



ICCAUA Proceedings Journal

Proceedings of the international conference of contemporary affairs in architecture and urbanism-ICCAUA
Volume 9 (December 2026), 2610245

ICCAUA
Proceedings Journal
<https://journal.iccaua.com/>

Journal homepage: <https://journal.iccaua.com/>

DOI: <https://doi.org/10.38027/ICCAUA2026EN0245>

Military Architecture of Early Modern Algeria: The Lost Fort of Burg al-Jazira (Cherchell)

* ¹ Roufeida Amrine, ² Samia Chergui, ³ Safia Benselama-Messikh

^{1, 2, & 3} Laboratory of Environment and Technology for Architecture and Cultural Heritage (ETAP), Institute of Architecture and Urban Planning, University of Blida 1, Blida (09000), Algeria.

¹ E-mail: amrineroufeida@univ-blida.dz / amrineroufeida@gmail.com, ² E-mail: samiachergui@gmail.com, ³ E-mail: safiamessikh@gmail.com

¹ ORCID: <https://orcid.org/0000-0001-8057-2575>, ² ORCID: <https://orcid.org/0000-0002-3935-9622>, ³ ORCID: <https://orcid.org/0000-0003-0504-2974>

Abstract

Received: 28.04.2026
Revised: 27.06.2026
Accepted: 01.07.2026
Available online: 10.07.2026

Copyright © 2026 by the author(s).
All rights reserved.

This article is published under an open-access model and is made available in accordance with the terms of the Creative Commons Attribution 4.0 International Licence (CC BY).



The publisher maintains a neutral stance concerning jurisdictional claims in published maps and institutional affiliations.

This article has been selected and peer-reviewed for publication in this journal as part of the 9th International Conference of Contemporary Affairs in Architecture and Urbanism, held on 7–8 May 2026 in Istanbul, Türkiye.

This study examines the vanished early modern coastal fort of Burg al-Jazira (Fort Joinville) in Cherchell, Algeria, a fortification demolished during the French colonial period. Based on archival research, travellers' accounts, and historical architectural surveys, the study analyses the fort's architectural configuration, defensive features, and construction techniques through critical architectural reading and analytical redrawing. The study situates Burg al-Jazira within Cherchell's broader maritime defence system and compares it with the nearby Ottoman fort of Burg Cherchell, highlighting significant divergences in defensive logic and architectural design. The analysis identifies a pre-Ottoman early modern coastal fortification designed for maritime artillery defence that reflects the Western Mediterranean geopolitical context and the adaptation to artillery warfare, suggesting a circulation of military building knowledge. The research provides a systematic architectural interpretation of Burg al-Jazira and contributes to knowledge of early modern coastal fortifications in the central Maghreb.

Keywords: lost military heritage; early modern coastal fortifications; military architecture; heritage conservation; western Mediterranean; Cherchell.

1. Introduction

Military architectural heritage in Algeria faces significant preservation and documentation challenges. Despite constituting an important part of the country's built heritage, much of it remains what has been characterised as "unexplored architecture," highlighting the need for systematic identification and typological inventory (Benselama-Messikh, 2014; Korichi et al., 2020). Within this context, vanished or demolished fortifications—particularly those with no visible remains—have received very little scholarly attention. Despite the absence of physical traces, they retain considerable historical and commemorative value and can still be investigated rigorously through archival and graphic sources (Russo et al., 2024).

Existing scholarship on early modern military architecture in Algeria (sixteenth to eighteenth centuries) has largely adopted a corpus-building approach, treating fortifications as part of broader studies of Islamic architecture and urban heritage rather than as primary architectural subjects (Chennaoui, 2016; Beldjouzi, 2012; Boutaba, 2018; Boutaba & Arif, 2022). More focused research has predominantly concentrated on Spanish-built fortifications in Spanish-held coastal cities (Bendaoud & Radja, 2000; Bravo-Nieto et al., 2020; Hassam, 2014) or on Ottoman fortifications, most notably Benselama-Messikh's (2014) doctoral thesis, one of the most comprehensive contributions to date. This study catalogues and analyses the typologies of Algiers' Ottoman fortifications (1516–1830) based on French military archives and *in-situ* surveys. Although Burg Cherchell is included within the Dār al-Sulṭān fortifications, its treatment remains limited and does not extend to a detailed architectural case study. Other forts, particularly non-Ottoman examples such as Burg al-Jazira, fall outside the scope (Benselama-Messikh, 2014).

However, none of these studies has examined vanished fortifications as primary architectural objects of study, largely due to the limited archival documentation. Pre-Ottoman early modern coastal fortifications in secondary ports have likewise remained largely unstudied. As a result, their architectural reality remains insufficiently explored, underscoring the need for localized, context-specific investigations based on critical analysis of available archival documentation.

Cherchell constitutes a revealing case of this gap. Among its early modern defensive structures was the pre-Ottoman Burg al-Jazira (Fort Joinville). While early written sources attest to the city's strategic maritime position, they offer no architectural descriptions of its forts (Haëdo, 1881; Léon l'Africain, 1896; Shaw, 1980). During the colonial period, Lassus conducted archaeological surveys of the Joinville islet's ruins, documenting several structures, among which were the foundations of Burg al-Jazira (Lassus, 1959). The most recent study on Cherchell's Ottoman-period military heritage remains largely inventory-based; Burg al-Jazira is treated descriptively, relying on earlier written accounts and Ravoisie's

plan of the city and its surroundings (Boutaba & Arif, 2022). By contrast, surveys by the French military engineering corps (1841) provide detailed graphic documentation, forming a substantial yet underutilized evidentiary basis.

Absent from the urban landscape for over a century, Burg al-Jazira now exists almost exclusively in archival form and has largely faded from scholarly discourse and local collective memory. The archival surveys therefore constitute the primary surviving evidence for understanding the fort's architecture. The present study aims to examine this forgotten fort through the critical architectural reading of French military archival surveys, with particular attention to its spatial organisation, defensive elements, and construction techniques.

The paper argues that Burg al-Jazira represents a relatively rare example of a pre-Ottoman early modern coastal fortification on the Algerian coast, whose configuration reflects early sixteenth-century Western Mediterranean defensive developments and the broader transition toward artillery-based fortification systems, suggesting the circulation of military building knowledge across the region. To address this, the study first outlines the historical and geopolitical context of Cherchell, followed by an architectural analysis of the fort's spatial organisation, defensive logic, and construction techniques. It then situates Burg al-Jazira within Cherchell's broader coastal defence system and provides a comparative reading with Burg Cherchell (Fort Royal), before discussing its typological position within early modern Mediterranean fortifications.

Ultimately, the study contributes to the literature by providing a detailed architectural analysis of Burg al-Jazira based on French military engineering surveys, expanding knowledge of early modern coastal fortifications in Algeria through the study of a non-Ottoman example, and highlighting the methodological value of archival military drawings and technical architectural redrawing for the analysis of demolished fortifications where no physical remains survive. In doing so, it situates Burg al-Jazira within broader debates on Mediterranean coastal defence and military architectural circulation.

2. Materials and Methods

The primary challenge in studying completely vanished fortifications lies in the complete absence of surviving physical remains, precluding direct *in-situ* architectural investigation, requiring the analysis to rely entirely on archival sources and documentation evidence (Castiglione, 2025; Frolova, 2022). Burg al-Jazira was selected as the case study because of its significance as a pre-Ottoman early modern coastal fort in Algeria, its strategic role within Cherchell's maritime defensive system, and the availability of sufficiently detailed archival documentation permitting architectural analysis.

