilan University. The scientific analyses of the rock surface and coating materials were conducted in the Laboratory for Comparative Microarchaeology

The limestone ossuary (46×23×26 cm.; walls 2 cm. thick) has four feet and is covered by a vaulted lid, which is fractured into six fragments. Some of the breaks are recent. The façade (fig. 1) is adorned with a common design of two six-petalled rosettes within circles, which are enclosed by a rectangular frame of a zigzag pattern. A similar design, but with a single rosette, is carved on one of the narrow faces of the ossuary (fig. 2); the remaining faces are blank. The ossuary is intact and in a good state of preservation, except for a few small chips and scratches on the walls. The façade is covered by a fine, uneven, light brown patina. On the façade of the ossuary, a long Hebrew inscription is inscribed (see below). The ossuary belongs to Rahmani types A1b–A1c (Rahmani 1994: 21–25); these types are characterised by the use of a compass for the execution of the design and the combination of *kerbschnitt* carving and fine incised lines. Such ossuaries, dated to the century preceding the destruction of the Second Temple, are known from the Jerusalem necropolis. It seems that they were in use in Judaea until 135 CE, when, following the failure of the Bar Kokhba Revolt, the Jewish community was destroyed. The relatively careless execution of the design, in

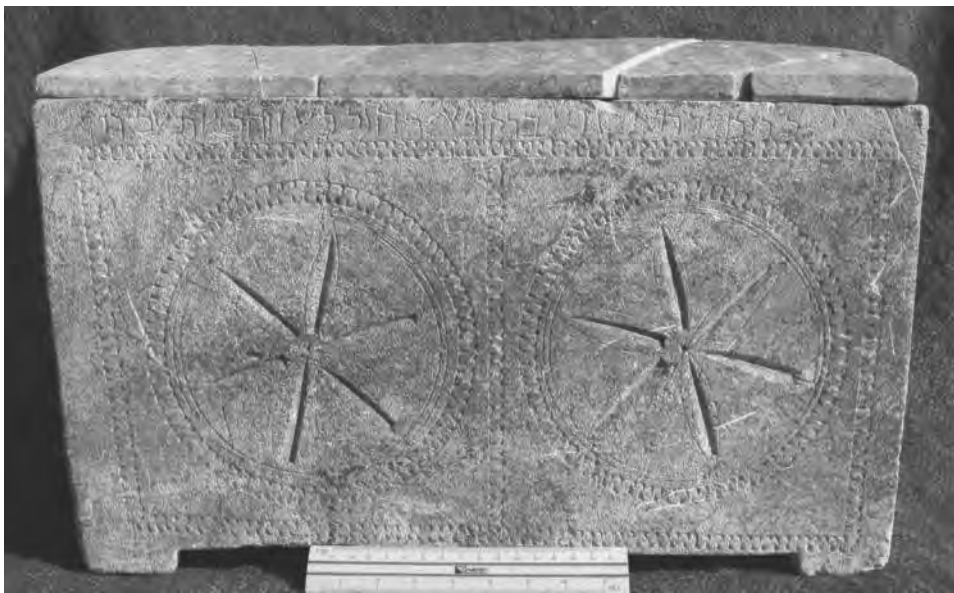


Fig. 1. Ornamented façade of ossuary; note the inscription on the façade, beneath the rim

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of the Department of Archaeology and Ancient Near Eastern Civilizations, Tel Aviv University. ESEM analyses were carried out in the Wolfson Applied Materials Research Center of Tel Aviv University, with the kind assistance of Dr. Zehava Barkai. The analyses were financed with the help of a grant from the Early Israel programme on behalf of the New Horizons Fund, Tel Aviv University. The authors thank Dr. Smadar Gabrieli for her useful comments and assistance in editing this paper.

