The drawing of Old Ashkelon.

A cross analysis of historical sources and architectural surveys.

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Abstract

Old Ashkelon city, studying historical sources

In the panorama of medieval fortifications, Israel represents a complex scenario due to the continuous cultural contamination over the centuries. During the medieval period, European and Oriental craftsmen met in these territories, which, at the beginning of the 19th century, became the destination of many explorers attracted by knowledge of the East or by the search for buried treasures.

The exploratory campaigns of this century are still distant from the modern archaeological concept of cataloging and recording data before destruction during excavation. In this context, the abandoned city of Ashkelon is mentioned in the descriptions of numerous explorers, offering descriptive details subject to interpretations that can be ambiguous (Stager, Schloen, and Master, 2008, pp. 143-152). The iconography provides the image of a city in ruins in which the representation of the walls is a common constant to several authors.

In this context, modern surveying technologies are relevant not only to collect exhaustive documentation of the current status, crystallising the monument condition to a specific historical period but also enables a direct comparison with what was noted by the painter of the 19th century.

Fundamental in this phase of comparison was the three-dimensional survey of the area, developed in November 2021 by the ASKGATE-MAECI research group, from which it was possible to recognise some of the perspective frameworks adopted in the historical iconographies, thus suggesting new traces of investigation.

The survey of the Jerusalem Gate area and the elaboration of the 3D model

The survey was conducted through an integrated methodology between image-based modeling and GPS survey. It used a DJI aerial drone equipped with a Hasselblad L1D-20c camera for the photographic survey and a Stonex GNSS receiver for instrumental measurement of control points. The choice of flanking the GPS survey with the photogrammetric survey carried out with a drone depended on the extension of the surface surveyed and the need to operate in a limited time. The use of a traditional topographic survey would have implied longer data collection times, offering a redundant level of accuracy for an urban-morphological survey scale. The shooting phase was programmed for the first hours of sunrise so as not to run into the problem of strong sunshine in the area, avoiding the presence of shadows. It was selected an area of about 100 square meters; 20 easily recognizable markers (with a size of 20 cm by 20 cm), spread over the entire extent of the area to be surveyed, were affixed. Then, the GPS measurements of the points and the aerial photographic mapping with 423 photographic shots (F73.5, ISO-100, exposure time 1/80 sec.) taken at an average height of 10 meters from the ground, were carried out. The points were recorded in a local NIG (New Israel Grid) coordinate system and WGS 84. It was observed, comparing the two data sets, that the most significant difference between the two reference systems was recorded in the elevations: the difference is approximately 17.6 m. Therefore, for the elaboration of the model, it is decided to take as reference the local geographic coordinate system considered more reliable and useful to facilitate the management of the survey that is processed in a digital space where the geometric entities are managed in a Cartesian system. Then the photographic and metric data were processed with Metashape, an IMAGE-Based 3D Modelling software designed for the elaboration of highly reliable three-dimensional models. The process involves a first alignment of the photos carried out by the programme itself thanks to automatic recognition of the data set. For this step to be successful, the photographs must be taken in such a way as to have sufficient areas of overlap between successive frames. After the first operation, it is possible to proceed with the visual-manual recognition of the targets identified in the GPS survey and the assignment of their coordinates. The next step involves realigning the photos again. After having fixed the coordinates of the *ground control points*, the programme recalculates the model by making the micro corrections due to the new data entered: a non-linear transformation is applied, optimising the sum of the reprojection error and the misalignment of the points to the reference coordinates. *ground control points* and *checkpoints* allow the operator to carry out an objective verification (a direct comparison between the returned measurement and the measured one) of the model error. The same software makes it possible to visualise the areas with the highest noise thanks to a chromatic visualisation that assigns a tone from blue to red to each point in the cloud according to the accuracy found: the red tree canopies intuitively clarify the software's calculation method. It is pointed out that the direct survey of the Santa Maria in Viridis made it possible to verify a metric error of the model's area estimated to be below half a centimeter. In the last steps, the programme automatically recalculates a dense cloud, linked to the sparse cloud described above, and then produces a mesh with the corresponding texture. The mesh model and texture can finally be exported as 2d orthomosaics and used in raster-type software, or exported in the various vector formats to be further processed according to different requirements. In this specific case, the data was exported in .obj and re-processed on the 3D modelling software Rhinoceros to manage the perspective view and control the position of the viewpoint.

These operations have therefore made it possible to carry out the 3D model of a significant piece of the city, directly comparable with the historical iconographies (Fig. 1). Through a 3D model, it is possible to easily rotate the scene by adopting different viewpoints and altitudes to simulate the reconstruction of the framing adopted by the various authors.

