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A Medieval Book Fitting(?) from the 'Atlit Castle

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A metal object found on the surface at the 'Atlit Castle was identified as a book fitting. Although such mounts could have served other functions, such as inlays, belt or girdle mounts, this artifact was probably an anchor-plate, part of a book clasp for a medieval codex, possibly of religious content, bound in a leather cover. Visual testing inspection and SEM-EDS analysis of the book fitting have shown that the item was made of a heterogeneous composition of copper alloy. This book fitting joins a growing corpus of metal artifacts from the Latin East, establishing a metallurgical database for future comparative analysis of book fittings and similar artifacts. The identification of the item as a book fitting, and its plausible dating as a piece of medieval book furniture, supports its origin in the Frankish occupation of the site.

Keywords: archaeometallurgy, 'Atlit Castle, Château Pèlerin, book fitting, copper alloy, medieval Latin East, microstructural characterization

Introduction

The metal book fitting discovered on the surface in the inner bailey, east of the Two-Towers' Wall of the 'Atlit castle, provides an opportunity to focus on book fittings retrieved from Crusader-period sites in the Latin East.[2] This article first briefly reviews the role of books in the medieval Latin East, based on the written documentation and the state of research. The book fitting is subsequently described in the context of the 'Atlit Castle, noting two other sites in Israel where similar finds may have been retrieved. This is followed by the presentation of the metallurgical analysis of the 'Atlit book fitting and its results.

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BOOKS IN THE LATIN EAST

Books as artifacts have received relatively little attention in the study of the Latin East, although they were an essential component of religious monastic life in the medieval period. The commissioning of manuscripts by the religious houses of the great monastic and military orders and by the clergy in the Crusader period, is well-documented. The manuscripts included devotional and liturgical codices, such as psalms and missals, obit books and scholastic texts of biblical exegesis, and also works of secular nature and books on philosophy, canon and civil law. In 1176/77, Patriarch Aimery of Antioch thanked Hugo Etherianus, a Pisan, for his book on the Procession of the Holy Spirit and requested three books on other subjects (Kedar 1983:65, n. 57; *Thesaurus Novus* 1:480–481; *RRR* No. 880; *RRH* No. 491). In 1209, Antioch Cathedral received two great golden gospel books (*texta*) decorated with pearls and precious stones from the Hospitallers, as well as another gospel book, and a book of the epistles with silvered tables (*RRR* No. 1619; *Cart Hosp* 2:112–113, No. 1336; *RRH* No. 840). In the late thirteenth century, William of Santo Stefano, an Italian Hospitaller brother and a jurist, commissioned the production of an illuminated manuscript of the first French translation of two Latin works on rhetoric: Cicero's treatise, *De invention*, and the anonymous, *Rhetorica ad Herennium* (Rubin 2018:25). The manuscripts were produced and copied in local scriptoria, probably located in Jerusalem and 'Akko (Acre), the two capitals of the Latin Kingdom of Jerusalem.

Notwithstanding the extensive documentation on the production and use of codices, very few codices and their original bindings have survived.[3] An extremely rare example is a psalter produced for Queen Melisende that was preserved in the scriptorium of the Church of the Holy Sepulcher in Jerusalem and is now in the British Library. The richly illuminated psalter retains its original ivory panels carved with scenes from the life of King David, and the names of the illuminator, Basilius (probably a Greek), and the ivory-carver, Herodius, are inscribed on the book cover.[4]

Books and manuscripts may attest to the specific character of medieval monastic institutions, just as the architectural features of religious buildings may reflect specific denominations. Levant-based institutions predating the Crusades would have had their libraries, while newly founded, post-First Crusade institutions would have built up their collections with books brought from the west, locally commissioned manuscripts and also donations (Yolles 2022:27–31). The manuscripts and illuminations were created by scribes, artists and artisans conforming to standard practices, trends and styles, and reflecting their or their patrons' beliefs and ideas. The manuscripts, particularly those annotated over time, may provide tangible evidence of the development of religious thought.

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[3] For texts and works written in 'Akko, see Rubin 2018:151, 162.

[4] BL Egerton MS 1139; see Folda 2012:450–459.

However, most books/manuscripts did not survive. In the aftermath of the Muslim conquests, Christian churches and cathedrals were destroyed or converted into mosques, liturgical objects were plundered, and manuscripts were often burned. Also, manuscripts written on paper and parchment rarely survive in the archaeological record due to their organic composition, and their retrieval is mostly a privilege reserved for scholars exploring monastic or other archives.

Manuscript book-covers were usually made of stiffened leather, textiles or oaken boards (Derolez 2003:44–45). Book covers made of precious textiles and gems were reserved for the royalty, nobility and high-ranking ecclesiastics, and these too were doomed to destruction or abduction in the wake of conquest.

Metal book fittings have better withstood the ravages of time, and they have often been recovered in archaeological excavations of medieval sites in the West, and to a much lesser extent, in the Latin East. However, these often-fragmentary artifacts, have frequently been misidentified as inlays or clothing accessories, such as belt/girdle mounts (Egan and Pritchard 2002:154, 197), thus mistaking their function, and even misinterpreting their find-context. Whilst book fittings reveal little about the manuscripts’ content, they may hint to the book types, whether secular or religious, and to their quality and importance. The discovery of a book fitting in an excavation attests to the former presence of a codex, thus shedding light on the function of the edifice in which it was found.

Scholars focusing on the physical attributes of medieval manuscripts consider that all elements of a book should be analyzed to understand its cultural and historical significance within its contemporary society. Georg Adler (2010) established a standardized terminology based on hundreds of German, Italian and Dutch book furniture and fastening clasps.[5] He treated the manuscripts as archaeological finds, considering all the physical and paleographical elements, including the original script, authorship, illustrations, sewing structures, bindings, book fittings and furniture. Unfortunately, many medieval manuscripts kept in libraries, monastic institutions and private collections have been rebound, altering their original form. Moreover, whilst some elements of book bindings—mainly threads and boards—have remained intact, the metal book fittings have often been removed or replaced, resulting in the loss of significant information (Ker 1964:xxi).