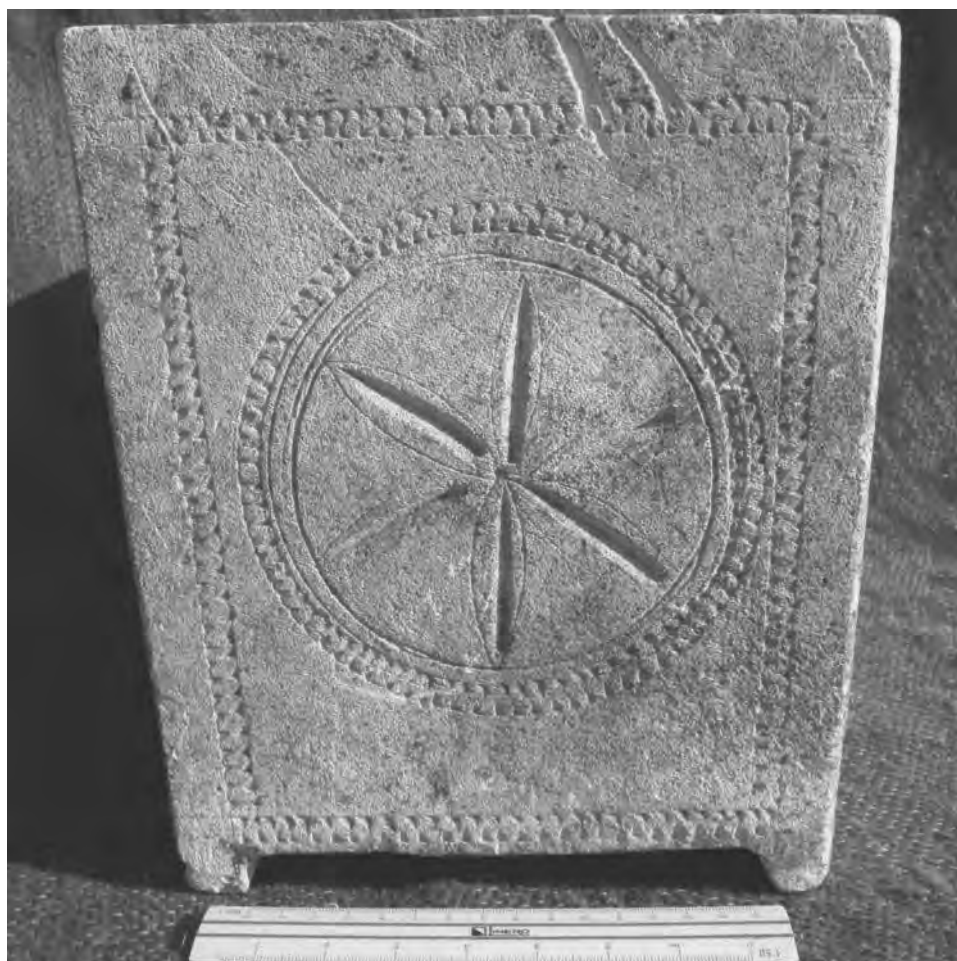


Fig. 2. Ornamented short wall of ossuary

conjunction with the date provided by the pair of oil-lamps described below (see fig. 4 on p. 83), may indicate that this ossuary was produced in a Judaeen workshop and can be dated approximately to 70–135 CE.

#### THE INSCRIPTION

The inscription (average letter height: 10–15 mm.; total length of inscription: 35.5 cm.), incised meticulously on the front of the ossuary, between the rim and the frame surrounding the decoration, reads as follows (fig. 3):

מרים ברת ישוע בר קיפא כהנמ מעזיה מבית אמרי  
 Miriam daughter of Yeshua son of Caiaphas, priests of Maʿaziah  
 from Beth ʿImri





ל דילטבלת ו א ו א ב לקונ צ כ ה ל ל ז ו ו ה ל ב ה א ת א ל ק



Fig. 3. Inscription incised on ossuary façade

The script is formal, of the style common in ossuary inscriptions in Jerusalem of the late Second Temple period. On palaeographic grounds, the inscription should be dated to the late first century BCE or to the first century CE (Misgav 1991: 16–17).

It was customary to use a regular *mem* or *nun* at the end of a word in ossuary inscriptions, as in the word כהנמ ('priests') in our inscription. Interestingly, the name of the deceased, Miriam, originally ended with a regular *mem*, but a vertical line was subsequently added, turning it into a final *mem*. For similar examples of inattention to detail, see four cases in which the name Shalom is written as שלומ (Ilan 2002: 249–250); instances of שלומ and אדמ (Zissu and Ganor 2007: 6–7), בני חננ (Frey 1952: no. 1360), יהוספ (Rahmani 1994: 893), and cases of Menahem written on a single ossuary as מנחמ, מנחם, and מנחמ (Bagatti and Milik 1958: 93).

The letter *aleph* in the words קיפא ('Caiaphas') and אמרי ('Imri') is written in a fairly cursive fashion. The left leg is missing, making it resemble a *šade* or V. Similar examples of *aleph* are found on ossuaries and on a bowl from the Jewish cemetery in Jericho, in יהועזר בן אלעזר גלית 'Yeho<sup>z</sup>ezer son of Ele<sup>z</sup>azar Goliath' (Hachlili and Killebrew 1999: 146, fig. IV.4); מריה בת נת[נ]אל 'Maria daughter of N<sup>at</sup>[an]el' (Hachlili and Killebrew 1999: 148, fig. IV.8); יהועזר עקביא 'Yeho<sup>z</sup>ezer Aqaby<sup>a</sup>/Azaby<sup>a</sup>' (Hachlili and Killebrew 1999: 149, fig. IV.9); and in two inscriptions with the name עקביא/עזביא 'Aqaby<sup>a</sup>/Azaby<sup>a</sup>' (Hachlili and Killebrew 1999: 152, fig. IV.14); and פלטה/פלטיא 'Palta/Pelatya' (Hachlili and Killebrew 1999: 156, fig. IV.17). The same *aleph* is also found in the names קפא and בר קיפא incised on ossuaries from the Caiaphas family cave in Jerusalem (Reich 1992: 72–74) and on other ossuary inscriptions.