Fig. 1. Textured 3D model of the area around the Jerusalem Gate and Santa Maria in Viridis.

The urban structure

It is easy to verify the existence of a turreted wall system in the shape of a semicircle along the current Israeli coastline. In diameter, the site is oriented north-south along the coast: it is the result of long history and the events that involved the city until the medieval period, after which it was destroyed and abandoned. The new center of Ashkelon has been rebuilt outside the old city walls in what is now called the Ottoman Quarter.

The oldest archaeological findings date the settlement's origins to the prehistoric period. The city then developed in the Canaanite-Egyptian period, a period to which part of the present walls are traced, and through various dominations came to be occupied in the Roman-Byzantine period, a period to which the urban layout cardo-decumanus, evidenced by the Madaba mosaic, is traced (Hoffman, 2019, pp. 97-134).

The city of Ashkelon, in the medieval period, was served by four gates on its perimeter: the Maris Gate to the west, the Jaffa Gate to the north, the Gaza Gate to the south, and the Jerusalem Gate to the east (William of Tyre). Today we can still recognize the Roman *bouleuterion*, the *odeon,* the church of Santa Maria in Viridis, numerous wells, and fragments of other structures now almost obliterated by erosion and historical decay.

Research and methods for studying the historic city

The contribution aims to present the research results focusing on the form of the ancient city of Ashkelon, thus on its walls and main public structures. A holistic approach makes it possible to collect and annotate all observations from the small to the large scale to recompose a puzzle that is still very fragmentary.

Among the most comprehensive descriptions, the one by William of Tyre offered a relevant hint of analysis by reporting the description of a city with double walls (Fig. 2). A theme on which current historians have debated believing that they found traces of it near the Jerusalem Gate (Hoffman, 2019, pp. 154-176). From reading the texts, the existence of a larger walled circuit appeared plausible, as already has been found in the city of Caesarea, a term of comparison very close to the same urban structure of Ashkelon (Luschi, Stefanini, Vezzi, 2021).

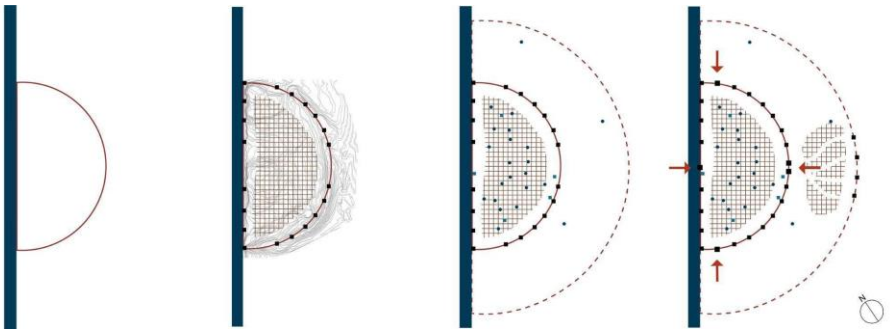

Fig. 2. Staged diagram of William of Tyro's description of the city of Ashkelon.

The study of nineteenth-century sources and iconographies helps trace the historical conservation state of the site.

Explorers of the century include the 1815 mission of Lady Hester Stanhope, who set out in search of a treasure buried under the great mosque, and the 1830 operations of the Egyptian Ibrahim Pasha, who, in his attempt to rebuild a military base on the Tell of old Ashkelon, carried out excavations that brought to light other finds. Iconographies of 1819 by L.N.P.A. Forbin are of great value. So those of 1837 by A. Egron and those of 1838 by D. Roberts that were published in 1855.

Then, towards the end of the century, the mapping operations by authors such as G. Rey in 1871 and Conder and Kitchener in 1875 seem relevant.

The study of the sources, which are extremely fragmentary and heterogeneous, is not in itself sufficient to confirm what was the urban structure of which only a few elements surface today. Concordances and inconsistencies are clues that may suggest transformations and complementarities that are now lost or still to be excavated.

The research develops by comparing the sources and studying the structures visible today by tackling different scales of detail and incorporating them into a larger-scale mapping.

The three-dimensional survey was undertaken to document part of the archaeological asset to compare the sources and the current state. The analysis, therefore, focused on the area of Santa Maria in Viridis and the basilica, privileged subjects in the views of the last century.

This area is particularly significant because, already identified by William of Tyre as one of the main entrances to the city, with two towers flanking the gate, it continued to attract interest even in the 19th century, when G. Rey's drawing and description date back to, and is sufficiently close to the basilica of Santa Maria In Viridis, a structure that leaves several questions open. The latter still shows traces of a particularly complex hydraulic system due to the presence of numerous water pipes and the discovery of some lead pipes. A hydraulic collector system that seems to have belonged to a public water management system is still preserved under the floor layer.