The ‘Atlit Castle Metal Book Fitting

The metal book fitting from ‘Atlit was identified as a copper-alloy fragment of book furniture, a book mount, possibly an anchor plate. The plate is roughly triangular with

[5] Adler’s work was followed by a few thesis dissertations on the subject, for example, Wijk 2019. For detailed lists of binding terms in French, Italian and English medieval book binding, see, for example, Szirmai 1999; for monastic sites in England, see Howsam 2016; and for earlier studies, see Watts 1983.

a trefoil tip and two scallop-shaped sides, broken along one edge (extant dimensions 57 × 55 mm); it is decorated with perforations around slightly raised domes of which the central one is oblique, and its trefoil tip has a stud on the back (Fig. 1:a–c). The stud was probably once pressed into a leather manuscript cover, and the now-broken plate edge was probably attached to a metal hinged clasp. Similar metal artifacts attached to medieval and post-medieval manuscript covers feature integral hooked fastening mechanisms (Adler 2010:140–173, Types BV2 and BV3). A suggested reconstruction of the copper-alloy book fitting, showing the anchor plate, stud and hinged parts, is presented in Fig. 1:d. The book fitting probably dates to the thirteenth-century Templar occupation of ʻAtlit Castle.[6]

ʻAtlit Castle is the largest castle built and occupied by the military religious Order of the Temple in the Latin Kingdom of Jerusalem. It is the most impressive, extant example of Templar military architecture in the Latin East. The construction of the castle was initiated in 1218, its names—*Castrum Peregrinorum* and *Castrum Filii Dei*—possibly attesting to its role and status in the Fifth Crusade. The castle was embellished with walls and towers, large halls and maritime facilities. The most important structure in the castle was the chapel, whose polygonal shape and plan suggest that it was designed to replicate the Holy Sepulcher in Jerusalem that was no longer in Christian hands (Shotten-Hallel 2022). For several decades, the castle withstood the attacks and sieges of the Ayyubid and Mamluk forces, until it was abandoned by the knights a few weeks after the 1291 fall of ʻAkko and the final collapse of the Latin Kingdom of Jerusalem. The castle was partly dismantled by the Mamluk conquerors, but its destruction was an ongoing process, as considerable parts of the castle, and specifically the east sanctuary of the chapel, were still seen and depicted by western travelers in the mid-nineteenth century (Shotten-Hallel 2022). Religious books and manuscripts were often housed in chapels, but they could have also been kept in other locations within the castle, for example, in the chapter house, the refectory, the cloister, or the dormitory. This book fitting, however, was discovered at some distance from these locations.

Book fittings and other book furniture are depicted in medieval illuminations. In a fourteenth-century illumination, a scribe is shown copying a manuscript in a scriptorium, accompanied by an apprentice and surrounded by sheets and books (Fig. 2). The leather-covered books on the shelf exhibit book fittings comprising three main components: on the front and back covers, and on the open side. The red book has two hinged clasp-fastening devices, consisting of a plate on the front cover, an anchor plate on the back cover and a hinged clasp. The luxurious blue book cover to its left features gilded *fleur-de-lis* studs and gilded book fittings. Medieval book fittings were occasionally further embellished by the application of secondary materials, like gold, but also by other darkening materials, such as oil, as described by Theophilus (Hawthorne and Smith 1979:28–29).

[6] Since the artifact was a surface find, the possibility that it arrived at the medieval castle in a later occupation phase, when soil was brought in to fill in large areas of the castle courtyard, cannot be discounted.