Also noteworthy are short vertical lines lightly incised to the right of the inscription, about 2 cm. to the right of the letter *mem*. Apparently the writer began to inscribe the *mem* there, but changed his mind and started the inscription further to the left.

The first part of the text is familiar from other ossuary inscriptions: the name of the deceased, Miriam, is followed by her father's name, Yeshua. Next comes the name of her grandfather, Caiaphas, with emphasis on his distinguished lineage as a scion of a family of priests from the Ma<sup>z</sup>aziah course. The inscription ends with the deceased's place of residence or birthplace: Beth <sup>z</sup>Imri. The prime importance of the inscription lies in the reference to the ancestry of the deceased — she is descended from the family of Caiaphas — and the connection to a priestly family from the course of Ma<sup>z</sup>aziah. The reference to her home town, Beth <sup>z</sup>Imri, a locality otherwise not recorded, is an important contribution to geographical and historical scholarship of Judaea.

## DISCUSSION

*Miriam*

The name of the woman buried in the ossuary, Miriam, is the most common name in the Jewish onomasticon of the late Second Temple period. Ilan (2002: 9, 242–248) documented almost 80 instances of this name in literary and epigraphical texts of the period, including some Aramaic/Hebrew and Greek variants in ossuary inscriptions from Jerusalem and Judaea.

*Yeshua*

The name of Miriam's father, Yeshua, is fairly common in literary and epigraphical texts, including ossuary inscriptions. Ilan enumerated more than 100 documented cases in which this name appears in various forms in Aramaic/Hebrew or Greek (Ilan 2002: 126–133).

*Caiaphas*

The wording of the inscription indicates that Caiaphas — Yeshua's father and Miriam's grandfather — was a member of a prominent family of priests active in the first century CE. The origins of the name קיפא are apparently non-Hebrew — the name may derive from several Semitic etymologies (Klein 1929: 338; Reich 1992: 74–76; Ilan 2002: 408). Another family member, the High Priest Joseph son of Caiaphas, became famous because of his involvement in the trial and crucifixion of Jesus (Bickermann 1978: 82–138; Flusser 1992: 81–87; 1998: 195–206).

In 1990, Greenhut (1992) excavated a burial cave dating from the late Second Temple period in the Jerusalem Peace Forest. One of the ossuaries in this cave bore the name Caiaphas (קפא); the name יהוסף בר קיפא ('Joseph son of Caiaphas') was incised twice on another ossuary. This find constitutes archaeological documentation of the existence of a family known from historical sources: twice Josephus mentions Joseph, called Caiaphas (*Ant.* 18:35, 95), who served as High Priest from 18 to 36 CE. There is no mention of the given name of the High Priest in the New Testament, where he is referred to only as Caiaphas (Matt. 26:3, 57; John 11:49; 18:13, 14, 23, 28; Luke 3:2; Acts 4:6). The Tosefta explicitly mentions 'the family of the house of Caiaphai of Beth Mekoshesh ... and some of them were high priests' (T. *Yevamot* 1:10; see also Reich 1992 and the discussion and textual variants there). Rosenfeld suggests identifying Beth Mekoshesh with Khirbet Marah el-Jum'a (Nabi Daniy'al), in the northern Hebron Hills, based on the preservation of the word Mekoshesh in the Arabic name of the spring north of the site, 'Ein Qisis (Rosenfeld 1991: 206–218; see also Reeg 1989: 115, and other opinions there). Amit, exploring the site, discovered considerable remains of a Jewish settlement dating from the Second Temple period, including an olive press and two ritual baths (Amit 1996: 21–23). The archaeological finds thus corroborate Rosenfeld's suggestion.

*Priests of Maʿaziah*

After mentioning the names of Miriam, her father and her grandfather, the inscription identifies them as priests from the course of Maʿaziah. Thus, the lineage of the deceased is emphasised. Maʿaziah/Maʿaziahu is the last of the 24 priestly courses that served in the Temple in Jerusalem. According to the Mishnah, ‘The First Prophets ordained twenty-four courses, and for every course there was a *maʿamad* in Jerusalem, made up of priests, Levites and Israelites. When the time was come for a course to go up, the priests and the Levites thereof went up to Jerusalem, and the Israelites that were of the selfsame course came together unto their own cities to read the story of Creation’ (M. *Taʿanit* 4:2).<sup>2</sup>

The list of 24 priestly courses, apparently formulated during the Second Temple period and attributed to the time of King David appears in the Bible (1 Chron. 24:18). The signatories to the pledge in the days of Nehemiah include ‘Maʿaziah, Bilgai, Shemʿaiah; these are the priests’ (Neh. 10:9).

