

An Overview of Gypsum-based Stucco Ornaments from Early Islamic Archaeological Sites in Neyshabur, Khorasan Razavi Province, Iran

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Abstract: Neyshabur, as the largest city in Greater Khorasan, housed exquisite gypsum-based stucco ornaments due to its climate and weather conditions. Numerous archaeological excavations have been conducted in this city, the most important of which include the excavations by the Metropolitan Museum of Art's expedition in four mounds known as Old Neyshabur and the archaeological surveys of the Shadyakh site. In the excavations of Old Neyshabur, remains of diverse architectural ornaments were found, including brick ornamentation, gypsum-based stucco ornaments, and black and polychrome murals. Evidence of gypsum-based materials was also found in the Kohandezh site, the oldest section of Old Neyshabur. The archaeological surveys conducted at the Shadyakh site led to the discovery of abundant architectural ornaments, including gypsum-based stucco fragments and murals. These findings indicate the existence of magnificent architectural structures at Shadyakh. The gypsum-based ornaments found in Neyshabur are often in the form of panels with raised (relief) motifs. Samples with raised human figures have also been found at Shadyakh. The gypsum-based stucco motifs include geometric, vegetal (floral), and epigraphic (inscriptional) designs, showing a significant resemblance to the Abbasid ornaments in Samarra. The background of these panels, which were generally used in wall ornamentation and wainscoting (dado), are decorated with perforated (āzhdakāri) geometric patterns, and traces of blue and red colors have been observed on a number of them. A portion of these ornaments found by the American expedition has been transferred to the Metropolitan Museum of Art and the National Museum, and some of them are also located in the Grand Museum of Khorasan. A part is also kept at the Shadyakh site. This research is prepared with the aim of introducing the gypsum-based stucco ornaments found in the excavations of Neyshabur's archaeological sites, as these artifacts possess considerable value and significance, and a comprehensive and focused study on them has not been conducted to date.

Keywords:

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1. Introduction

Architectural ornament has historically played a pivotal role in signifying the grandeur and splendor of palaces, mansions, and residential structures. Climatic variations across Iran have resulted in a diverse range of materials and execution techniques for this ornamentation. The hot and dry climate of the Khorasan region, in particular, favored the widespread use of gypsum-based stucco ornament over other forms of architectural embellishment. Despite numerous invasions and destructive natural phenomena, such as powerful earthquakes, the skill of master gypsum workers ensured that some of these intricate works have endured in historical buildings. These ornaments not only reflect the art and philosophy of past centuries' artisans but also offer insights into the

prevailing cultural and artistic currents of those eras. Neyshabur Plain (Fig. 1), geographically bounded by the Binalud mountain range to the north and extending toward the Gorgan Plain and the southern shores of the Caspian Sea to the west and northwest (Wilkinson, 2001), experiences long, hot, and dry summers alongside short, cold winters. The distinct topography between the plain and the mountains creates a unique climatic condition in the area (Taheri, 2005: 9).

The Great Khorasan Road, later known as the Silk Road, was crucial not only for the exchange of goods but also as a vital route for the transfer of culture, ideas, and beliefs between the peoples of East and West Asia. Positioned strategically on this route, Neyshabur emerged as a "merchants' abode," a central hub for trade, and a major confluence of diverse thoughts and cultures (Labaf Khaniki, 2014). Neyshabur experienced unparalleled prosperity during the Islamic period, serving as the capital of Khorasan under the Tahirid, Samanid, and Seljuq dynasties. However, the city later suffered extensive destruction due to the Mongol invasions and severe seismic activity (Metropolitan Museum of Art Excavations, 1939). The city's destruction was a continuous process caused by several factors, including repeated wars and invasions, primarily because, like other ancient cities such as Ray and Damghan, Neyshabur lay on the Khorasan thoroughfare and the Silk Road. This essential route, while serving commerce and travel, constantly exposed the city to foreign attack. Earthquakes represent the second primary factor in the city's ruin (Rahmani et al., 2013). The earliest precise reference to seismic events in Neyshabur is attributed to Abu al-Abbas al-Ya'qubi, who reported that earthquakes near Qumis and Neyshabur on Tuesday, Sha'ban 18, 242 AH (December 22, 856 CE), resulted in the disappearance of approximately 200,000 people (Melville, 1980).