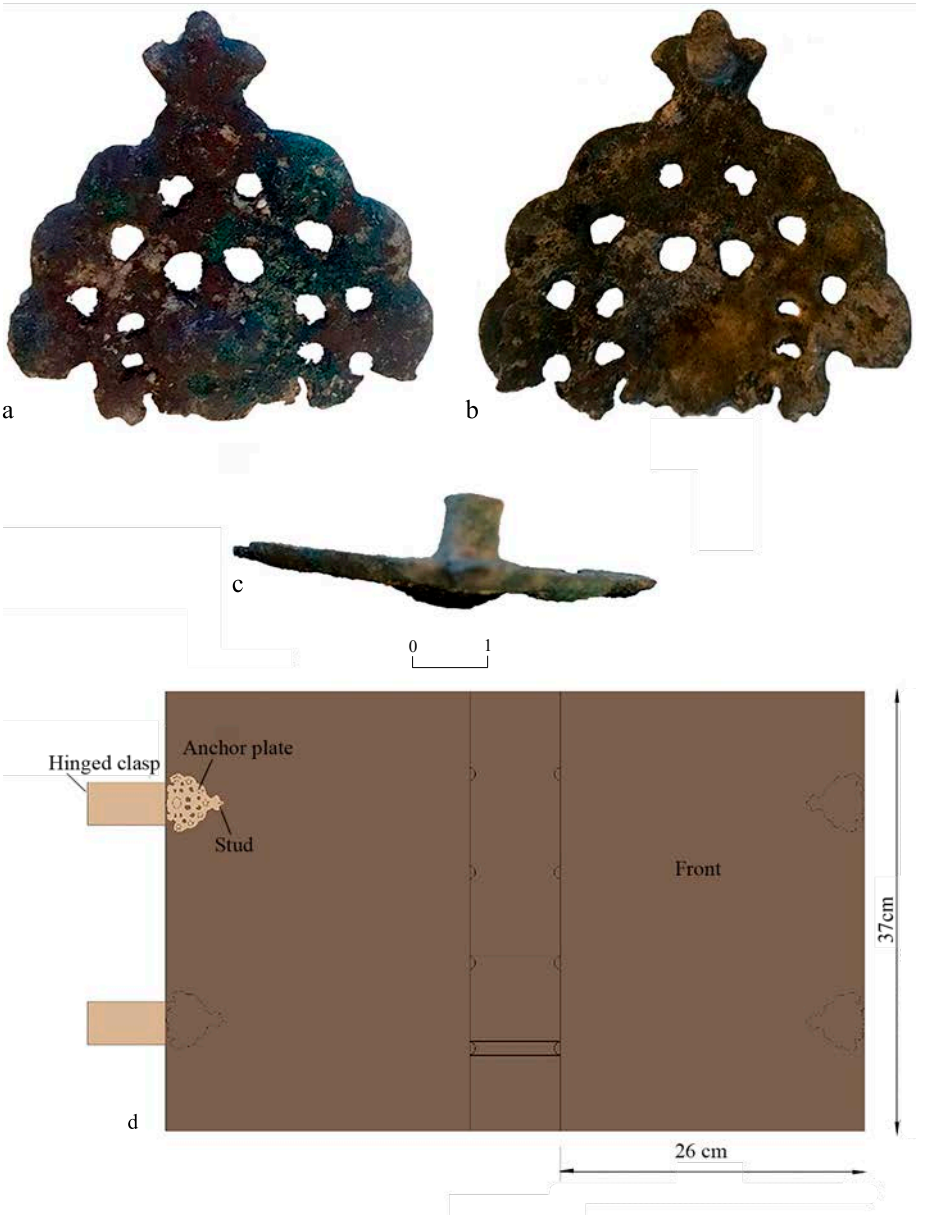

Fig. 1. The ‘Atlit Castle book fitting fragment: (a) front view; (b) back view; (c) side view of stud; (d) proposed reconstruction of the book fitting, based on Adler’s terminology (2010:19–34), the measurements indicating general scale and proportions.

Fig. 2. Jacques de Guise, Chronique de Hainaut, Flandres (BnF ms. Fr. 20128, fol. 1. © Courtesy of Bibliothèque Nationale de France).

OTHER BOOK FITTINGS FROM THE KINGDOM OF JERUSALEM

Metal book furniture items have been found in two other medieval-period excavations in the Kingdom of Jerusalem. An excavation carried out in 2007 at the Knights' Hotel site in the Old City of 'Akko[7] yielded at least a dozen metal items that can be identified as straps and

[7] The excavation was directed by Danny Syon, to whom the author is grateful for permission to look at these objects; the finds will be published by Joppe Gosker (forthcoming).

plates that were once attached to leather book covers by rivets or polygonal domed quatrefoil mounts, octagonal domed bosses or studs, and perforated mounts to support the cover. Initially understood as mounts, these metal objects—some gilded—are probably parts of book fittings. A corner piece of an L-shaped plate with floral arms, recently published with the finds from the medieval-phase at Ashqelon, was identified as an appliqué (Buckingham 2019:630–631: Catalogue No. 5), but it may possibly be a corner plate book fitting. Mounts for other objects listed in the catalogue may also include book fittings.

The Metallurgical Analysis of the ʿAtlit Book Fitting

Metallurgical Background

Bronzes are copper and tin alloys (Cu-Sn) that usually contain more than 5 wt. % tin, and brasses are copper and zinc alloys (Cu-Zn) that usually contain more than 15 wt. % zinc (Ashkenazi, Iddan and Tal 2012; Ashkenazi, Taxel and Tal 2015). In the medieval period, copper, bronzes and brasses were used for a wide range of applications due to their special qualities: the pink to orange-yellow golden metallic luster appearance, good corrosion resistance, ductility, and facility of working and shaping (Ashkenazi, Taxel and Tal 2015; Garbacz-Klempka et al. 2015). The usage encompassed domestic objects (vessels, cooking pots, kitchen tools), work instruments (thimbles, needles, medical toolkits), decorative items (statuary, jewelry, dress accessories), musical instruments and bells, ecclesiastical ornaments, cannons and structural parts (Asinelli and Martinón-Torres 2016; Bourgarit and Thomas 2012; Garbacz-Klempka et al. 2015; Debut et al. 2016).

Two main technologies were employed in antiquity to manufacture copper-alloy objects: casting, designated ‘as-cast products’, and casting followed by forging and annealing cycles, designated ‘worked products’ (Ashkenazi, Bunimovitz and Stern 2016:173; Scott 1991:5). The casting quality of copper alloys, such as bronze and brass, is better than that of pure copper, and the metals are harder than worked pure copper. Cast copper alloys usually exhibit typical cast defects, such as inter-dendritic porosity imperfections and gas porosity (spherical gas bubbles trapped during the solidification of the alloy; Ashkenazi, Bunimovitz and Stern 2016:171; Gordon and Knopf 2006; Scott 1991). The addition of tin and zinc to molten copper decreases the melting temperature of the alloy and reduces the volume of bubble formation in the cast copper, resulting in an improved casting quality (Chen 2021). Leaded bronzes contain more than 1 wt. % lead (Pb), the lead often added to copper alloys from the Late Roman period onward to improve the fluidity and castability of the alloy, and to lower the cost (Abu-Baker, Khalil and Al-Gonmeen 2021; Ashkenazi, Iddan and Tal 2012; Ashkenazi, Taxel and Tal 2015; Orfanou et al. 2020). Metal scraps were frequently recycled due to the high demand for metals (Ashkenazi, Bunimovitz and Stern 2016; Park, Voyakin and Kurbanov 2021). Variation in the zinc content in bronzes, and zinc values lower than 5 wt. % Zn may be the result of remelting, as bronze and brass scraps were frequently melted together (Gliozzo et al. 2010). Copper alloy made of about 80 wt. % Cu, containing zinc, tin and lead is probably the result of recurrent recycling (Facsády and Verebes 2009).

In the medieval period, copper-alloy objects were cast either in disposable clay molds that were subsequently discarded, or in reusable two-part stone molds (Garbacz-Klempka et al. 2015). The often-rough surface of cast objects could be smoothed by sanding and polishing (van der Heide 1991). Metalworkers employed various techniques to embellish the cast copper-alloy artifacts, including smoothing by rubbing and polishing with fine sand or other minerals, striking, stamping and engraving decorative motifs (Drandaki 2005; van der Heide 1991); bow-drill tools were also used (Voulgaris, Mouratidis and Vossinakis 2019).