This is the first reference to the Maʿaziah course in epigraphic finds from the Second Temple period. The names of other courses, such as Abijah, Eliashib, Bilgah, Delaiah, Hakkoz, Shecaniah, Hezir,<sup>3</sup> Jehoiarib, Jakim (Jakim) and Jeshebeab, are known from historical and epigraphic texts from the Second Temple period, including inscriptions discovered in tombs (Ilan 2002: 8).

Some *piyyutim* and dirges that were composed and recited in synagogues in the mishnaic and talmudic periods list the 24 priestly courses and note the locations in the Galilee where the courses went after the destruction of the Temple (Kahane 1979: 9–29; Klein 1939: 162–165). Plaques with similar lists were placed in synagogues in memory of the courses that served in the Temple. Fragments of such inscriptions have been discovered in several places in Israel: Caesarea (Avi-Yonah 1962: 137–139), Ashkelon (Sukenik 1935: 66–67) and Nazareth (Eshel 1991: 159–161).<sup>4</sup>

*Beth ʿImri*<sup>5</sup>

The ending ‘from Beth ʿImri’ probably denotes the place of origin of the deceased (Miriam) or of her entire family. Places of origin are mentioned in numerous Second-Temple period burial inscriptions; some examples are ‘from Holon’

2 Translation adapted from H. Danby, *The Mishnah* (London, 1933), p. 199.

3 The course of Hezir is mentioned in the ‘Bnei Hezir’ inscription over the façade of the tomb of this priestly family in Naḥal Kidron. This is perhaps the best-known tomb inscription from the Second Temple period. See Avigad 1954: 59–66.

4 Ilan believed that the fragments found at Kibutz Kissufim — Kh. Suq Māzin (which preserves the ancient name of Shuq Mazon – Sukamazōn — known from the Madaba Map) belong to this category of inscriptions, but his proposal is dubious (Ilan 1973–74: 225–226).

5 The first letter, we believe, is *aleph* and not *ayin*; cf. the *aleph* in the word קיפא (‘Caiaphas’) and the *ayin* in מעזיה (‘Maʿaziah’).

(Naveh 1992: 192) and ‘from Jerusalem’ (Hachlili and Killebrew 1999: 156). For other examples, see Rahmani 1994 (nos. 99, 139, 257, 290, 293, 404, 777, 797, 803). Beth ʿImri is not known from other ancient texts, whether historical or epigraphic.

Kefar ʿImri was probably located in the Galilee, since the place name ‘is included in the ‘Parma list’ of locations of synagogues in northern Israel, which dates from the late thirteenth or early fourteenth century (Parma Ms., Italy, 1087/9, p. 24).<sup>6</sup>

The *PT* mentions a place known as כפר אימריא (Kefar ʿImra; *Taʿanit*, 69a [Academy of Hebrew Language edition, p. 735]; see also parallels in *Lamentations Rabbah* 2). Reeg (1989: 353–354) has summed up the scholarly opinions regarding the location of Kefar ʿImra (which in some versions is referred to as Kefar Nimra). Press has suggested identifying Kefar ʿImra with Beit ʿUmmar (discussed below) or with Khirbet ʿEmra, located in the southern Hebron Hills, c. 7 km. south-west of Dura and 4 km. south of Beit ʿAwwa (Press 1952: 476; see also *Survey of Western Palestine*, PEF map, sheet XXI, square Iw, Kh. ʿEmra). However, the fact that only sparse remains from the Byzantine period and the Middle Ages were discovered at this site does not lend support to Press’s suggestion (Kochavi 1972: 67, site 173).

It seems that the name is not related to the Aramaic word ʿimmēr (אִמְר) meaning ‘lamb’ (Sokoloff 2002: 50; Jastrow 1903: 51), since toponyms composed of names of animals do not have a *nisbe-* form. In other words, Beth ʿImri is not the ‘House of Lambs’, but the ‘House of the ʿImri family’.<sup>7</sup>

We should consider the possibility that the name of the ancient village of Beth ʿImri is preserved in the Arabic form Beit ʿUmmar, a village in the northern Hebron Hills.<sup>8</sup> In the past it was suggested that Beit ʿUmmar should be identified with Maʿarath, one of the towns belonging to the tribe of Judah — ‘Halhul, Beth-Zur, Gedor, Maʿarath, Beth-ʿAnoth, and Eltekon, six towns with their villages’ (Josh. 15:59) — but there is no archaeological evidence to support this possibility (Abel 1938: 91; Elliger 1934: 127–129; see above, Press’s suggestion that Kefar ʿImra was located here). It should be noted that the remains of a Jewish settlement dating from the Second Temple period and the time of the Bar Kokhba Revolt were identified in Beit ʿUmmar and at Khirbet Kufin, which is within the village