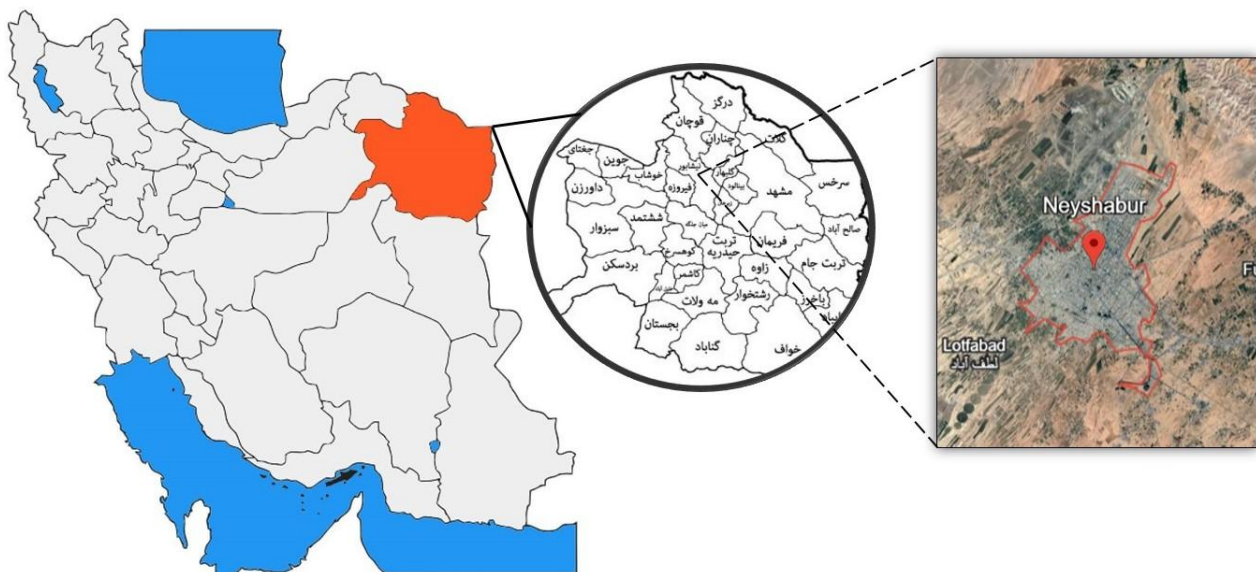


Figure 1. The location of Neyshabur County on the map of Iran.

The archaeological sites of Neyshabur, particularly those dating to the early Islamic centuries, contain invaluable gypsum-based stucco ornament. These artifacts attest to the artistic, aesthetic, and architectural advancements of the era. Despite their significance, a comprehensive study of this ornamentation—in terms of stylistic analysis, execution techniques, and cultural influences—remains limited. The scarcity of adequate documentation and environmental damage underscores the urgent need for further comparative and analytical research. This study, therefore, aims to analyze the technical and aesthetic characteristics of Neyshabur's stucco ornaments and determine their place within Islamic architecture by analyzing archaeological data and historical sources. The first serious attention to Neyshabur's gypsum-based stucco ornaments was drawn by the scientific excavations of the American mission from the Metropolitan Museum of Art (MMA), which unearthed thousand-year-old historic neighborhoods containing unique specimens of this art.

Subsequent excavations, including those at the Shadyakh site, confirmed the prevalent role of gypsum as the dominant element in Khorasan's architectural ornamentation. Proper conservation of these valuable ornaments is essential for a deeper understanding of the lifestyle and intellectual-cultural outlook of the people of that time. Stylistically, the gypsum-based ornaments of Neyshabur are comparable to counterparts found in Samarra and Na'in. Nevertheless, their distinctive motifs and execution rules represent a new phase in Islamic ornamental patterns, likely belonging to the second half of the tenth century CE. The engraved designs on this panel are considered a crucial link between the Abbasid and Seljuq styles (Dimand, 1938). Despite the abundance of historical evidence in this region, Neyshabur is predominantly known among archaeologists for its unparalleled pottery. However, multiple excavations have uncovered valuable finds besides pottery that are unique but have received scant attention. The gypsum-based stucco ornament found in the archaeological sites of Neyshabur falls into this category of valuable, yet largely unrecognized, artifacts.

This study aims to introduce the excavated historical sites and the gypsum-based stucco ornaments discovered within them, highlighting their diversity, beauty, and significant value. The research employs a qualitative and descriptive methodology. Data collection initially involved fieldwork to prepare visual documentation, supplemented by library resources and published literature. The article first introduces the archaeological sites of Neyshabur, then presents the excavated gypsum-based stucco ornament with visual documentation, and concludes with an analysis of the executed motifs and a summary.