Although copper alloys (bronze, brass) have better corrosion resistance than pure copper, buried ancient copper-alloy objects do corrode due to the interaction with the soil, water and chlorides, resulting in a thick patina cover layer (Ashkenazi, Bunimovitz and Stern 2016:173; Di Francia 2022; Scott 1991). The corrosion products of ancient bronzes contain various compounds and minerals, characterized by different colors (Shotten-Hallel, Ashkenazi and Tal 2022). Since the analysis of the surface of copper objects may not reflect their base metal composition, the external oxides and corrosion products should be removed before performing chemical analysis of the metal (Iddan et al. 2022).

Methods

The rarity of copper artifacts retrieved from archaeological sites, specifically from the Crusader period, usually precludes their examination with destructive methods, permitting only the employment of non-destructive or minimally destructive techniques. Consequently, in the present study, only small local areas were ground with silicon-carbide grinding papers and only non-destructive testing methods were employed. The examination was carried out on the patina-covered surface of the book fitting, and on the original metal surface locally exposed by grinding with 80–4000 grit silicon carbide grinding papers and cleaning with ethanol (Fig. 3). Two methods were employed: (a) Visual Testing (VT) inspection to observe the artifact's original color, evaluate its state of preservation, and understand the manufacturing processes; and (b) Scanning Electron Microscope (SEM) with Energy-Dispersive X-ray Spectroscopy (EDS) to determine the composition and microstructure of the artifact, and to better understand the manufacturing processes. FEI Quanta 450 SEM was used, equipped with an Everhart-Thornley secondary electron (SE) detector for surface topography observation; both SE and back-scattered electron (BSE) modes were applied. According to BSE mode, heavier elements appear whiter than lighter elements. The elemental analysis and chemical characterization of the object was measured with X-max 20 SDD (Oxford Instruments Inc.) Silicon Drift EDS Detector.

Results

The VT inspection of the external surface of the book fitting revealed that it was relatively well-preserved, its surface of thick dark green, light brown and dark brown minerals supporting its authenticity. The decorative form of the artifact with curved corners and perforations suggested that it was probably part of a prestige object. The inspection of the

Fig. 3. The book fitting fragment showing: (a) two locally ground areas on the front surface, and (b) two locally ground areas on the back surface; the metallic areas are shiny golden-yellow, and the patina is dark green, light brown, dark brown and black (Photograph: Yael Zolti).

ground areas of the book fitting revealed a shiny golden yellow metal that would have rendered the object its prestigious appearance (Fig. 3).

The SEM observation of the copper-alloy patina cover revealed a rough surface covered with different minerals and corrosion products (Fig. 4). Dark and bright areas observed on the external surfaces according to BSE mode, showed that the heavier bright areas contained more metal and less oxides than the darker areas (Fig. 4:a). The higher SEM magnifications of the bright patina Areas O and Q revealed the presence of a crystalline microstructure, with grains between 10 to 40 μm in size (Fig. 4:b–d); the dark patina areas (Area P) also revealed a similar crystalline microstructure.

The EDS analysis of the bright patina Area O revealed that it was mostly composed of copper, whilst other elements, including oxygen (O), chlorine (Cl), carbon (C), calcium (Ca) and silicon (Si), were also detected (Fig. 5:a). The EDS analysis of the dark patina Area P revealed that it was mostly composed of silicon and oxygen, whilst other elements including Cu, Zn, Ca, C, potassium (K), aluminum (Al), iron (Fe) and magnesium (Mg) were also detected (Fig. 5:b).

The EDS chemical analysis of the bright patina Areas O and Q (see Fig. 4:a) revealed the predominant presence of elements Cu, O and Cl; other elements, including Si, C and Cl, were detected as well (Table 1). The EDS chemical analysis of the dark Area P according to BSE mode, revealed the predominant presence of Cu, O, Si and C, with indications of Zn, Ca, Al, Fe, Mg and K (Table 1) The EDS chemical analysis of the dark Area R (Fig. 6:a, b) of the patina surface near the hole that was probably drilled with a bow-drill, revealed the