6 We are grateful to Prof. Zeʿev Safrai for bringing this source to our attention.

7 We would like to thank Prof. S. Aḥituv for this suggestion.

8 Beit ʿUmmar (map. ref. OIG 1598/1142) and Khirbet Kufin (map. ref. OIG 1608/1143) appear on different maps, e.g. on British Mandate 1:20000 maps (Surif, 15/11, 1942; Beit Fajjar, 16/11, 1943). The identification of Beth ʿImri with Bēth ʿUmmar is linguistically problematic, since the transposition of *i* into *u* is very rare (e.g., Biblical Michmās (מכמס) — Arabic Muḥmās). We wish to thank Prof. S. Aḥituv for this remark.

limits.<sup>9</sup> They include the remains of a typical ritual bath; a rock-cut and stepped installation, probably another ritual bath; burial caves; a large ossuary made of hard stone (Tsafrir, Di Segni and Green 1994: 77, 169; for additional finds, see Zissu 2001: 122–123).

Another possibility should, however, be considered. Beth ʔImri might be the name of a priestly family, not only a toponym.<sup>10</sup> It might be the name of one of the four priestly families that returned from the Babylonian Exile with the early waves of the Returnees. Ezra 2:36–37 (= Neh. 7:39–42) mentions the sons of Yedaʿyah to the house of Yēšuaʿ (בני ידעיה לבית ישוע), the sons of ʔImmēr (אמר), the sons of Pašḥur (פשוור) and the sons of Ḥārīm (חרם). These same priestly families are also mentioned in the list of the people who married foreign women (Ezra 6:18–22).

According to the Baraitha (T. *Taʿanit* 2:1; PT *Taʿanit* 4:2 68a (Academy of Hebrew Language edition, pp. 727–728; BT *Taʿanit* 27a), the four priestly families that returned from the Exile split into 24 courses (*mishmaroth*). The name אמר (ʔImmēr) is a shortened form of the theophoric name ʔAmaryāhu (אמר יהוה) and in the current form in Late Biblical and post-Biblical Hebrew ʔAmaryāh (אמר יהוה). The name of the priestly family ʔImmēr appears in the form ʔAmaryāh in the list of the signatories of the covenant in Neh. 10:4. It is the first document in which the name of the priestly family of Maʿazyāh (מעזיה) is mentioned (Neh. 10:9), along with other priestly families who composed the 24 priestly courses.

The splitting up of the four priestly families occurred quite early, if we are to believe the list of the priests who returned to Jerusalem with Zerubabel and Yēšuaʿ in Neh. 12:1–7, which in reality reflects the list of the priestly families in the period of the High Priest Yōyāqim (Neh. 12:12–21), son of Yēšuaʿ and father of ʔElyāshiv, who was a contemporary of Nehemiah. In these lists the family of Maʿazyāh is mentioned as Maʿadyāh (Neh. 12:5) and Mōʿadyāh (Neh. 12:17).<sup>11</sup> It seems that the lineage of Caiaphas was the course of Maʿazyāh, which belonged to the House of ʔImmēr/Amaryāh. However, it is not impossible that Beth ʔImri had been named after the House of ʔImmēr/Amaryāh which settled there.

9 In view of the inscription, it is worth examining the relationship between the name Caiaphas — a prominent family that seems to have lived in Beth ʔImri — and Khirbet Kufin — which perhaps preserves somehow the name of the Caiaphas family. Linguistically, this possibility is problematic. The letter *qof*, as in Caiaphas, does not usually switch with the letter *kaf*, as in Kufin. The transposition of the diphthong /ai/ in Qayafa to /u/ in the toponym Kufin is also problematic.

10 We would like to thank Prof. S. Aḥituv for this solution.

11 The data in the book of Ezra-Nehemiah is, however, somewhat problematic. It seems unrealistic that only three high priests officiated in the course of the 106 years which elapsed between Yēšuaʿ and ʔElyāshiv (including Yēšuaʿ and ʔElyāshiv). Thus, we may assume that the process of the splitting of the original four priestly families into the 24 priestly courses took longer.



Fig. 4. The oil-lamps; a) top view; b) bottom view

## THE OIL-LAMPS

According to the information in our possession, two pottery oil-lamps (fig. 4) were also found in the burial cave. The lamps, which are similar in shape but differ in size, were made in a mould and decorated with concentric circles around the pouring hole. The nozzle is rounded, and there is a degenerate spiral on either side. The handle of the smaller lamp was partly broken when it was attached during the leather-hard stage. The handle of the larger lamp has not survived. Although the type is fairly rare, these lamps should probably be associated with the group of southern ('Judaean') oil-lamps common in Judaea between the two Jewish revolts against Rome (for a similar lamp and a discussion of the relation between this type and the Judaean lamps, see Rosenthal and Sivan 1978: 84, no. 346; Sussman 1982: 88, no. 145; 93, no. 160; 95, no. 166; 116, no. 225; 117, no. 228).