2. Literature Review

Studies on the gypsum-based stucco ornaments of Neyshabur have mostly been limited to brief mentions and, at best, have focused on only a specific part. For example, Wilkinson (1986), in his book, reported on the excavations carried out at the historical site of Old Neyshabur and referred to the gypsum-based stucco ornaments as part of a vast collection of artifacts. Rajabali Labbaf Khaniki (2021), as the supervisor of the Shadyakh site excavations, also interpreted and analyzed the data obtained during archaeological excavations in his book. In Iran, Mesbah-Ardakani and Lezgi (2008) and Montasheri (2017) examined the similarities between the motifs of gypsum-based stucco ornaments from the early Islamic period in Iran and Sasanian same ornaments, noting the Neyshabur artifacts as an important link between these two periods. Salehi-Kakhki and Taghavi Nejad (2018) also referred to one of the examples found in the Sabz Pushan mound as a specimen with a vegetal composition. Ahmadi and Shekofteh (2011) mentioned the gypsum-based stucco ornaments of Old Neyshabur as part of the ornamentations discovered in the early Islamic centuries in Iran. Khaksar-Baghan et al. (2024) focused solely on the structural study of five pieces of gypsum-based stucco ornaments from the Shadyakh site. Outside Iran, following the excavations of Old Neyshabur by an American team, studies have been published regarding the Sabz Pushan dodoes and Samanid gypsum-based ornaments (Hauser, 1936; Dimand, 1938). Therefore, there is a clear need for a study specifically focused on the gypsum-based stucco ornaments found in Neyshabur to properly introduce and document these valuable works.

3. Neyshabur in the Early Islamic Period

Neyshabur, likely founded during the Sasanian era, initially served as a military fortress to safeguard trade along the Silk Road (Holakooei et al., 2018). Shapur I's inscriptions at Naqsh-e Rostam identify Neyshabur within the "Greater Khorasan" region. Archaeological evidence indicates the city's core, established under Yazdegerd I, served as a garrison against northeastern invaders (Labbaf Khaniki, 2015: 61–64). During the Islamic period, Neyshabur gained prominence as a political center. Local dynasties, including the Tahirids and Saffarids, designated it as the capital of Greater Khorasan after Merv (Bibak, 2019). Historical sources describe the Arab conquest of Neyshabur, highlighting the city's strategic submission through negotiation and eventual integration into the Muslim domain (Al-Baladhuri, n.d.: 159).

The Umayyad to Abbasid transition, led by Abu Muslim Khorasani, originated in Khorasan, including Neyshabur, shaping intellectual and socio-political movements such as the Sanbad revolt (Labbaḥ Khaniki, 2015: 70). Opposition to Abbasid central authority gradually fostered semi-independent dynasties, including the Tahirids, Samanids, Ghaznavids, and Seljuks (Kiani, 2019: 41). Taher ibn Husayn's appointment as governor of Khorasan in 820 CE marked Neyshabur as a capital, a status later affirmed by subsequent rulers such as Ya'qub ibn al-Layth al-Saffar and the Samanids (Badri, 2011; Dashti, 2004).

The Ghaznavid dynasty, founded by the Turkic commander Sebuktigin, ruled from Ghazni and expanded under Sultan Mahmud into Iran and northern India (Bombachi, 1997: 74). Neyshabur experienced multiple Seljuk conquests in 1038 and 1040 CE, becoming a political and cultural hub under rulers like Tughril Beg and Alp Arslan. Under Malikshah and the vizier Nizam al-Mulk, the city witnessed significant intellectual growth, with the establishment of the Nizamiyya school and thirteen libraries. However, the subsequent Ghaz invasion led to widespread destruction, including massacres of scholars and the burning of libraries. Stability returned under the control of Sultan Sanjar's forces, restoring political and economic order and reaffirming Neyshabur's strategic importance as a caravan city linking Iraq, Baghdad, and Central Asia (Rahmati et al., 2013).

4. Archaeological Sites of Neyshabur during the Islamic Period

In the early Islamic centuries, Greater Khorasan encompassed a vast territory extending beyond present-day political boundaries. The region's climate and environmental conditions supported the development of exquisite gypsum-based stucco ornaments. Notable buildings and sites across this expansive province exhibit diverse forms of gypsum-based stucco ornaments, which functioned both as aesthetic enhancements and as complementary elements to the otherwise simple architecture of the period (Fig. 2).

4.1. Kohandezh

Kohandez, the oldest section of ancient Neyshabur, has undergone multiple cycles of destruction and reconstruction. Situated atop a 10-meter-high mound, it was originally constructed during the Sasanian period, covering approximately 40,000 m². Excavations in the southern part of Kohandez revealed traces of the massive city gate, built with bricks measuring 42×42×10 to 50×50×12 cm and mud mortar. The gate featured a 26-meter-wide passage flanked by walls approximately 10 meters thick, and was framed by two colossal towers with diameters of around 15 meters. The eastern tower of the gate was destroyed in the early Islamic period, and on its ruins, a brick architectural structure with gypsum-plastered floors and walls was erected, incorporating an oven and hearth (Labbaḥ Khaniki & Cruranne, 2007). In this area, gypsum was used exclusively in mortar form, and no evidence of gypsum-based stucco ornaments was identified, either on the mounds of ancient Neyshabur or Shadyakh within this site (Labbaḥ Khaniki, M., Personal Communication, 2020).