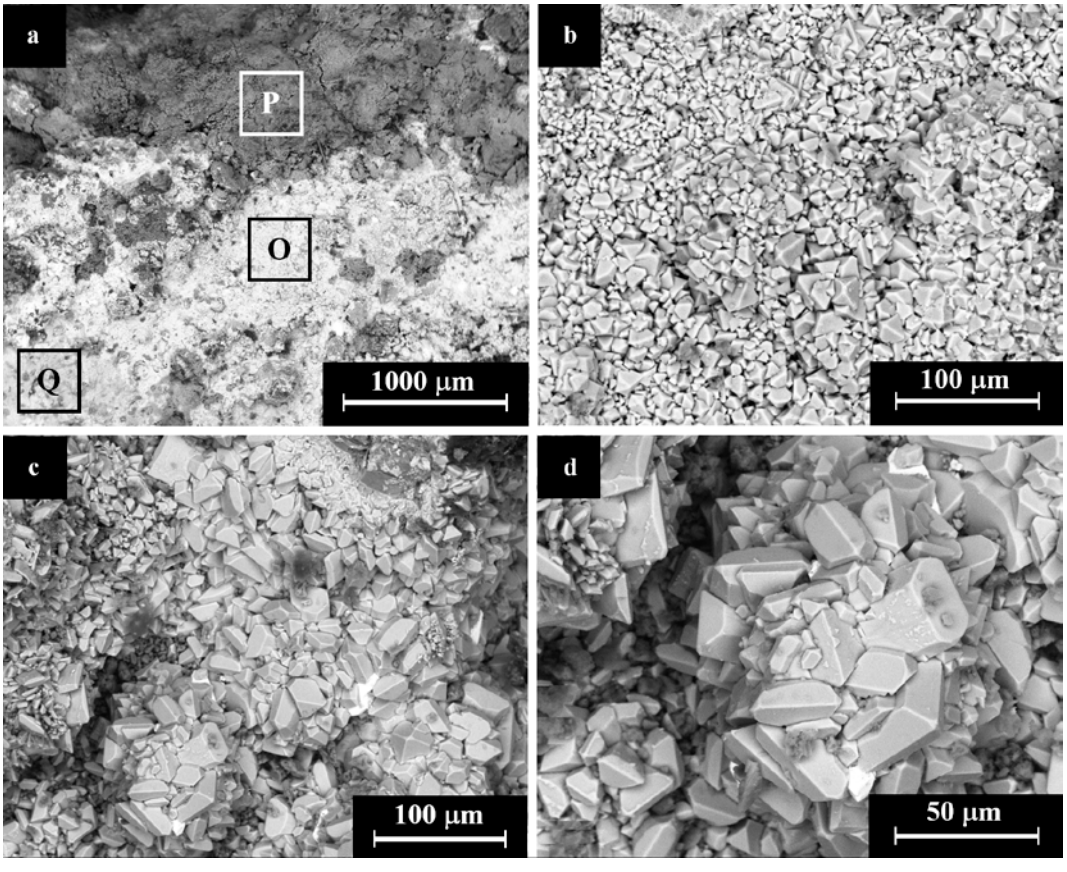

Fig. 4. SEM (BSE mode) images of the front surface of the book fitting covered with patina, examined by EDS analysis: (a) general view Areas O, P and Q, showing bright and dark minerals; (b) Area O; (c, d) higher magnifications of Area Q.

predominant presence of O, Ca and C; also detected were Cu, Zn, Si, Cl, Al, Fe, Mg, K and phosphorus (P) (Table 1).

The SEM observation of the ground back surface of the book fitting revealed a speckled microstructure of dark gray matrix and white precipitations according to BSE mode (Fig. 7:a). The EDS elemental analysis of the ground area revealed that the matrix was mostly made of copper-alloy (back of the object, stub, copper matrix; Fig. 7:b, Areas A, B), whilst peaks of Sn, Zn and As were also detected (Fig. 8:a, BSE mode), whereas the white precipitations are mostly composed of lead-oxide (Fig. 8:b, BSE mode). Higher SEM magnification revealed that the copper-alloy matrix displays a characteristic dendritic microstructure with dark and bright gray areas, the bright gray areas containing a higher amount of tin than the dark gray areas (Fig. 7:b).

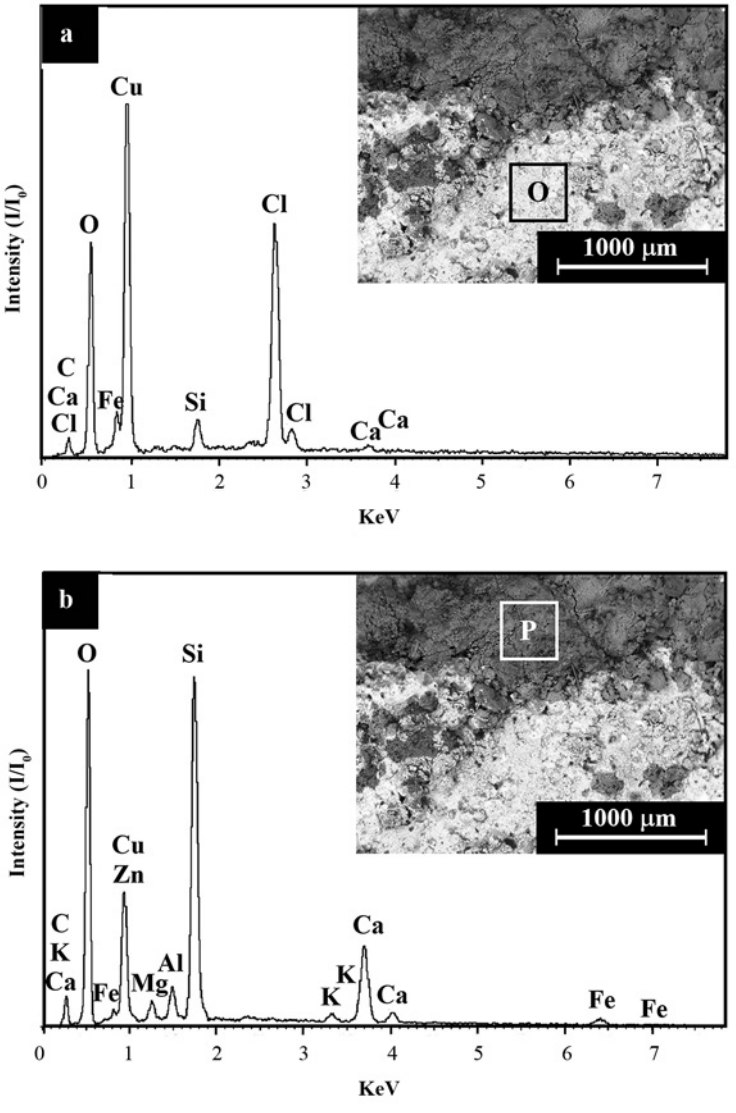

Fig. 5. EDS elemental analysis of the patina surface on the front of the book fitting: (a) Area O; (b) Area P.

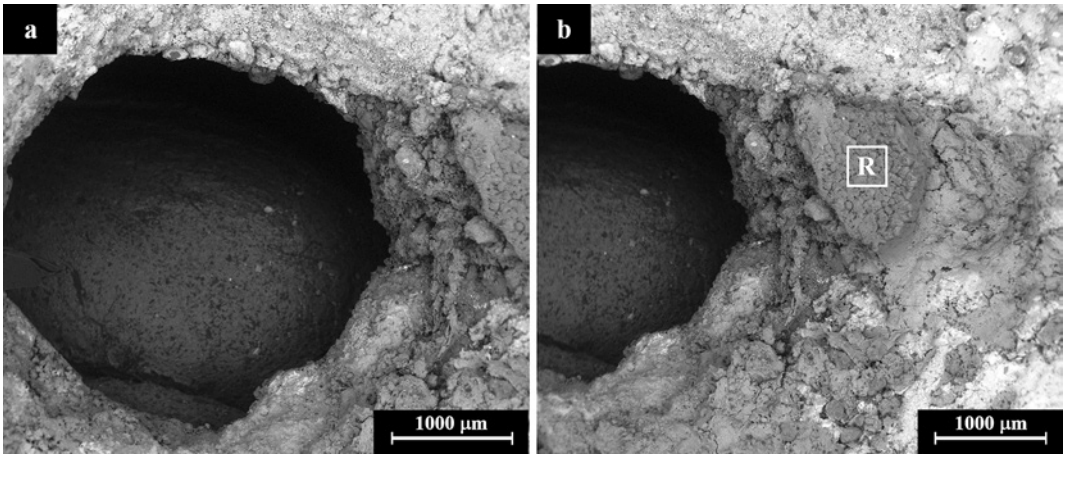

Fig. 6. SEM images (BSE mode) of the book fitting’s front surface covered with patina around a drilled hole, examined by EDS analysis: (a) general view of hole; (b) Area R.