2.1 Archival Sources and Documentary Evidence

The study adopts a case-study approach grounded in primary graphical and textual archival sources. The core corpus consists of nineteenth-century French Military Engineering Corps surveys preserved at the Service Historique de la Défense (SHD, Vincennes), including the surveys of Burg al-Jazira (1840) (Figure 1.) and Burg Cherchell (1841). The archival corpus was selected because it constitutes the only surviving metric documentation of the demolished fort and provides sufficient architectural information to support the analysis.

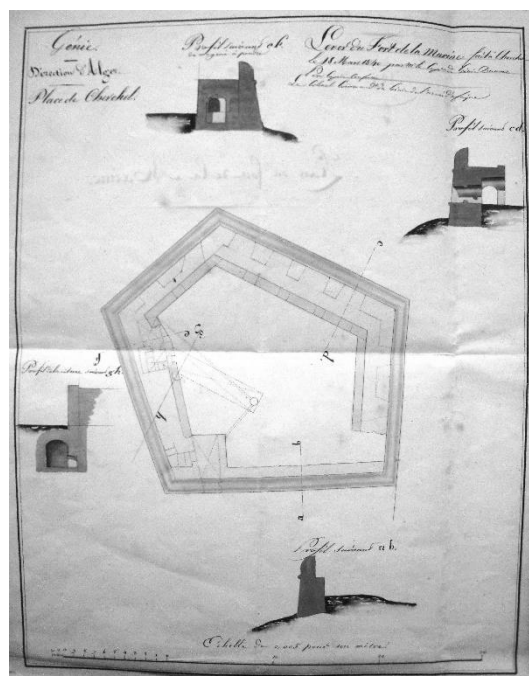


Figure 1. Archival source of Burg al-Jazira. 19th century French military engineering surveys (SHD, Vincennes).

These surveys were produced in the context of early colonial military assessments aimed at evaluating and integrating existing fortifications into a reconfigured defensive system. They provide detailed information on plans, dimensions, elevations, and artillery positions, forming the primary evidentiary basis for the architectural analysis of Burg al-Jazira. This corpus is complemented by two cartographic sources: the cadastral plan of Cherchell (1840), reproduced by Chennaoui (2016), and Ravoisie's plan (1840–1842). These documents situate the fort within its coastal and urban context and allow cross-referencing with the military surveys. Ravoisie's sketches are used as supplementary visual material,

providing qualitative indications of volumetric perception and landscape relationships, without being used for metric analysis.

2.2 Analytical Framework

The study does not attempt a physical reconstruction of the fort, but rather a critical architectural reading of its spatial organisation and defensive configuration based on archival evidence. It adopts a descriptive, interpretative, and comparative architectural approach grounded in the systematic examination and cross-referencing of documentation relating to Burg al-Jazira. Given the precision and completeness of the French military surveys, the analytical framework consists of three complementary, successive stages (Figure 2): data verification and organisation, architectural analysis, and contextual interpretation.

The first stage involves the verification, clarification, and organisation of the architectural information through the critical examination and cross-referencing of archival sources.

The second stage consists of the qualitative assessment of the fort's site organisation, built morphology, defensive elements—including gateways and upper defences—and construction techniques.

The third stage consists of interpreting these results in relation to the fort's historical and geographical context. The fort is analysed within Cherchell's broader maritime defensive system, with a comparative reading of Burg Cherchell highlighting divergences in architectural configuration and defensive logic.

This three-stage analytical framework is supported throughout by two-dimensional technical drawings (plans and sections) produced in AutoCAD directly from the measured data contained in the archival military surveys. These drawings constitute analytical documents rather than hypothetical reconstructions, and serve as the principal graphic technique through which the fort's spatial organisation, defensive configuration, and construction systems are examined.

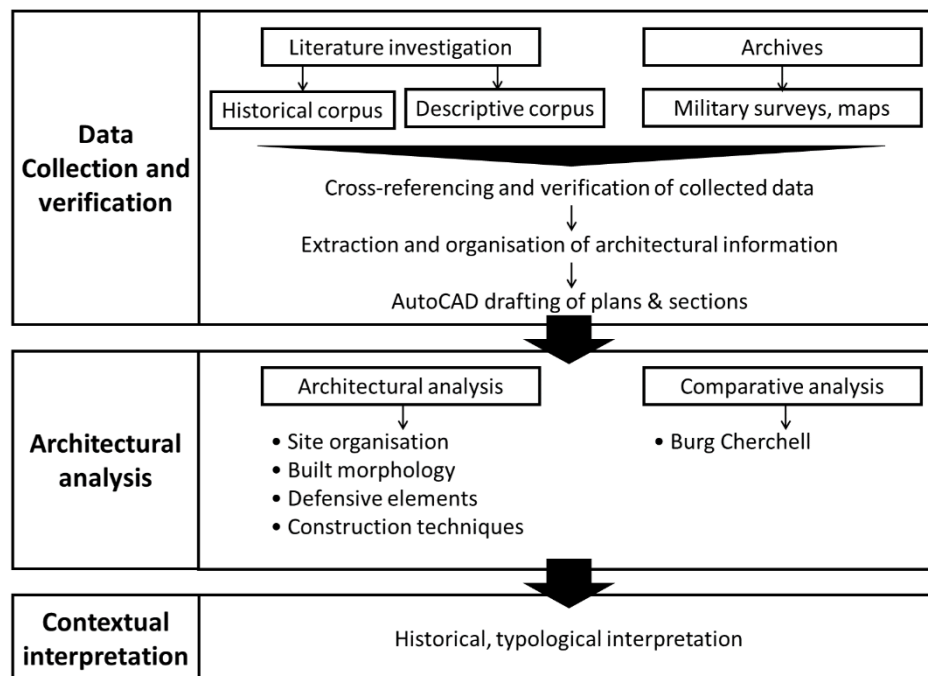


Figure 2. Methodological framework adopted in the Study (Author).

3. Results

3.1 Historical and Geopolitical Context

Cherchell occupies a site of long-standing strategic significance on the Algerian coast, known successively as IOL (Punic), Caesarea Mauretaniae (Roman provincial capital), and later as Cherchell under Berber and Islamic rule (Chennaoui, 2016). After centuries of abandonment, the city was resettled at the turn of the sixteenth century by Andalusian refugees from Granada, Valencia, and Aragon who had been expelled from the Iberian Peninsula following the fall of Granada (Paradis, 1898). Experienced sailors familiar with Iberian waters, they engaged in commerce and corsair activity in the western Mediterranean. They recognised Kara Hassan as their leader—a Turkish corsair, former companion of Barbarossa and later his rival, who established control over Cherchell and its surroundings (Paradis, 1898). In 1516, Aruj Reis seized the city and installed a garrison of his Turkish soldiers (Berbrugger, 1865). The city's proximity to Spain, its sheltered natural harbour, and the surrounding forests supplying timber for shipbuilding made it an ideal base for corsair operations (Berbrugger, 1865; Haëdo, 1881; Paradis, 1898).

From the sixteenth to the eighteenth century, amid intensified geopolitical and military rivalry between Christian and Muslim powers over territorial expansion and control, Cherchell was frequently targeted by Spanish naval expeditions, prompting the construction of coastal defences. Several historical accounts indicate that the city initially lacked an enceinte, a situation persisting into the early sixteenth century (Haëdo, 1881; Léon l'Africain, 1896; Paradis, 1898). The first clear reference to defensive walls appears in Thomas Shaw's account, indicating that an enceinte had been established by the eighteenth century (Shaw, 1980).