4.2. The Old City of Neyshabur

The archaeological site of Neyshabur lies a few kilometers east of the modern city, near the tombs of Attar and Omar Khayyam (Haddon, 2016). Ancient Neyshabur extended from the present Tehran–Mashhad Road south to Khayyam's cemetery, southeast to the tomb of Fazl ibn Shadhan, and west to Attar's tomb (Moyyed-Sabati, 1974: 3).

The eastern railway, constructed in the mid-20th century, passes through the northwest to southeast axis of the site, cutting across the remains of Kohandezh and possibly the city's first congregational mosque (Rante & Collinet, 2013: 2). Scientific excavations were initiated in 1935 by a team from the Metropolitan Museum of Art with permission from the Ministry of Culture and Arts, continuing intermittently until 1947, interrupted by World War II (Fig. 3). Charles Wilkinson and Joseph Upton supervised the excavations, which revealed kilns, empty domestic storage spaces, glazed and unglazed ceramics, glass fragments, metal objects, and architectural remains, including ornamental bricks, gypsum-based stucco ornaments, and murals executed in black or

polychrome on white plaster (Wilkinson, 1986: 18–19). The gypsum-based stucco ornaments of Neyshabur can be compared to those found in Samarra and Na'in. However, their motifs and execution represent a new phase of Iranian ornamental art, likely dating to the mid-10th century CE. Incised designs on these ornaments illustrate important connections between Abbasid and Seljuk styles (Dimand, 1938).