Iconographies of the nineteenth century often depict this fragment of the city. The comparison of the wall profile, placed on a rise surrounding the town, suggests a correspondence between the two images (Fig. 3). Although with some variations, the profiles can be compared in terms of masses and distinctive elements such as a small window and the position of staggered walls. The area that could correspond to the location of Santa Maria in Viridis appears in L.N.P.A. Forbin's image with two archways; in A. Egron's image, it remains buried by rubble, excluding the description of the ruined buildings from later sources.

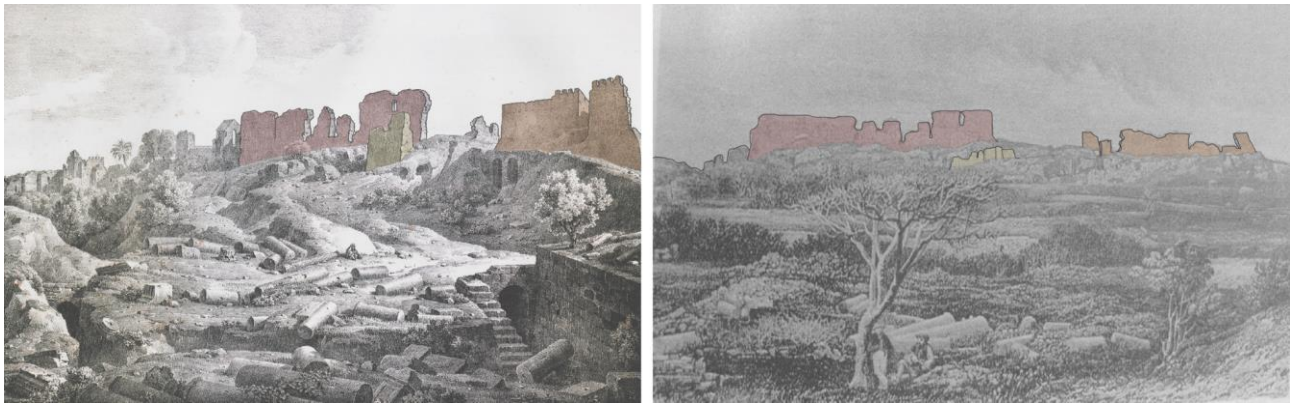

Fig. 3. Comparison of wall remains in the representations of L.N.P.A. Forbin, 1819 (left), A. Keith, 1849 (right).

Conclusions

The construction of a 3D model of a representative piece of the city, compared with historical iconographies, has allowed different disciplines from the technical and humanistic fields to collaborate. Three-dimensional survey and techniques for analysing representations, as iconographic sources considered for their documentary and not just evocative value, are tools for achieving a deeper understanding of the archaeological heritage and shape of the city of Ashkelon.

The observations arising from this approach have suggested new avenues of investigation and may contribute to the formulation of reconstructive hypotheses.

One of the aims of this contribution is to show how, thanks to a holistic approach, it is possible to proceed in research by providing an all-round framework that can transcend the analysis of a single scientific or metric source . Thanks to the combined use of historical and technical data, the research can propose to the scientific community the hypothesis of the presence of a double wall, as described by William of Tyro and first confirmed by in situ findings, and the hypothesis that the basilica Santa Maria in Viridis was part of a larger architectural complex built on an ancient structure of which the particular water system could be a part. The comparisons between the iconography and the current state have shown a worrying insight into the speed of degradation. In fact, the deteriorating condition of the site only in the last century prompted the local authorities to intervene to secure portions of the walls. With a view to research development, the survey campaign already carried out was preparatory to dialogue with the local authorities and planning new excavation campaigns aimed at future in-depth studies to increase knowledge and awareness of the value of the cultural heritage represented by the Ashkelon site.

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References

Stager L. E., Schloen J. D., and Master D. M. (2008). Ashkelon 1: Introduction and Overview (1985–2006). EISENBRAUNS, Winona Lake, Indiana. ISBN 1-978-57506-929-6

Hoffman T. (2019). Ashkelon 8: The Islamic and Crusader Periods, EISENBRAUNS, University Park, Pennsylvania

Luschi C., Stefanini B., Vezzi A. (2021). Forma e cultura architettonica dell'antica città di Ashkelon. Architectural shape and culture of the Ashkelon ancient city. In Evolution - journal of life sciences and society, Vol I, Issue 2, May 2021. pp. 74-83. ISSN 2708-6771

William of Tyre, LIBER XVII, CAPUT XXII. Describitur situs civitatis, et commoditas aperitur William of Tyre: Liber XVII (archive.org)