Notably, two forts—predating the enceinte of Cherchell—emerged as central components of its maritime defence: Burg al-Jazira and Burg Cherchell, both considered among the first known early modern forts erected in the central Maghreb (Benselama-Messikh, 2014; Berbrugger, 1865).

Their construction coincided with the military revolution, characterised by rapid developments in gunpowder artillery and evolving siege tactics, which exposed the limitations of medieval fortification design and rendered them obsolete. This required new architectural responses: lower, thicker, and angled walls, often reinforced with earthworks and designed both to resist cannon fire and to accommodate artillery (de Crouy-Chanel, 2007; Faucherre et al., 2014; Vera Boti, 2001). In the central Maghreb, where medieval military architecture was limited, these transformations raise key questions regarding the adaptation of coastal fortifications to Mediterranean warfare.

3.2 Case Study: Burg al-Jazira

Burg al-Jazira was known locally as Burg al-Jazira (the islet fort) or Burg al-Bahr (the sea fort) (Saïdouni, 2001), in reference to its location on Joinville islet. During the early phase of French colonisation, the fort remained in use from 1840 to 1848, and was variously referred to as “fort de l’îlot,” “fort Joinville,” or “fort de la Marine” (Berbrugger, 1865). The chronology and attribution of Burg al-Jazira remain uncertain. Lassus’ work and Ravoisié’s plans label it a Turkish fort (Lassus, 1959; Ravoisié, 1846–1850), reflecting a terminological imprecision characteristic of nineteenth-century French colonial scholarship, in which the term was routinely applied to any pre-colonial, non-Roman structure regardless of its precise date. Berbrugger, relying on Leo Africanus’s original Italian text, which reports the construction of a fortress by Andalusian refugees upon their arrival in Cherchell, identifies this structure as Burg al-Jazira and further argues that it predates Burg Cherchell, suggesting a pre-Ottoman construction (Berbrugger, 1865).

In parallel, the map of the Algerian coast around Algiers by the Ottoman admiral Piri Reis in *The Book of the Sea* (1513) depicts a pentagonal structure rendered in red on the islet, although not explicitly labelled (Figure 3.). When cross-referenced with textual sources, the visual indication suggests that the fort was constructed between the arrival of Andalusian refugees in 1496 (Chennaoui, 2016) and 1513. The fort was therefore likely constructed during the Andalusian refugee settlement phase before Ottoman control of Cherchell, although later Ottoman occupation and possible modifications cannot be excluded.



Figure 3. Extract of Piri Reis’s 1513 map of the Algerian coast.

Archaeological investigation of the islet has revealed the remains of successive earlier occupations, including Phoenician dwellings, a Roman villa, an apsidal sanctuary, and an ancient lighthouse (Lassus, 1959). During the early colonial period, the fort initially remained in military use and was considered for integration into the new French colonial fortification system following projected modifications and adaptations. However, these proposals were ultimately abandoned, and the structure was demolished to make way for the present-day lighthouse.

3.3 Architectural and Defensive Analysis

3.3.1 Implantation and Site Configuration

The fort was erected on a small hillock on Joinville islet, locally known as Sīdī ‘Alī al-Ferkī. It occupies the outermost point projecting into the sea along Cherchell’s coastline, providing an unobstructed view of the open sea and the adjacent littoral on both sides, enabling effective surveillance of approaching vessels.

Facing the city and the harbour—the only suitable anchorage and landing point—the islet was connected to the mainland by a jetty of approximately 100 metres long constructed under Khayr al-Dīn Barbarossa (Figure 4.). This intervention, comparable to works undertaken in Algiers, created a harbour basin protected from strong westerly winds (Chennaoui, 2016; Haëdo, 1881; Léon l’Africain, 1896).

The site’s natural configuration further reinforced its defensive value: the islet is formed of sandstone of varying hardness terminating in steep cliffs exposed to strong waves (Lassus, 1959). This restricted access to a single vulnerable approach from the landward side, while the remaining perimeter is naturally protected by maritime escarpments.



Figure 4. Location of Burg al-Jazira and its relation to the urban structure of the city of Cherc'hell, 16th century (Chennaoui 2016).

3.3.2 Design and Spatial Organisation

Burg al-Jazira is defined by an irregular polygonal (pentagonal) plan forming the main enclosing rampart, without flanking defensive works (bastions). According to Lassus, the north wall measures 19.50 metres, forming angles of 115° with the east wall (16.98 metres) and 111° with the west wall (14.13 metres) (Lassus, 1959).

The internal organisation is centred on a courtyard, establishing an inward-facing spatial structure. At its centre lies a rectangular, vaulted underground cistern for rainwater collection and storage, ensuring the fort's autonomy during a siege. The fort is organised into four wings of varying depth, integrated within the enclosing ramparts, three of which are subdivided into vaulted units along the northern side (Figure 5.).

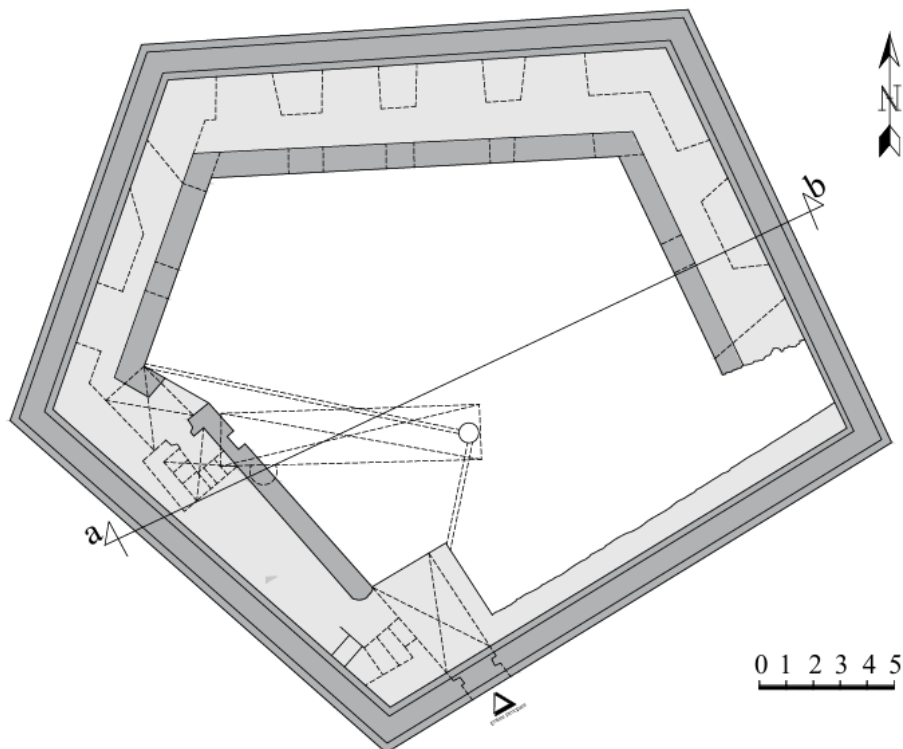


Figure 5. Plan of Burg al-Jazira, (from the 1840 SHD French military survey, redrawn by Author).