## SCIENTIFIC EXAMINATION

*Method*

Since the ossuary in question was not found in a controlled excavation, it was subjected to scientific analyses in order to address the question of authenticity. The examinations focused on the surface of the stone and the outer crust, namely, the patina coating the stone surface (Dorn 1998), with emphasis on the inscribed area. The principal hypothesis was that if the surface had been subjected to normal weathering processes and the patina covering the script had been created under natural conditions, reflecting normal progression of sequential coating of the stone over a prolonged period of time, the ossuary and the inscription on it should be authentic. The examination of the patina followed in part the methodology practiced in previous studies (i.e., Goren 2007 with references therein). According to this method, both *in situ* and detached samples of the outer crust were analysed by a series of structural, mineralogical and chemical methods starting with low-powered reflected light microscopy, through transmitted light petrographic microscopy, to the environmental scanning electron microscope (ESEM) accompanied by chemical determination of the different phases using the ESEM energy-dispersive spectrometer (EDS). The analyses consisted of the following stages:

- A. The first stage consisted of careful microscopic surface examination of the entire length of the inscribed area, as well as of other parts of the ossuary.<sup>12</sup>

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<sup>12</sup> The examination was made under a Zeiss Stemi 2000-C stereomicroscope equipped with an attached C-mount with a Nikon Coolpix P5000 camera and Nikon MDC lens, at magnifications ranging between  $\times 10$  and  $\times 200$ .



This was done in order to locate use and wear signs, pigments, rock-coatings and other secondary materials, and isolated sediments that were attached to the ossuary from the environment where it was presumably deposited. Each letter along the length of the inscription was recorded and photographed. This analysis was conducted in the storage facilities of the IAA.

- B. On the same occasion, controlled samples were carefully extracted under the stereomicroscope for further analyses. The samples were taken from several points along the inscription with the aid of a scalpel. The following eight samples were removed from different locations (fig. 5):

*Sample 1.* — Dark soil (presumably *Terra Rossa*) attached in places to the surface, sampled for petrography.

*Sample 2.* — An overlaying layer of calcitic patina, covering the surface and the script in places, was sampled for petrographic analysis.

*Sample 3.* — A sample of the very thin veneer of ochre (yellow-orange) film, most probably representing biopatina, appearing underneath the soil and the calcitic patina and sliding in many places into the letters, was taken for petrographic analysis.

*Sample 4.* — A sample of the black stuff appearing in places over the assumed biopatina of sample 3 was taken for petrographic analysis.

*Sample 5.* — A small block of the rock with the above-mentioned coating materials was chiseled for the production of a cross-section to be examined in thin section under the petrographic microscope.

*Sample 6.* — A similar block as in sample 5, containing the upper crust, was removed for ESEM analysis.

*Sample 7.* — A block including the assumed lower biopatina on rock substrate, as in sample 3, was removed for ESEM analysis.

*Sample 8.* — A sample of the thin black veneer on the surface, as in sample 4, was taken for ESEM analysis.

- C. Following stage B, sample 5 was thin-sectioned in perpendicular orientation to the surface (namely in cross-section), in order to examine the micro-stratigraphy of the rock coating. For this purpose, the sample was briefly glued by a tiny drop of superglue to the base of a small polyvinyl cup with its cross-section parallel to the bottom. Then the sample was gradually impregnated with Buhler Epo-Thin low-viscosity epoxy resin within a desiccator of which the air was slowly pumped out to form vacuum conditions, and then slowly released (for more details, see Courty, Goldberg and Macphail 1989: 57–59).
- D. Samples 2–5 were used for the preparation of standard petrographic thin sections and examined under a Zeiss Axiolab Pol petrographic microscope at  $\times 50$ – $\times 400$  magnifications, in order to identify the petrologic properties of the base rock and the micromorphology of the coating materials.



Fig. 5. The location of the samples extracted for scientific analysis (sample numbers indicated)



- E. The other samples were subjected to micro-structural and chemical analyses by an ESEM equipped with EDS.<sup>13</sup> This specific instrument was chosen because it allows for the examination of non-conducting, contaminated, hydrated and even living samples without significant sample preparation, in addition to those samples that have always been viewable under conventional scanning electron microscopes. Therefore, the same samples could be used for additional petrographic thin sectioning if needed. The samples were secured to the carrying stabs in an angle that allowed the analysis of the rock coating layers, enabling the *in situ* examination of each layer in SE and BSE modes with the semi-quantitative determination of their elemental composition by the EDS system.
- F. Soil sample 1 was placed in a metallographic polyvinyl mould and impregnated by epoxy using the above-described method. The resulting thin section was studied under the petrographic microscope in order to reveal the possible provenance and setting of the sediment where the stone was presumably deposited until its discovery in modern times.