Table 1. SEM-EDS Analysis Results of the Patina Surface (Oxides, Corrosion Products and Soil Elements) and the Ground Copper Alloy Book Fitting

Description of Examined Part	Composition (wt. %)											Fig.
	Cu	Sn	Pb	Zn	As	O	Si	C	Ca	Cl	Other	
Patina, front surface, bright Area O	46.1	–	–	–	–	33.5	1.2	7.7	0.3	11.2	–	4a, 5a
Patina, front surface, dark Area P	14.7	–	–	0.5	–	52.8	12.2	11.8	4.7	–	1.1 Al, 0.9 Fe, 0.9 Mg, 0.4 K	4a, 5a, 5b
Patina, front surface, bright Area Q	45.0	–	–	–	–	36.2	0.8	8.9	0.4	8.7	–	4a, 4c–d
Patina, front surface, dark Area R	4.8	–	–	1.5	–	53.9	4.2	14.6	17.3	0.3	0.6 Al, 1.0 Fe, 0.7 Mg, 0.6 K, 0.5 P	6b
Ground metal, back surface with stud, copper matrix, Area A	87.0	4.0	–	2.2	1.3	0.6	–	4.9	–	–	–	7b
Ground metal, back surface with stud, white precipitation, Area B	3.1	–	81.0	–	–	10.2	–	5.7	–	–	–	7b
Ground metal, back surface with stud, copper matrix, Area C	84.6	4.8	–	1.8	1.4	0.8	–	6.4	–	–	0.2 Fe	7b
Ground metal, back surface with stud, white precipitation, Area D	5.2	–	76.0	–	–	10.3	–	5.7	–	–	2.8 Ag	7b
Ground metal, upper part of front surface, copper matrix, Area E	85.9	7.0	–	1.8	2.2	0.5	–	2.6	–	–	–	10b
Ground metal, upper part of front surface, white precipitation with dark parts, Area F	6.0	–	73.4	–	–	5.2	–	–	–	15.4	–	10b
Ground metal, upper part of front surface, white precipitation with dark parts, Area G	10.7	–	58.4	–	–	4.7	–	8.3	–	17.9	–	10b
Ground metal, upper part of front surface, dark precipitation, Area H	60.8	–	–	–	–	–	–	6.1	–	33.1	–	10b
Ground metal, lower right part of front surface, copper matrix	78.4	10.2	–	1.0	4.9	0.8	–	4.7	–	–	–	–

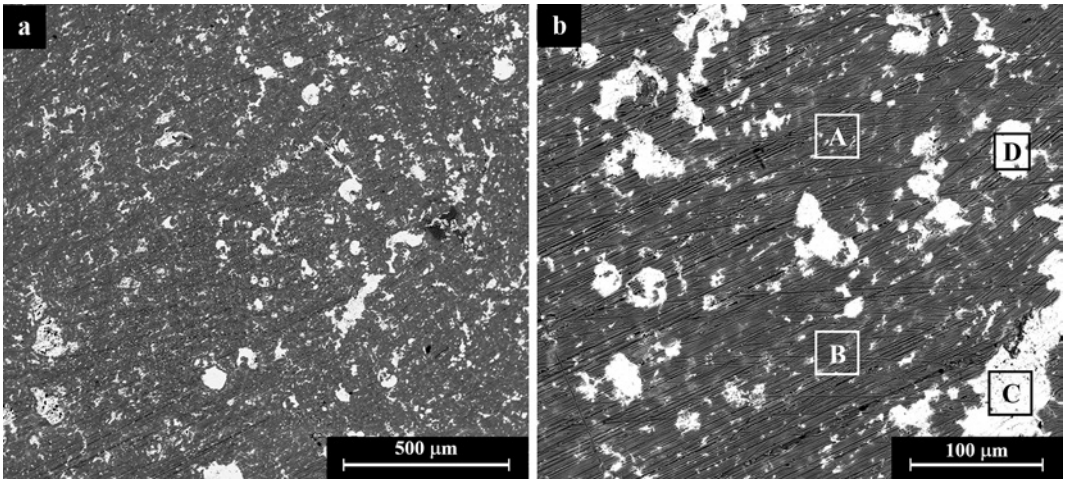

Fig. 7. SEM images (BSE mode) of the book fitting's stud on the back surface, showing an area of a ground alloy: (a) general view of the dark copper alloy matrix and the white lead precipitations; (b) the dendritic microstructure of the cast alloy combined with white lead precipitations, where Areas A–D were examined by EDS analysis.

The EDS elemental mapping of the alloy of the book fitting stud revealed a presence of Cu, Sn, Zn, Pb, arsenic (As) and O (Fig. 9:a–f). EDS analysis of the ground copper matrix on the back of the object (Fig. 7:b) revealed a predominant presence of Cu, Sn, Zn and As, whilst the existence of O, C and Fe was also detected (Table 1). EDS analysis of the white precipitations revealed that it was mostly composed of Pb and O, with a presence of Cu, C, Cl and silver (Ag) (Table 1). The SEM observation of the book fitting's surface, the area of an exposed ground metal at the upper part of the object, revealed a presence of white and dark precipitations surrounded by a copper-alloy matrix (Fig. 10, BSE mode); EDS analysis revealed that the dark precipitations (Fig. 10) comprise Cu and Cl (Fig. 10:b, Area H; Table 1).