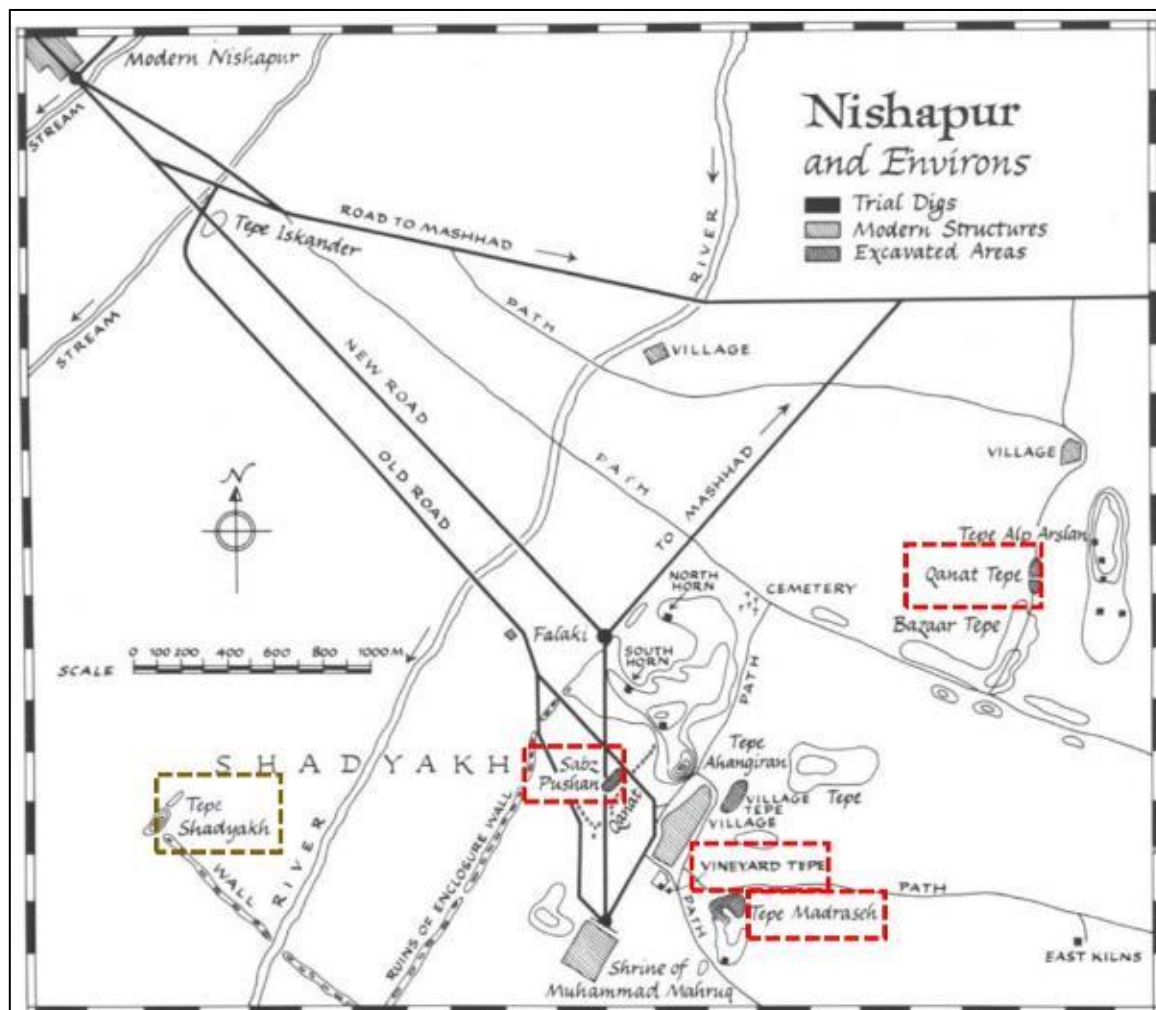


Figure 2. Location of Historical Sites in Ancient Neyshabur and Shadyakh (Wilkinson 1986).

Excavations at four mounds—Sabz Pushan, Madraseh, Vineyard, and Qanat—yielded some of the most significant gypsum-based stucco ornaments in Greater Khorasan. Notable motifs from the mid-10th century include rectangular frames adorned with small and large rose motifs combined with vine scrolls and palm leaves, painted in yellow, black, white, red, and blue. Some large rose motifs incorporate traditional Iranian animal designs, with palm leaves symbolically suspended from bird beaks. Most ornaments are two-dimensional, with only a few featuring minor relief details (Sharato, 1997: 60). The most complete examples were found at the Sabz Pushan mound, including wall gypsum-based stucco muqarnas located in the southwest courtyard of an adjacent domed hall. Many designs are set within square or hexagonal frames, with abstract scroll forms branching into four or six subsidiary shapes, typically circular or spiral. Palm leaf motifs appear in diverse forms, including Sasanian-style half-leaves, simple overlapping leaves, trifoliate leaves, and composite palm-leaf arrangements (Dimand, 1986: 95).

A. Tepe Madraseh: Madraseh Mound, 0.5 km northeast of Muhammad Mahruq's tomb, is the most prominent part of ancient Neyshabur excavated by the Metropolitan Museum of Art. Early excavations revealed extensive gypsum-based stucco ornaments (Wilkinson, 1986: 47–54).

Several mihrabs were found, including a deep square mihrab with gypsum-based stucco ornament, comparable to the Great Mosque of Samarra. Other ornaments include relief floral motifs and scroll and palm-leaf designs within geometric frames, reflecting Samarra Styles B and C (Ahmadi & Shekofteh, 2011). Different layers show stylistic evolution: early layers feature circular vine patterns with simple leaves and fan-shaped palms, while upper layers display simpler, more geometric gypsum-based stucco ornaments (Wilkinson, 1986: 122) (Figs. 4 and 5).