### *Results and Discussion*

Petrographic examination of samples 5 and 6 revealed that the ossuary is made of Senonian foraminiferous chalk of the Menuha Formation, containing ~30% planktonic foraminifera (*Globigerinelloides* spp., *Heterohelix* spp.) and calcareous nannoplankton, and is devoid of any signs of local metamorphism. This rock type is widespread in the Jerusalem vicinity and was commonly used for the production of ossuaries during the first century CE. The soil coating it (sample 1) was identified as *Terra Rossa*. This soil type is deposited in Israel over hard limestones and dolomites in the sub-humid Mediterranean climatic zones, including the <sup>2</sup>Elah Valley and the Judaeen-Samaritan Anticline.

The macroscopic and stereomicroscopic examinations of the different surfaces of the stone, and particularly of the inscription, reveal several phenomena of rock weathering and coating. The surface exhibits severe pitting and weathering, visible on the surface around and within the inscribed grooves (fig. 6). This phenomenon is related to the precipitation of the calcite ( $\text{CaCO}_3$ ) in groundwater in the form of carbonic acid. The pits are evenly spread throughout the entire ossuary surface and within the letters, reflecting a non-selective process that affected the entire artefact, not only parts of it. In principle, such processes can be replicated artificially by exposing the surface to carbonic acid (such as soda water), but in the case of the ossuary under discussion, the pitting and the letters are coated by a sequence of other materials, including a thin veneer of brownish-ochre film

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<sup>13</sup> The study was made using the analytical Quanta ESEM at the Wolfson Applied Materials Research Center of Tel Aviv University.

coating the rock surface, overlaid by patches of darker and more coarsely-crystalline matter and infilled by brown earth (fig. 6). Therefore, the nature of these coatings is crucial for the verification of the inscription's authenticity.

Petrographic examination of the cross-section of the rock in sample 5 reveals a thin micro-laminated skin of orange crust covering the rock surface. The ESEM examination of the corresponding sample 6 (see below) indicates that this layer is indeed a biofilm created by the activity of microbiota. The petrographic sample reveals the interaction processes between the substrate (namely the base rock) and the surface patina. The orange layer of the patina is set in direct contact with the substrate, and in places it reflects some interaction with the rock by the absence of a clear, smooth border line between them. A large body of analytical data points to the development of such films as the result of bioactivity of certain types of lichens and unicellular algae, but also bacteria and fungi (de los Rios and Ascaso 2005, with more references therein). The colouring of this crust is understood to be the result of organic pigmentation of the surface by the related microbiota by melanine (Saiz-Jimenez 1995), carotenoids (Krumbein 1992), or kerogene (Beukes and Lower 1989). As mentioned above, this film appears on the inscribed surface in a microlaminated form, denoting a sequence of colonisation events of the surface by microbiota over time (Garcia-Vallès, Urzi and Vendrell-Saz 2002: 894–895). Another phenomenon that was observed in the thin sections was the development of another, endolithic colouring front in sample 5 at the depth of about 1 mm., denoting the activity of some endolithic microbiota as well.

Studies of weathering processes on calcareous rock surfaces from Mediterranean climatic zones indicate that the development of various categories of biogenic patina (microstromatolitic, microlaminated, monolayered) is dependent upon several factors, such as the degrees of exposure and orientation of the rock and the microenvironment around it (Garcia-Vallès *et al.* 1997; Garcia-Vallès *et al.* 2000, Garcia-Vallès, Urzi and Vendrell-Saz 2002). The input of nutrients to the rock surface from the surrounding is seen to be more significant to the degree of the development of biofilms than the nature of the rock substrate, and this can also differ in various locations even on the same rock (Dornieden, Gorbushina and Krumbein 2000). Although we might never be completely familiar with the circumstances of discovery of the ossuary, the micromorphological examination of the orange coating indicates an evenly undisturbed development of this crust on the ossuary and the inscription over a prolonged sequence of time.

The inspection of the outer, greyish calcitic crust (sample 2) under the higher magnifications of the petrographic microscope ( $\times 200$ – $\times 400$ ) reveals general calcitic, micritic to microsparitic composition. Fibrous and bipiramidal crystals, presumably of calcium oxalates, can be also seen but are better observed under the ESEM (fig. 7). The latter, probably in the form of whewellite (hydrated calcium oxalate) and weddelite (calcium oxalate), are known to accompany biopatinas as the result of lichen activities (Krumbein 2003).



a



b

Fig. 6. Stereomicroscopic views of the words קיפא (a) and כהנמ (b), showing the intensive pitting on the surface and within the letters, the biopatina (thin grey coating) and the upper calcitic patina (darker incrustations throughout the surface); for scale, refer to fig. 1