The southern side departs from this regularity: its two curtains are of simpler construction, with the south-west curtain widened and the south-east curtain reduced to a narrow wall-walk, except at the section containing the entrance. The courtyard provides access to all internal spaces, including vaulted artillery casemates arranged at ground level along the north, east, and west curtains. These are arranged as a series of vaulted units opening onto the courtyard and separated by pierced transverse load-bearing walls allowing circulation between them (Figure 6.).

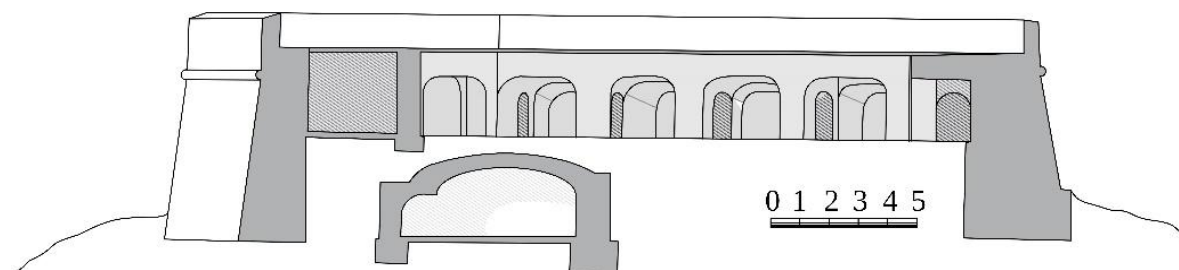


Figure 6. Longitudinal section a-b - Burg al-Jazira (redrawn from the 1840 SHD military survey by Author).

No dedicated permanent garrison quarters have been identified, likely due to the fort's proximity to the city. A vaulted chamber embedded within the south-west curtain, approximately 0.80 metres below courtyard level, likely served as a powder magazine. The wings are surmounted by terraces, except for the south-east curtain facing the harbour, which is instead topped by a narrow wall-walk approximately 0.80 metres wide.

Burg al-Jazira presents a single-storey elevation of uniform height, reaching a maximum height of 6.68 metres on the northern seaward front, including the parapet, in response to the site's topography. This lowered profile reflects adaptation to artillery warfare and the defensive requirements of early modern coastal fortification.

3.3.3 Gate Defences

The access is designed to minimise vulnerable points and exposure of the entrance to attack. The fort features a single, direct frontal entrance opening into a vaulted rectangular guardhouse, providing direct access to the courtyard. This configuration marks a departure from the medieval bent entrance, which lost its effectiveness with the development of artillery warfare, reflecting broader adaptations in early modern defensive design.

The entrance is devoid of outer defensive works; the gate is pierced through the south-east curtain at its southernmost point, oriented towards the harbour and the city, away from the principal direction of attack, and opens directly at ground level, without a ditch or drawbridge, as the islet topography itself constitutes a natural obstacle, severely restricting any direct approach from land or sea.

3.3.4 Upper Defensive Structures

The terraces, occupying the four wings of the fort, appear to have served primarily for observation and surveillance rather than as upper batteries. The parapet is continuous and lacks cannon embrasures, indicating the absence of artillery use at this level. Access to the upper level (terraces and wall-walk) is provided by L-shaped staircases originating from the guardhouse. The parapet is built in stone masonry with a rounded upper slope and measures between 1.72 and 2.00 metres in height and between 1.30 and 1.45 metres in thickness.

However, Ravoisie's sketches depict a cannon embrasure on the north curtain parapet, which does not correspond to the earlier configuration and may correspond to a later French colonial modification. This feature is also recorded in French project drawings, suggesting that the proposed intervention may have been partially implemented.

3.3.5 Materials and Construction Techniques

Burg al-Jazira is constructed primarily of large ashlar masonry, most likely sourced from the abundant ruins present both on the islet and within the city, a practice well attested in Cherchell during this period (Chennaoui, 2016), indicating a deliberate emphasis on durability and structural robustness. Lassus examined the fort's foundations and questioned their origin on account of the quality of the masonry and binding material, suggesting the possible reuse of earlier substructures predating the Ottoman period (Lassus, 1959).

The outer rampart walls are largely solid, with openings limited to the entrance and the row of vaulted embrasures along the seaward front. They incorporate an ashlar stone cordon separating the sloping outer faces from the vertical parapets, ensuring structural stability and reflecting a vocabulary associated with early modern European military architecture (Belidor & Jombert, 1768; Žmegač, 2025). The survey indicates variations in curtain thickness and construction techniques across the fort.

The seaward curtains remain relatively consistent: the north curtain measures 4.95 metres, the north-east 4.55 metres, and the north-west 3.88 metres. The exterior north wall, 2.65 metres thick, consists of a hard concrete core incorporating irregular fragments of various materials, enclosed between two ashlar facings (Lassus, 1959).

The casemates of these curtains are structurally reinforced by a system of barrel vaults integrated within the thickness of the rampart. These vaults, rising to 2.64 metres at the apex of the intrados, are constructed between transversal load-bearing walls arranged perpendicular to the rampart. In contrast, the landward curtains adopt different construction techniques. The south-west curtain is built in rammed earth between two stone facings, with a thickness varying between 5.05 and 4.06 metres. This technique reduces construction time and cost while improving resistance to artillery by

absorbing impact and limiting splintering (Djelloul, 1995). The south-east curtain, thinner at approximately 2.20 metres, is constructed in shuttered masonry. These variations indicate a clear prioritisation of reinforcement on the seaward fronts. The survey indicates that different vaulting systems were used according to spatial and functional requirements; however, these distinctions are not always clearly specified in the available sections. Barrel vaults are primarily associated with the casemates, whereas groin vaults are used in enclosed interior spaces such as the guardhouse, cistern, and powder magazine.

3.3.6 Defensive System and Tactical Positioning

Cherchell is located on a Tyrrhenian sandstone terrace forming a narrow coastal strip between the first mountain slopes and the sea (Leveau, 1984). It is enclosed on three sides by mountains inhabited by local tribes, leaving the sea as its principal source of threat (Shaw, 1980). The coastline is rocky and sinuous, rising approximately twenty metres above sea-level in steep cliffs and significantly limiting potential landing zones (Leveau, 1984). At its outermost maritime point lies a small islet facing the city. These natural conditions are reinforced by a secondary layer of built defences.

As the earliest known defensive structure of the early modern city, Burg al-Jazira formed the forward element of Cherchell's coastal defensive system, controlling access to the harbour within a broader network of natural and built defences. Its sole firing front is oriented seaward and is organised as a series of casemated batteries at ground level, enabling *tir à fleur d'eau* (sea-level artillery fire) against approaching vessels. The fort mounted eight cannons, distributed according to the number of embrasures: four on the north curtain and two on each of the northeast and north-west curtains. Their field of fire extends over an angle of approximately 196° , from the northeast to the southwest, covering a wide maritime sector, while the landward front does not include artillery positions. This configuration indicates a prioritisation of maritime defence and limits the fort's capacity to defend its rear.

This disposition is consistent with local geography, which renders the fort difficult to approach from land, and is reinforced by the wider defensive system of Cherchell. The urban fabric was enclosed on three sides by substantial walls approximately forty feet high, strengthened by buttresses (Shaw, 1980). Within this perimeter, an open strip of land separated the town from the shoreline and functioned as an additional defensive element. This zone accommodated Burg Cherchell and an adjacent irregular battery, equipped with eight cannons, known as Burg al-Assas or Burg al-Bled (Chennaoui, 2016). In conjunction with these supporting structures, Burg al-Jazira contributed to a layered defensive arrangement associated with the protection of the harbour and its approaches, covering blind spots and creating overlapping fields of fire (Figure 7.).