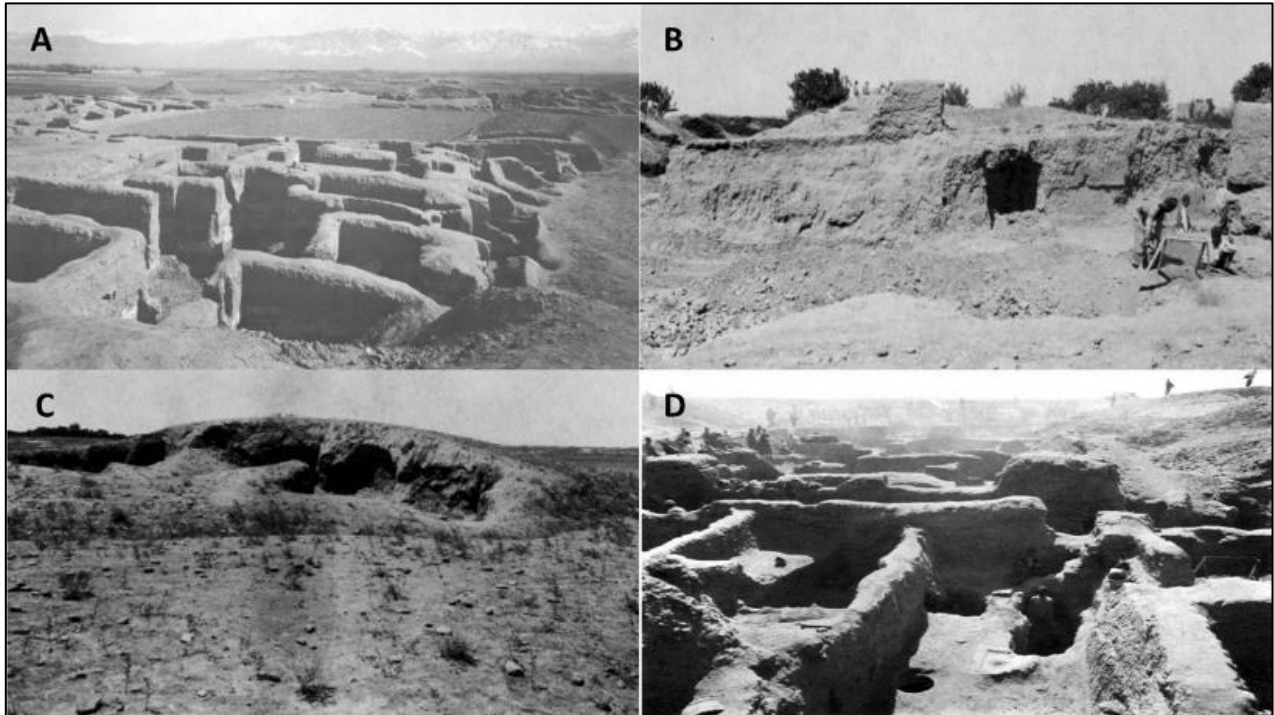


Figure 3. Excavated Sites by the Metropolitan Museum of Art Expedition: A) Tepe Madrased, B) Vineyard Tepe, C) Tepe Sabz Pushan, D) Qanat Tepe (Wilkinson, 1986).

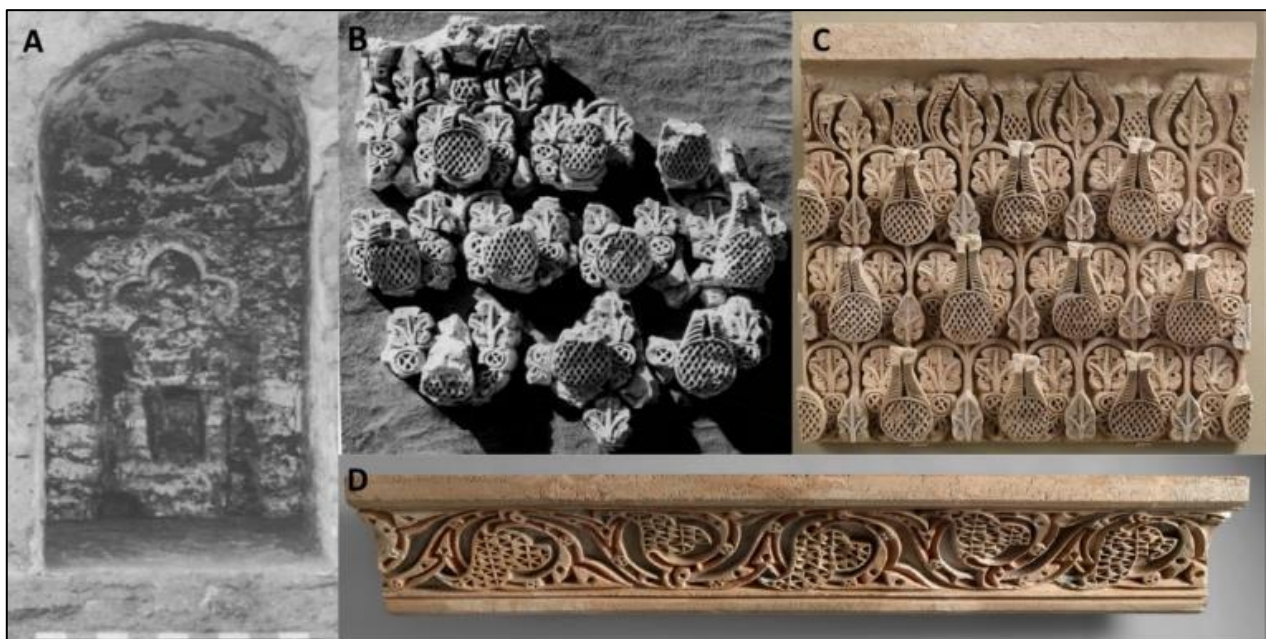


Figure 4. Gypsum Ornaments Discovered During Excavations at Tepe Madrased: A) Gypsum-Based Mihrab, B & C) Excavated and Restored Gypsum Reliefs, D) Prominent Gypsum-Based Cornice (Wilkinson, 1986).