Discussion

The thick patina cover of light brown, dark brown, black, and dark green minerals on the book fitting's surface supported the authenticity of the artifact. The different compositions of the patina layer and the exposed ground metal (Table 1) led to the conclusion that the presence of the elements Cu, Sn, Pb, Zn and As are related to the copper alloy base metal, whereas the elements O, C, Si, Ca, Cl, Al, Fe, Mg and O are related to corrosion products and soil contamination. The patina cover may include different minerals, such as brown to black tenorite (CuO), dark red cuprite (Cu_2O), and white to turquoise nantokite (CuCl) (Shotten-Hallel, Ashkenazi and Tal 2022), but X-ray diffraction (XRD) analysis—beyond the scope of the current study—is required to expose the specific minerals of the patina cover. While the present study revealed the core metal composition and microstructure of

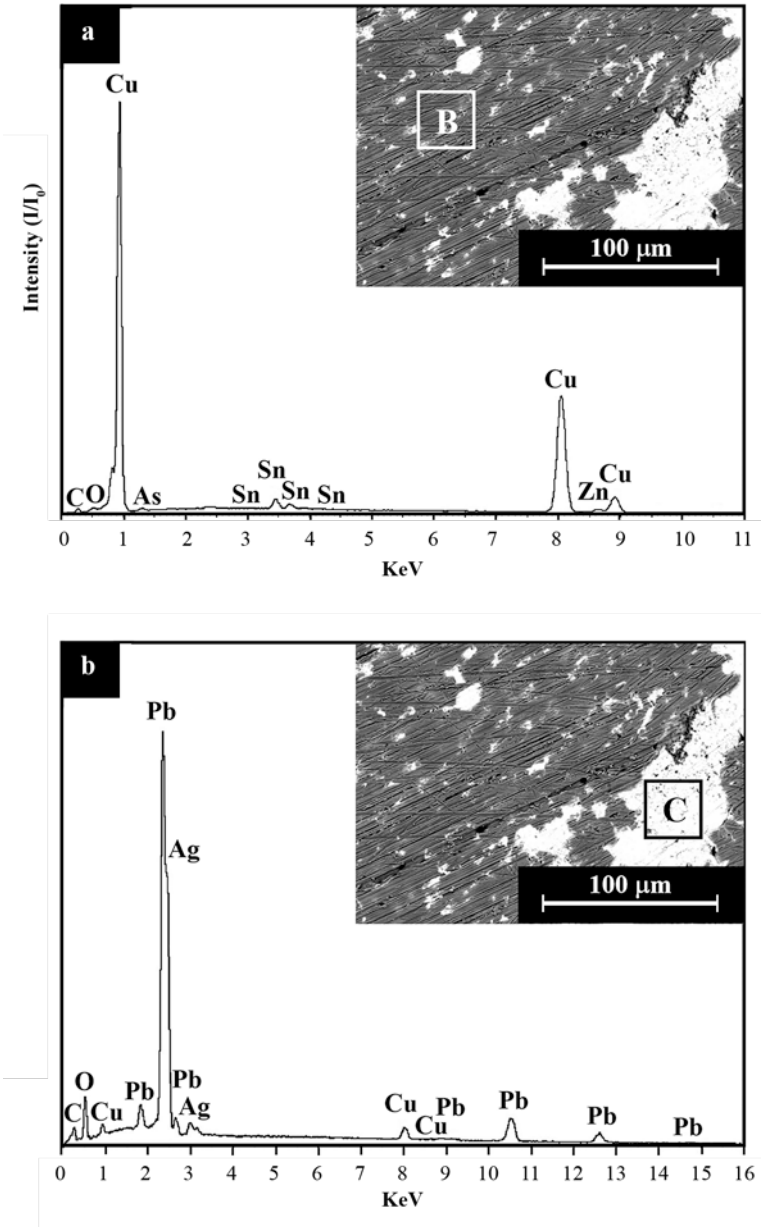

Fig. 8. EDS elemental analysis of a ground alloy area on the book fitting's stud on the back surface: (a) Area B, copper alloy matrix; (b) Area C, white lead precipitation.