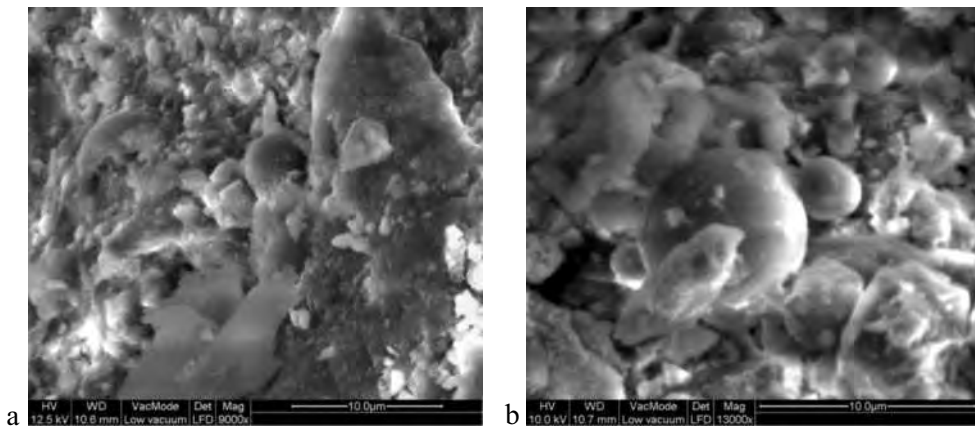


Fig. 7. ESEM views of spherical bodies of microbiota, most likely representing unicellular algae, within the biopatina layer; (a) magnification  $\times 9,000$ ; (b) magnification  $\times 13,000$

Under the ESEM, the orange layer appears as fine-grained film, overlaid by the grittier coat of the grey carbonate skin. Both in the thin section of sample 3 (at  $\times 400$  magnification) and under the ESEM (fig. 8), this layer is seen to contain numerous spherical bodies of microbiota, most likely representing unicellular algae (Garcia-Vallès *et al.* 2000). Chemical analysis of this film by the EDS reveals calcite, quartz ( $\text{SiO}_2$ ) and clay (in the form of alumo-silicates), with apatite and minor values of iron and magnesium (fig. 8). The upper crust revealed the presence of calcite with lesser amounts of clay, quartz and iron minerals.

To sum up, the lower film is a biopatina skin, which may be attributed to lichens, moss, fungi, bacteria, or algae. An overlying layer of calcitic patina, resulting from the re-crystallisation of calcium carbonate from groundwater, was created on the stone surface.

In conclusion, the patination processes of the stone are in agreement with the existing data about the nature of biopatination and secondary crystallisation of calcite over rocks in the Mediterranean sub-humid climatic zones. This includes the results of colonisation by epilithic and endolithic microbiota and the development of progressive patination over the rock substrate, followed by crystallisation of calcite after its precipitation in groundwater. The microlaminated nature of the epilithic patina and the existence of an endolithic front, the overlying calcitic crust and the even process of pitting in and around the inscription, indicate a complex process that occurred over a prolonged sequence of time, which is seemingly extremely difficult — if not impossible — to

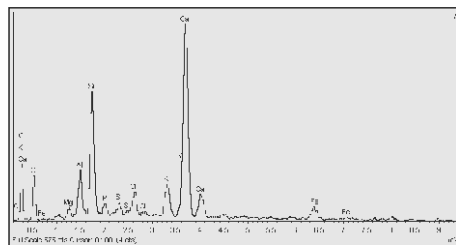


Fig. 8. ESEM-EDS spectrum of the biopatina layer in sample 7

replicate in laboratory conditions. It may be concluded, therefore, that the patina and the inscription that it covers should be considered authentic beyond any reasonable doubt.

### CONCLUSIONS

Although the ossuary in question was not found in a controlled excavation — and this can cast a shadow over the joy of scholarly publication — the inscription is of great importance and should be brought to the attention of scholars and the general public.

The first part of the inscription, which includes the names of the deceased and her father — ‘Miriam daughter of Yeshua’ — is familiar from many inscriptions incised on ossuaries in the Second Temple period. The reference to Miriam’s grandfather — Caiaphas — is very interesting, because this family of priests is known from literary and epigraphic texts. Perhaps some members of this family moved to Jerusalem, where their burial cave was found, while the economic foundations of the family remained back in their village, which may have been located in the northern Hebron Hills. The reference to the connection between the Caiaphas family and the twenty-fourth priestly course — Ma<sup>ʿ</sup>aziah — is extremely important. As stated, this is the first mention of this course found in an ancient inscription. Furthermore, the inscription tells us for the first time that the lineage of Caiaphas family was the course of Ma<sup>ʿ</sup>azyāh. We have also discussed the possibility that the course of Ma<sup>ʿ</sup>azyāh initially belonged to the House of ʔImmēr/ʔAmaryāh.

It is not impossible, however, that Beth ʔImri had been named after the House of ʔImmēr/ʔAmaryāh which had settled there. As for the toponym, Beth ʔImri, to the best of our knowledge, no settlement by this name is mentioned in any ancient text. We have discussed its possible identification with the Arab village of Beit ʔUmmar, where some remains of a Jewish village from the Second Temple period were found. Even if Beth ʔImri is indeed a toponym, its identification with Beit ʔUmmar is far from conclusive.

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