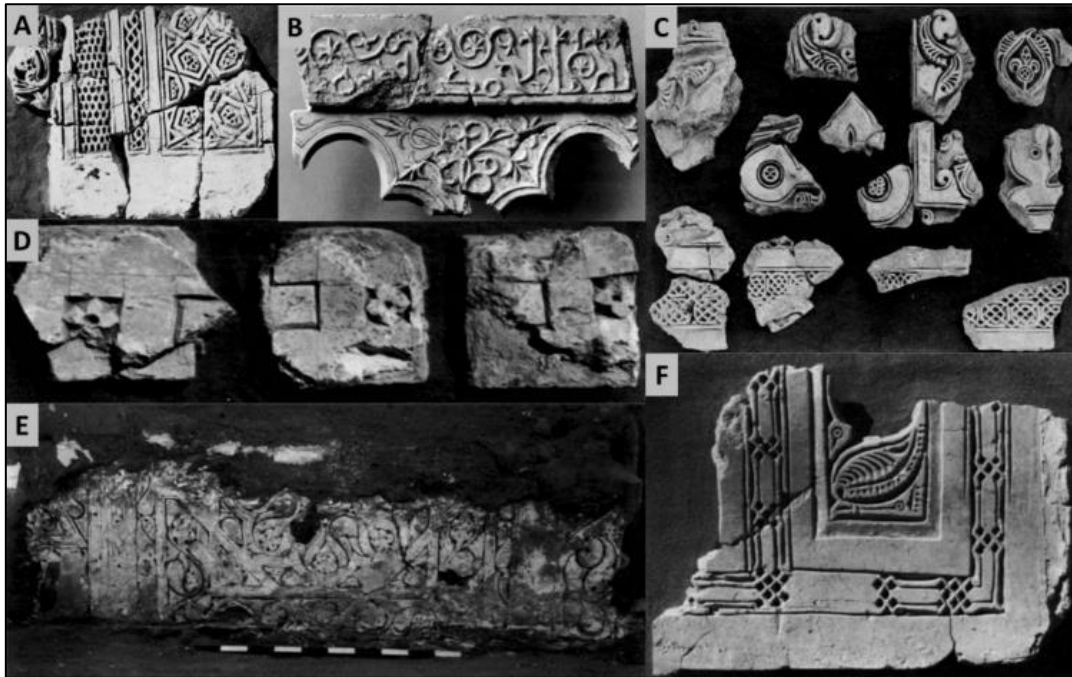


Figure 5. Gypsum Ornament Discovered During Excavations at Tepe Madrased: A) Gypsum Relief with Geometric Motifs, B) Gypsum-Based Window Frame with Sealed Designs, C) Gypsum Fragments of a Kufic Inscription, D) Gypsum Ornament (Shebh-e kaloukband) with Four and Five-Petaled Floral Motifs, E) Remnants of an In-Situ Gypsum Dado, F) Fragment of a Gypsum Dado with Vegetal Motifs (Wilkinson, 1986).

B. Vineyard Tepe: Excavations at Vineyard Mound revealed only part of a larger complex of buildings, resembling the palace-like structures of Madrased Mound and more elaborate than those at Sabz Pushan. Although natural disasters, looting, and agriculture had largely destroyed the gypsum-based stucco ornaments, some fallen wall fragments were well preserved. Reconstructed pieces show dados decorated with circular bands of tulip-shaped forms, vine leaves, quatrefoils, and palm leaves whose tips resemble bird heads, closely resembling motifs from lower layers of Madrased Mound (Wilkinson, 1986: 187, 193–198). A notable find is a gypsum-based stucco lantern, decorated in relief and molded form (Figs. 6 and 7).