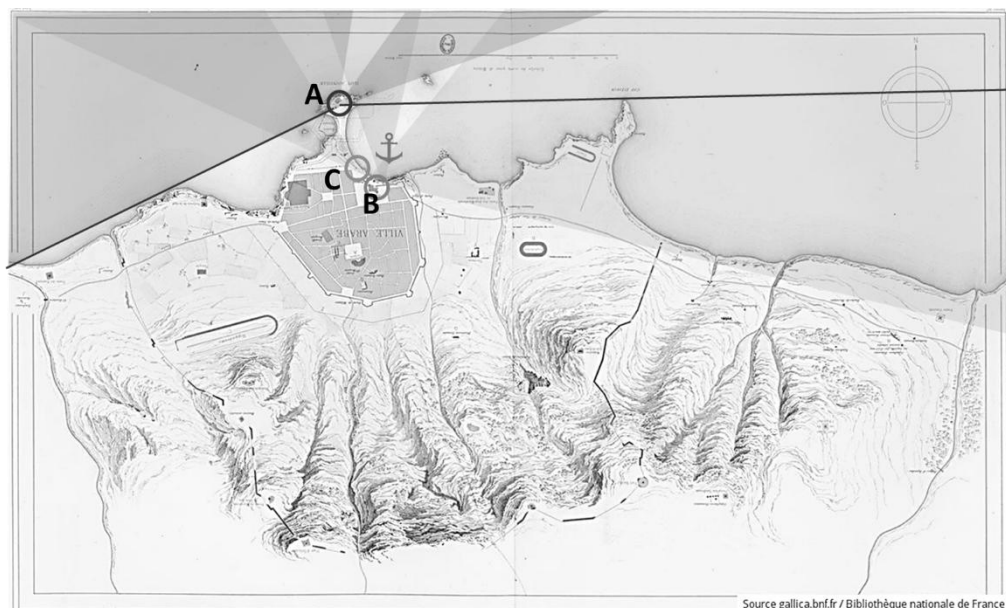


Figure 7. Burg al-Jazira's artillery coverage, the overlapping fields of fire (A: Burg al-Jazira, B: Burg Cherchell, C: Burg al-Assas) (Ravoisié, 1846–1850, annotated by Author).

Such spatial organisation, in which a coastal strip is reserved for fortification, corresponds to Moorish-Andalusian port settlements along the North African coast, with comparable examples at Ténès (Algeria) and Bizerte (Tunisia) (Chennaoui, 2016). Access to these defensive structures, including the islet fort, was therefore channelled through controlled routes within the fortified urban and harbour system, thereby reinforcing their integration within the defensive framework.

3.3.7 Comparative Observations with Burg Cherchell

Burg Cherchell, commissioned by Aruj Reis shortly after the seizure of the city in 1516 under the direction of the Andalusian architect Caïd Mah'moud Ben Fares Ez-zaki (Berbrugger, 1865), provides a relevant point of comparison for understanding the architectural specificity of Burg al-Jazira. Although both forts were constructed within a relatively short chronological interval, between the late fifteenth and early sixteenth centuries, a comparison of their spatial organisation, defensive characteristics, and construction techniques reveals several notable differences.

Although both are isolated coastal forts, their topographical settings differ considerably. Burg al-Jazira occupies an offshore islet controlling the harbour entrance, whereas Burg Cherchell stands on a steep cliff within the city enclosure, commanding both the harbour and Burg al-Jazira below. These contrasting locations correspond to different fields of observation and control within the defensive system (Figure 8).

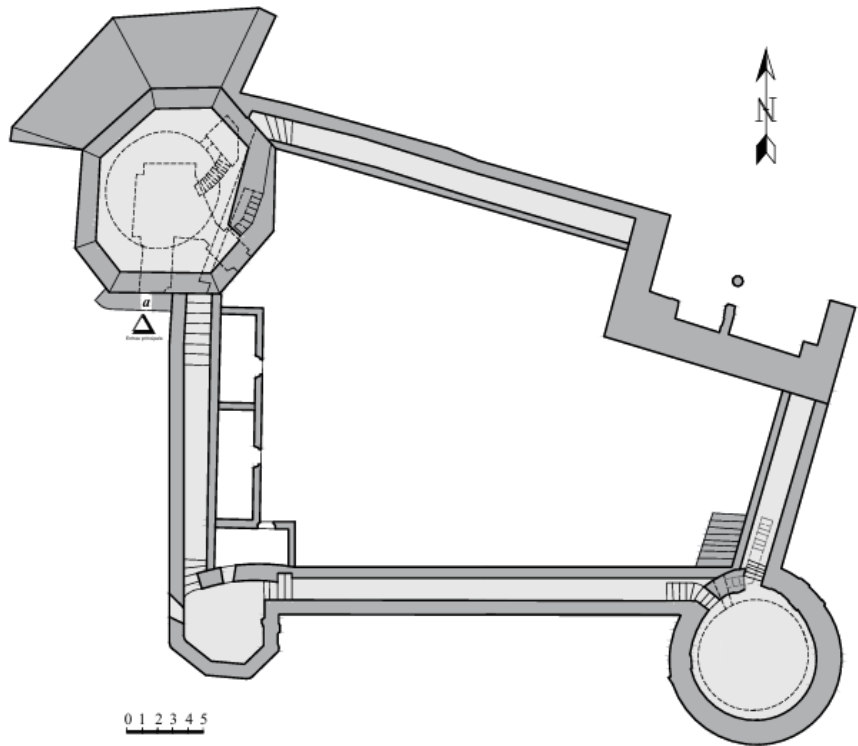


Figure 8. Plan Burg Cherchell (redrawn by the author from the 1840 SHD French military survey).

Unlike Burg al-Jazira, Burg Cherchell adopts a considerably larger irregular rectangular plan, enclosing a central courtyard and a bent entrance within its octagonal tower. It also presents a markedly higher profile, with thinner curtains exceeding 10 metres and towers reaching almost 13 metres. These characteristics are typical of medieval military architecture. The upper defences comprise wall-walks protected by crenellated parapets with a loophole beneath each pyramidal merlon, a feature commonly associated with Andalusian and Maghrebi military architecture. At the north-east angle, the structure is articulated as a re-entrant covered recess integrating a reused Roman column, suggesting adaptation to pre-existing remains rather than a purely defensive arrangement (Table 1). Construction techniques also differ between the two forts. While both forts reuse stones from Roman ruins, archival reports indicate that Burg Cherchell employs shuttered masonry, consisting of rammed-earth infill between two facings of squared rubble masonry (Benselama-Messikh, 2014). The internal spaces of its towers are covered by masonry domes. In contrast, Burg al-Jazira is characterised by thick, low ashlar masonry walls combined with reinforced vaulted systems and casemated artillery structures.

Table 1: Comparative architectural characteristics of Burg al-Jazira and Burg Cherchell (Author).