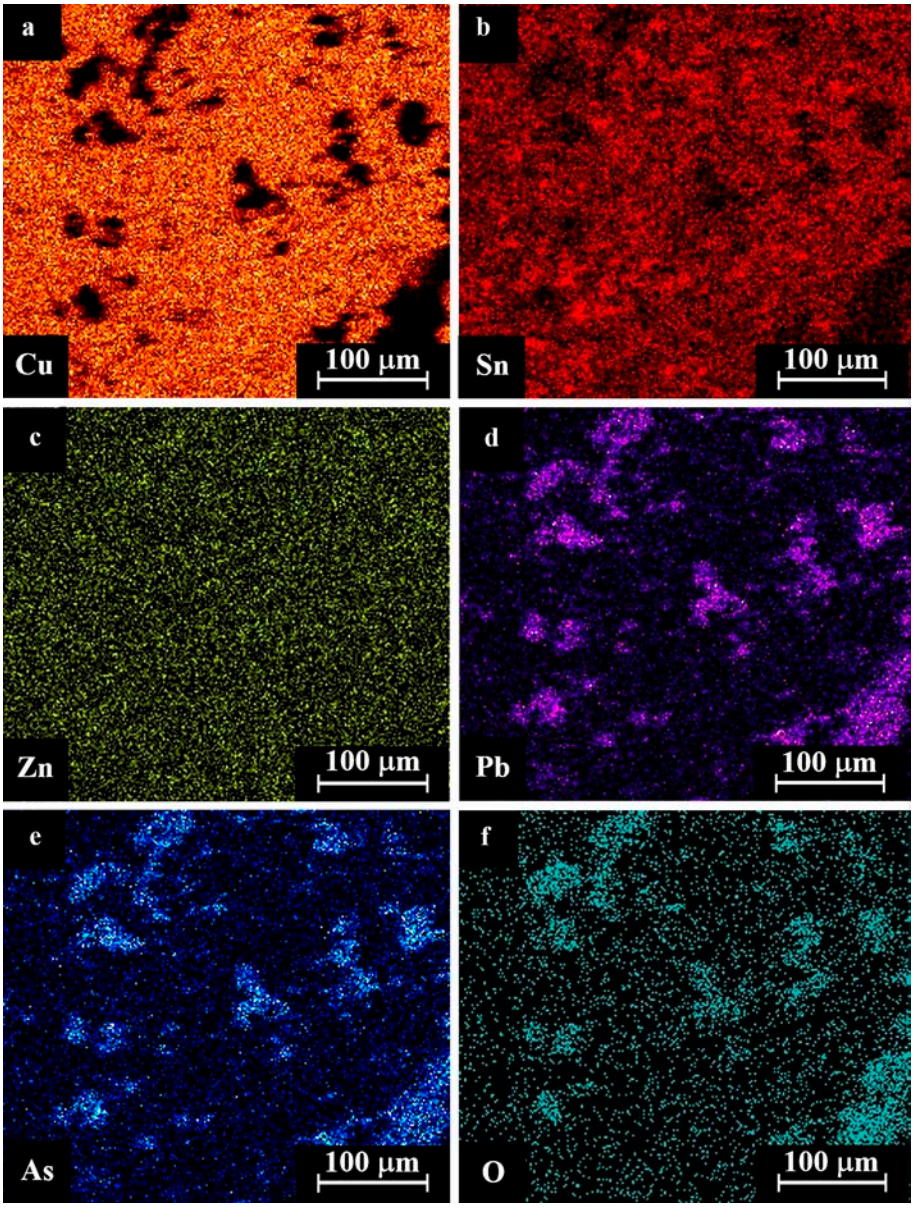

Fig. 9. EDS elemental mapping of a ground alloy area on the book fitting's stud on the back surface showing: (a–f) the presence of copper, tin, zinc, lead, arsenic and oxygen elements.

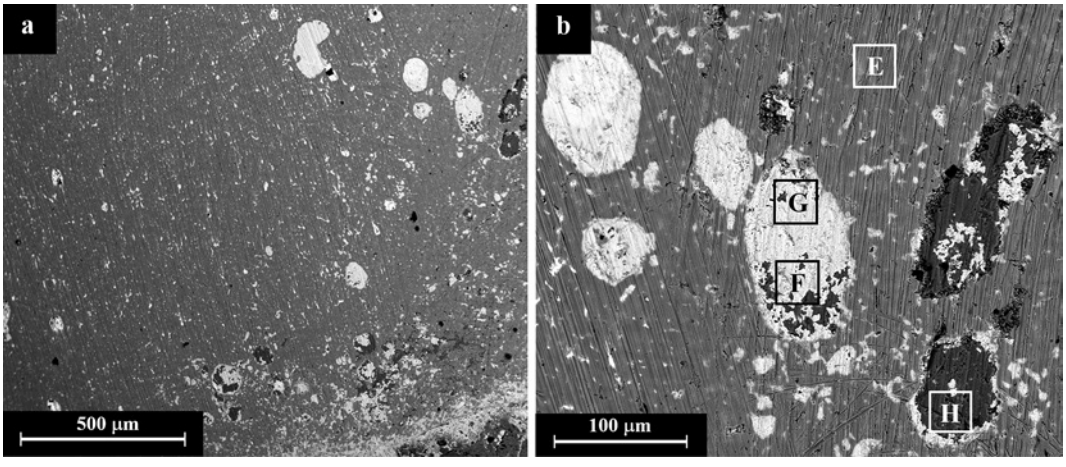

Fig. 10. SEM images (BSE mode) of a ground alloy area on the upper part of the book fitting's front surface: (a) general view of the white and dark precipitations surrounded by gray copper alloy matrix; (b) higher magnification of the white and dark precipitations, showing Areas E–H examined by EDS analysis.

the artifact and its general manufacturing process, it was not possible to determine the origin of the raw materials used to produce this object due the use of recycled alloys.

The VT observation of the book fitting's ground surface revealed a shiny golden yellow metal, indicating that the item was most probably part of an ornamental object, adorning a valued book. The dendritic microstructure of dark and bright gray areas (Fig. 7) and the presence of white precipitations observed by SEM (BSE mode), indicate that the book fitting was made of a copper-alloy that was cast to its final shape, and holes were then drilled using a bow-drill. The VT observation of the curved surfaces of the book fitting suggests that they were probably smoothed by rubbing with fine sand or other minerals. The high-quality finish indicates that the book-fitting was made by a skilled craftsman. In the Crusader period, skilled craftsmen were members of guilds and probably worked in urban centers, such as 'Akko rather than in a military castle like 'Atlit.[8]

The EDS analysis of the book fitting's ground surface (Figs. 7–10) revealed that the artifact was made of a heterogeneous Cu-Sn-Zn-As-Pb alloy, indicating that it was created from recycled copper-alloys (Table 1). The choice to manufacture the fitting with recycled materials was influenced by economic, aesthetic and technological considerations. The presence of zinc and arsenic in the alloy, for example, enhanced the golden hue of the object, the zinc also improving the casting quality, strength and corrosion resistance of the alloy (Ashkenazi, Iddan and Tal 2012; Ashkenazi, Taxel and Tal 2015; Asinelli and Martinón-Torres 2016; Orfanou et al. 2020; Abu-Baker, Khalil and Al-Gonmeen 2021; Chen 2021).

[8] Eltjo Buringh argues that only a university town could support a guild specializing in making book fittings (Buringh 2011:355; Epstein 2004:31).

Conclusions

The book fitting fragment found on the site of the Frankish ‘Atlit Castle was probably an anchor-plate that secured a hinged clasp or a strap to a book cover. The fine metal and the high-quality finish suggesting that it adorned an important manuscript, possibly of religious nature. Notwithstanding the lack of a secure archaeological context, the identification of the artifact as a book fitting and its probable dating to the medieval period, support its origin in the Templar-period occupation of the castle, revealing new information on the inhabitants of the castle and the monastic site at ‘Atlit.

The analysis of the book fitting’s composition, microstructure and manufacturing process may also contribute to our understanding of the material culture in the medieval-period castle. The book fitting is therefore an addition to a growing corpus of metal finds from the Kingdom of Jerusalem that may serve for future comparative analysis of book fittings, initiating a metallurgical data base of artifacts from the East, and also highlighting the methodology for researching similar artifacts. It raises plausible hope for the discovery of additional similar finds in the future, possibly even the remains of a manuscript.

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