	Burg al-Jazira	Burg Cherchell
Date (approximate)	1496–1513	1516–1518
Location	Offshore islet At the harbour entrance	Cliff edge 20 m above sea level between harbour and city
Layout	Irregular pentagonal plan (NE) 20.35 m, (NW) 14.74 m, (E) 17.72 m, (W) 18.61 m, (S) 22 m Central pentagonal courtyard	Irregular rectangular plan (N) 48.45 m, (S) 40.23 m, (E) 29.10 m, (W) 33.9 m Central courtyard
Profile height	6.58m	Curtain 10.55 m, towers 11.01–12.88 m
Entrance	1 Direct Through south-east curtain	1 Bent-entrance Within the octagonal tower
Water supply	Cistern	(None)
Construction techniques	Ashlar masonry, Barrel-vaulted casemates (north curtains), Rammed earth (southwest curtain), Shuttered masonry (southeast curtain)	Shuttered masonry, Squared rubble, Domed towers, Partial reuse of earlier structure
Typological character	Transitional artillery fortification	Medieval-Andalusian fortification

In terms of defensive characteristics (Table 2), Burg Cherchell relies on three projecting towers of varying forms and dimensions to provide flanking capability: an octagonal tower at the north-west angle facing the sea, a circular tower at the south-east angle, and a smaller orthogonal tower projecting from the western curtain and flanking the southern curtain. The circular and orthogonal towers both face the town. Polygonal towers, while present in North African and Andalusian medieval fortifications, were less common than circular and orthogonal ones (Djelloul, 1995). They are considered characteristic of the Andalusian military architectural tradition and became increasingly widespread in North Africa during the late fifteenth century, often associated with Morisco engineers (Abd al-Aziz, 1986; Pavón Maldonado, 2005). In contrast, Burg al-Jazira lacks projecting towers and instead incorporates ground-level casemated batteries specifically designed for artillery deployment. None of the towers of Burg Cherchell appears to have been equipped for artillery, indicating only limited adaptation to gunpowder weaponry. Rather, its defensive system is centred on tower-based surveillance and vertical dominance, unlike the compact pentagonal mass of Burg al-Jazira, whose design focuses on maritime artillery defence.

Table 2: Comparative defensive characteristics of Burg al-Jazira and Burg Cherchell (Author).

	Burg al-Jazira	Burg Cherchell
Flanking defence works (Towers/Bastions)	(None)	3 towers: -North-west angle octagonal tower (12.88 m), hollow, 2 levels -South-east angle circular tower (11.01 m), hollow, 1 level -South-west angle orthogonal tower (uncertain)
Upper defences	Terrace (surveillance) Plain parapet (1.76–2.05 m), no embrasures	Wall-walks Crenellated parapets (1.01-1.47 m), pyramidal merlons, and loopholes
Curtain height	6.68 m	10.55 m
Curtain thickness	2.2–5.05 m	2.09–2.35 m
Artillery integration	Ground-level casemated batteries	Limited artillery adaptation
Role	Maritime artillery defence Maritime surveillance Anchorage control	Maritime and urban surveillance Local population control

Overall, the comparison highlights substantial differences in architectural layout, defensive organisation, construction techniques, and artillery integration between the two forts.

4. Discussion

The study reinterprets the demolished fort of Burg al-Jazira through the analysis and redrawing of nineteenth-century French military surveys, establishing it as an early modern fortification in the central Maghreb. Its construction falls within the transitional period between the late fifteenth and early sixteenth centuries, marked by intensified Christian–Muslim conflict across the western Mediterranean and the rapid development of artillery warfare, which rendered medieval fortifications increasingly inadequate and drove a shift from predominantly passive to more active defensive systems. The architectural analysis suggests a purpose-built, isolated coastal fort reflecting these transformations.

Within the relatively modest defensive framework of Cherchell, largely dependent on the site's natural topography and a limited number of built fortifications, Burg al-Jazira occupies a strategic position on Joinville islet at the entrance to the harbour, facing the city, and functions as a forward maritime defensive outpost. The fort fulfilled complementary functions, including the surveillance of the open sea, control of the anchorage, and protection of the harbour and the city, thereby contributing to the repulsion of recurrent seaborne threats. This situation is comparable to other forts constructed on offshore islets extending into the sea for similar strategic purposes, such as Burg al-Fnar (Algiers), Fort Mandry (Tripoli), and the fortress of Abu Qir (Alexandria). These examples reveal analogous spatial relationships between the mainland, maritime approaches, and offshore fortified outposts, reflecting a shared strategy aimed at projecting control beyond the shoreline and intercepting maritime threats before they reached the urban fabric.

From an architectural and defensive perspective, the fort's configuration and structural adaptations express both its strategic role and the broader shift in defensive logic associated with artillery warfare. Its compact polygonal configuration, reduced elevation, and reinforced ramparts mark a significant departure from earlier medieval defensive traditions, reducing exposure to enemy fire. Variations in construction techniques across the fort's perimeter—from vaulted buttresses to rammed earth and shuttered masonry—indicate a hierarchy of reinforcement according to the anticipated direction of attack. The use of rammed earth and the barrel-vault system integrated within the rampart thickness extends beyond spatial organisation, functioning as a lateral bracing mechanism against artillery impact, while supporting the loads of the terrace above (García Mas & Martínez-Medina, 2015). It also contributes to reducing the propagation of vibrations caused by cannonball impact (Corbin, 1892), suggesting a technically sophisticated response to artillery bombardment. The adaptation to artillery extends beyond passive defence to the active deployment of firearms within the fort's spatial organisation. This integration appears to have been concentrated in casemated ground-level batteries oriented primarily towards the maritime sector, while the terraces were reserved for observation.

However, the specificity of Burg al-Jazira cannot be fully understood without situating it within its broader architectural and regional context. Algeria appears to have entered the early modern period without a well-established tradition of medieval military architecture that could have served as a design reference (Beldjouzi, 2012; Bourouiba, 1983). Although

Haëdo mentions the existence of ribats at Cherchell, this account is not attested in other sources, including medieval Arabic geographers such as al-Bakri and al-Idrisi, making the nature of any preceding defensive infrastructure uncertain (Haëdo, 1881). Within this context, Burg al-Jazira stands out as an atypical configuration, most notably expressed in its irregular pentagonal plan. While pentagonal geometries existed prior to the advent of gunpowder, their use in Islamic military architecture in North Africa and al-Andalus appears comparatively limited, where square, rectangular, hexagonal, and octagonal forms predominated, particularly in defensive elements such as towers (Djelloul, 1995). By contrast, pentagonal configurations are more frequently attested in Iberian fortification contexts, particularly within late medieval Christian defensive architecture (Pavón Maldonado, 2005). In this light, the design of Burg al-Jazira underscores its distinctiveness within the regional corpus and points towards affinities with broader western Mediterranean fortification practices.

This interpretation is further supported when considered against the broader Ottoman approach to fortification in early sixteenth-century Algeria. As documented by Benselama-Messikh for Algiers, early Ottoman military architecture initially remained rooted in medieval forms before progressively incorporating imported models and Italian-influenced poliorcetic principles through the movement of renegade engineers during the sixteenth century (Benselama-Messikh, 2015). In contrast, the level of architectural adaptation observed at Burg al-Jazira—particularly in its early and coherent integration of artillery—suggests an earlier or more direct engagement with these developments.

A comparison with Burg Cherchell further highlights the architectural specificity. Although both forts were constructed within relatively close chronological proximity, they exhibit markedly different architectural and defensive logics. While Burg al-Jazira is organised as a compact, low-profile structure oriented towards maritime artillery defence, Burg Cherchell retains a more vertical configuration characterised by thinner walls and tower-based defences oriented primarily towards urban control than maritime defence. Its use of circular and polygonal towers, bent entrance, and defensive features associated with medieval Andalusian traditions—particularly octagonal forms and pyramidal merlons—appears consistent with earlier defensive models. Based on French military reports and discussed by Benselama-Messikh (2014), this configuration appears to have been oriented not only towards external threats but also towards the control and surveillance of the urban space. This contrast illustrates the coexistence of distinct defensive models within the same urban context, reflecting differing strategic priorities: Burg al-Jazira responds primarily to maritime threats through an integrated artillery system, whereas Burg Cherchell appears more closely tied to the consolidation and control of the urban environment.

In this regard, Burg al-Jazira represents a relatively rare example in the central Maghreb, illustrating an early response to artillery warfare in a coastal context that extends beyond what might be expected from local continuity or regional inheritance, and may instead indicate a circulation of military knowledge across the western Mediterranean.

From a typological perspective, Burg al-Jazira belongs to a transitional phase in the development of artillery fortification preceding the formalisation of bastioned systems. Its polygonal layout, reinforced ramparts, and ground-level casemated batteries indicate an early adaptation to artillery warfare. At the same time, the absence of bastions, flanking defensive works, and outerworks make the fort distinct from the fully developed bastioned fortifications that came to define Mediterranean military architecture from the mid-sixteenth century onward. This configuration appears to reflect an earlier stage in the development of artillery fortification rather than a defensive limitation. This intermediate position underscores the fort's architectural specificity within the development of early modern fortification in the central Maghreb.

5. Conclusions

This study investigated the vanished fort of Burg al-Jazira through the critical architectural analysis of nineteenth-century French military engineering surveys. By relying on archival documentation as its primary source of evidence, the study demonstrates the potential of historical military surveys for investigating completely demolished fortifications and recovering overlooked military heritage.

These findings support the study's argument that Burg al-Jazira represents a rare example of a pre-Ottoman Algerian maritime defensive outpost integrated within Cherchell's layered coastal defence system. Its compact polygonal plan, reduced elevation, reinforced ramparts, ground-level casemated batteries, and differentiated construction techniques reflect a coherent adaptation to artillery warfare. These features distinguish the fort from contemporary regional examples and position it within a transitional phase in the evolution of artillery fortification in the early sixteenth-century Western Mediterranean, preceding the emergence of fully developed bastioned systems.

The comparative reading with Burg Cherchell revealed the coexistence of two architecturally and strategically distinct defensive models within the same context. While Burg Cherchell largely retains medieval-Andalusian defensive characteristics, centred on surveillance and vertical dominance, Burg al-Jazira reflects a defensive logic specifically adapted to maritime artillery warfare. This contrast highlights differing strategic priorities and suggests the circulation and local adaptation of military building knowledge across the western Mediterranean.

The study contributes to the existing literature in three principal ways. First, it provides the first detailed architectural analysis of Burg al-Jazira, a fortification that has largely disappeared from both the physical landscape and scholarly discourse. Second, it expands the limited body of research on pre-Ottoman military architecture in Algeria. Third, it demonstrates the methodological value of combining archival military surveys with technical architectural redrawing for the study of vanished fortifications.

The analysis is nevertheless constrained by the nature of the available evidence. Although nineteenth-century surveys provide a highly detailed architectural record, it remains difficult to determine the extent to which they reflect the fort's original configuration or later modifications.

Despite its absence, the fort presents a key reference for understanding an overlooked phase of early modern coastal fortification in Algeria and provides a basis for further comparative and documentary research. Its archival recovery may

represent only an initial step towards future efforts aimed at reintegrating this lost heritage into local and national collective memory and cultural identity.

Acknowledgements

The authors would like to thank the Laboratory of Environment and Technology for Architecture and Cultural Heritage (ETAP), University of Blida 1, for its academic support. The authors also thank the anonymous reviewers whose insights helped improve the clarity and quality of the manuscript.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Conflicts of Interest

The authors report no conflicts of interest.

Data Availability Statement

The data supporting the findings of this study are contained within the article and its referenced archival sources. Additional materials are available from the corresponding author upon reasonable request.

Institutional Review Board Statement

Not applicable.

CRedit Author Statement

Conceptualization: R.A.; Methodology: R.A.; Investigation: R.A.; Formal Analysis: R.A.; Visualization: R.A.; Data Curation: R.A.; Writing – Original Draft: R.A.; Writing – Review & Editing: R.A., S.C., S.B.-M.; Supervision: S.C., S.B.-M.; Resources: S.B.-M.; Validation: S.C., S.B.-M. All authors have read and approved the final version of the manuscript.

Reference List

- Abd al-Aziz, S. (1986). *Al-masājid wa-al-quṣūr fī al-Andalus [Mosques and palaces in Andalusia]*. Mu'assasat Shabāb al-Jāmi'a.
- Beldjoui, B. (2012). *Āthār 'imrān ḥawādir bāylik al-gharb fī al-'ahd al-'uthmānī: Māzūna wa-Ma'askar wa-Wahrān wa-Mustaghānim anmūdḥajan [Monuments of the western Beylik district in the Ottoman era: Mazouna, Mascara, Oran, and Mostaganem as a model]* [Doctoral dissertation, University of Algiers 2].
- Belidor, B. F. de, & Jombert, C. A. (1768). *Dictionnaire portatif de l'ingénieur et de l'artilleur [Portable dictionary of the engineer and artilleryman]*. C. A. Jombert.
- Bendaoud, F., & Radja, H. (2000). *Étude de l'architecture militaire de la ville d'Oran pendant l'occupation espagnole (1505–1792) [Study of the military architecture of the city of Oran during the Spanish occupation (1505–1792)]* [Master's thesis, École Polytechnique d'Architecture et d'Urbanisme]. DSpace EPAU. <https://dspace.epau.edu.dz/items/06a21f09-93b2-4d2a-beb3-35beeb045ba7>
- Benselama-Messikh, S. (2014). *Les fortifications ottomanes d'Alger: Essai de restitution typologique et défensive 1516–1830 [The Ottoman fortifications of Algiers: An essay in typological and defensive restitution 1516–1830]* [Doctoral dissertation, Aix-Marseille Université].
- Benselama-Messikh, S. (2015). Les fortifications ottomanes d'Alger (1516–1830) [The Ottoman fortifications of Algiers (1516–1830)]. In P. Rodríguez-Navarro (Ed.), *Defensive Architecture of the Mediterranean: XV to XVIII Centuries* (Vol. 1, pp. 125–132). Universitat Politècnica de València. <https://doi.org/10.4995/FORTMED2015.2015.1680>
- Berbrugger, A. (1865). Le fort de Cherchell [The fort of Cherchell]. *Revue Africaine*, 9(51), 202–206.
- Bourouiba, R. (1983). *L'architecture militaire de l'Algérie médiévale [The military architecture of medieval Algeria]*. Office des publications universitaires.
- Boutaba, M. (2018). *Atlas al-'imāra al-'askariyya bi-al-Jazā'ir fī al-'ahd al-'uthmānī min khilāl al-maṣādir al-māddiyya wa-al-kitābiyya [Atlas of military architecture in Algeria during the Ottoman era through material and written sources]* [Doctoral dissertation, University of Algiers 2].
- Boutaba, M., & Arif, K. (2022). Al-munsha'āt al-mi'māriyya al-ḥarbiyya bi-madīnat Sharshāl khilāl al-ḥukm al-'uthmānī [Military architectural constructions in the city of Cherchell during the Ottoman rule]. *Majallat Āfāq 'Ilmiyya*, 14(1), 75–94.
- Bravo-Nieto, A., Ramírez-González, S., & Metair, K. (2020). De Diego de Vera a Juan Martín Zermeno: tres siglos de reformas en la arquitectura del castillo viejo de Rosalcazar en Orán, Argelia [From Diego de Vera to Juan Martín Zermeno: three centuries of reforms in the architecture of the old castle of Rosalcazar in Oran, Algeria]. In G.-P. Navarro Palazón (Ed.), *Defensive Architecture of the Mediterranean: XV to XVIII Centuries* (Vol. 12, pp. 1077–1084). Universidad de Granada; Universitat Politècnica de València; Patronato de la Alhambra y Generalife. <https://doi.org/10.4995/FORTMED2020.2020.11460>
- Castiglione, F. (2025). Memorie e tracce scomparse di una città fortificata: il caso studio di Cosenza [Memories and missing traces of a fortified city: The case study of Cosenza]. In O. Zerlenga & V. Cirillo (Eds.), *Defensive Architecture of the Mediterranean: XV to XVIII Centuries* (Vol. 19, pp. 505–512). Università degli Studi della Campania Luigi Vanvitelli; Universitat Politècnica de València. <https://doi.org/10.4995/fortmed2025.2025.20289>

- Chennaoui, Y. (2016). Notes sur le modèle urbanistique des villes portuaires de fondation andalouse au Maghreb, après 1492: la médina de Cherchell (Algérie) [Notes on the urban model of port cities of Andalusian foundation in the Maghreb, after 1492: The medina of Cherchell (Algeria)]. *RM2E - Revue de La Méditerranée Édition Électronique*, 3(1), 153–168.
- Corbin. (1892). *Cours de fortification permanente. 1ère partie: Les principes de la fortification déduits de son histoire* [Course on permanent fortifications. Part 1: The principles of fortification deduced from its history]. École d'application de l'artillerie et du génie.
- de Crouy-Chanel, E. (2007). La genèse du système bastionné [The genesis of the bastioned system]. In I. Warmoes (Ed.), *Vauban, bâtisseur du Roi-Soleil* (pp. 18–25). Cité de l'architecture et du patrimoine.
- Djelloul, N. (1995). *Les fortifications côtières ottomanes de la régence de Tunis (XVIe–XIXe siècles)* [The Ottoman coastal fortifications of the Regency of Tunis (16th–19th centuries)] (Vol. 1). Fondation Temimi pour la recherche scientifique et l'information.
- Faucherre, N., Martens, P., & Paucot, H. (2014). *La genèse du système bastionné en Europe : 1500–1550* [The genesis of the bastioned system in Europe: 1500–1550]. Cercle historique de l'Arribère.
- Frolova, Y. (2022). The destruction factors of the Southern Ukraine fortresses. *Current Issues in Research, Conservation and Restoration of Historic Fortifications*, 17, 133–151. <https://doi.org/10.23939/fortifications2022.17.133>
- García Mas, A., & Martínez-Medina, A. (2015). La frontera marítima fortificada: de la vigilancia a la señalización (XVI–XIX) [The fortified maritime border: From surveillance to signaling (16th–19th centuries)]. In P. Rodríguez-Navarro (Ed.), *Defensive Architecture of the Mediterranean: XV to XVIII Centuries* (Vol. 1, pp. 61–68). Universitat Politècnica de València. <https://doi.org/10.4995/fortmed2015.2015.1670>
- Haëdo, D. de. (1881). *Histoire des rois d'Alger* [History of the Kings of Algiers] (H.-D. de Grammont, Trans.). Adolphe Jourdan. (Original work published 1612)
- Hassam, S. (2014). *Essai de la stratification de la citadelle d'Oran* [Essay on the stratification of the citadel of Oran] [Master's thesis, École Polytechnique d'Architecture et d'Urbanisme]. DSpace EPAU. <https://dspace.epau.edu.dz/items/c00ed6c6-0c67-47ba-97ce-32e3233c448b>
- Korichi, A., Guenadez, Z., & Faucherre, N. (2020). La réutilisation du patrimoine défensif urbain en Algérie [The reuse of urban defensive heritage in Algeria]. In G.-P. Navarro Palazón (Ed.), *Defensive Architecture of the Mediterranean: XV to XVIII Centuries* (Vol. 12, pp. 1225–1230). Universitat Politècnica de València. <https://doi.org/10.4995/fortmed2020.2020.11367>
- Lassus, J. (1959). Les découvertes récentes de Cherchell [Recent discoveries in Cherchell]. *Comptes-Rendus des séances de l'Académie des Inscriptions et Belles-Lettres*, 103(2), 215–225. <https://doi.org/10.3406/crai.1959.11047>
- Léon l'Africain. (1896). *Description de l'Afrique* [Description of Africa] (C. H. A. Schefer, Trans.; Vol. 1). Ernest Leroux. (Original work published 1550)
- Leveau, P. (1984). *Caesarea de Maurétanie: Une ville romaine et ses campagnes* [Caesarea of Mauretania: A Roman city and its countryside]. École française de Rome.
- Aziz Amen, M., & Ahmad NIA, H. (2021). The Effect of Cognitive Semiotics on The Interpretation of Urban Space Configuration. *Proceedings Article*, 260–274. <https://doi.org/10.38027/ICCAUA2021227n9>
- Paradis, V. de. (1898). *Alger au XVIIIe siècle* [Algiers during the eighteenth century] (E. Fagnan, Ed., Vol. 1). A. Jourdan.
- Pavón Maldonado, B. (2005). *Al- 'imārah fī al-Andalus: 'Imārat al-mudun wa-al-ḥuṣūn* [Architecture in al-Andalus: The architecture of cities and fortresses] (A. I. Menoufi, Trans.; 1st ed.). al-Majlis al-A 'lā lil-Thaqāfa.
- Ravoisié, A. (1846). *Exploration scientifique de l'Algérie: Beaux-Arts, architecture et sculpture* [Scientific exploration of Algeria: Fine Arts, architecture and sculpture] (Vol. 3). Firmin Didot frères.
- Russo, M., Flenghi, G., Buonacucina, A., & Russo, V. (2024). Virtual reconstruction of destroyed fortifications: the case study of Santa Caterina in Verona. In G. Islami & E. Veizaj (Eds.), *Defensive Architecture of the Mediterranean: XV to XVIII Centuries* (Vol. 17, pp. 603–610). Universiteti Politeknik i Tiranës; Universitat Politècnica de València. <https://doi.org/10.4995/fortmed2024.2024.18107>
- Saïdouni, N. E. (2001). *L'Algérois rural à la fin de l'époque ottomane (1791–1830)* [Rural Algiers at the end of the Ottoman period (1791–1830)]. Dar-El-Gharb Al-Islami.
- Shaw, T. (1980). *Voyage dans la régence d'Alger; ou description géographique, physique, philologique, etc. de cet état* [Journey through the Regency of Algiers, or a geographical, physical, philological, etc. description of this state] (J. Mac Carthy, Trans.). Éditions Bouslama. (Original work published 1738)
- Vera Boti, A. (2001). *La arquitectura militar del Renacimiento a través de los tratadistas de los Siglos XV y XVI* [Renaissance military architecture through the treatise writers of the 15th and 16th centuries] [Doctoral dissertation, Universitat Politècnica de València]. <https://doi.org/10.4995/THESIS/10251/7529>
- Žmegač, A. (2025). "Il cordone in fin della scarpa fa bel vedere" ["The cordon at the top of the scarp makes a beautiful view"]: On the purpose of the cordon in fortification architecture. *RIHA Journal*, 0342. <https://doi.org/10.11588/RIHA.2025.1.113528>