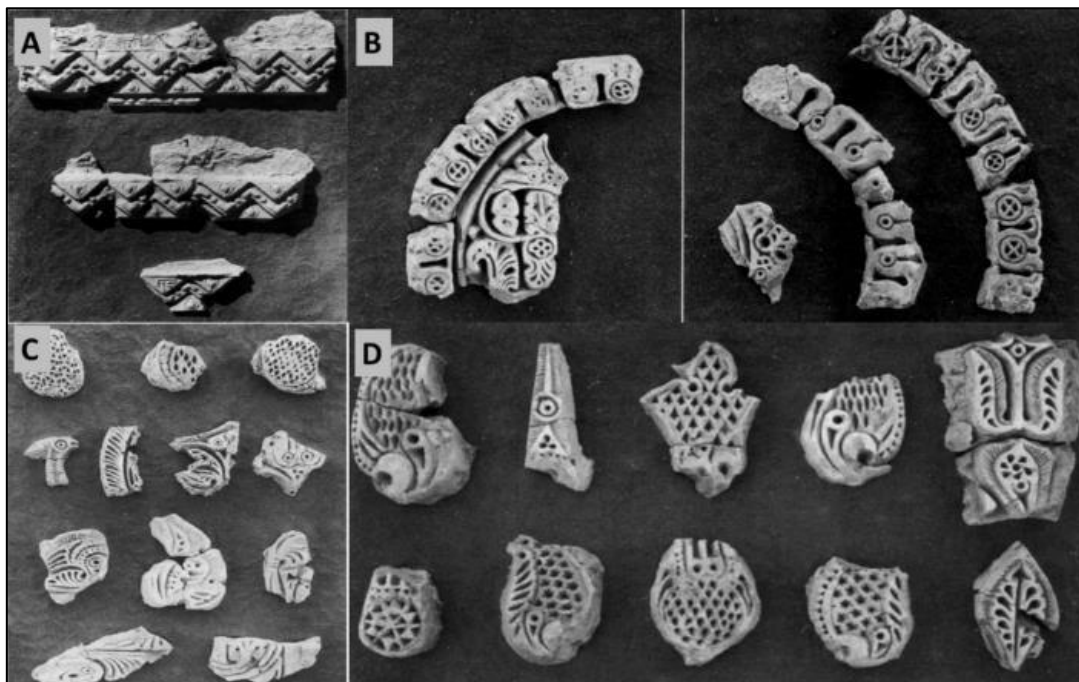


Figure 6. Gypsum Ornament Discovered at Vineyard Tepe: A) Molded Gypsum Ornament with Geometric Motifs, B-C-D) Gypsum Ornament with Vegetal and Zoomorphic (Bird Head) Motifs (Wilkinson, 1986).

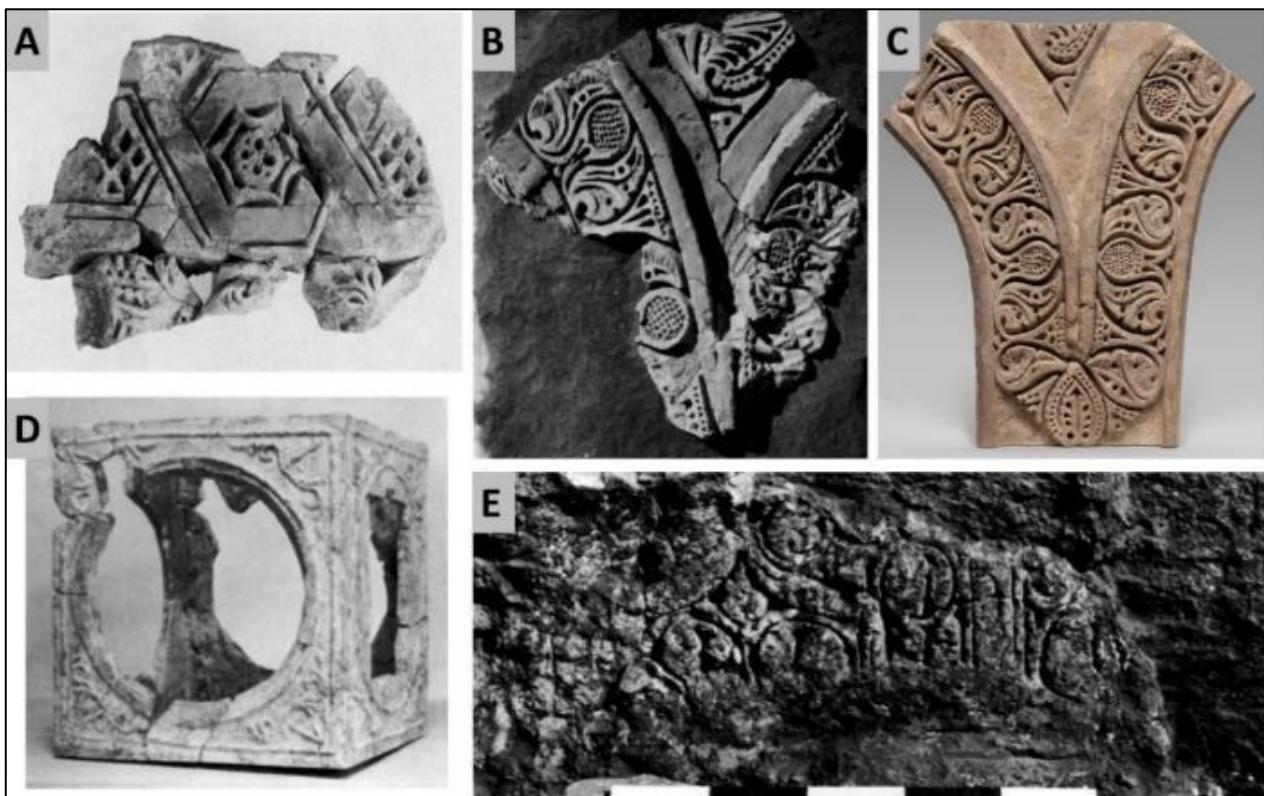


Figure 7. Gypsum Ornament Discovered at Vineyard Tepe: A) Gypsum Relief with Geometric Motifs, B and C) Gypsum Relief with Vegetal Motifs (Excavated and Restored), D) Gypsum Lantern with Molded and Sealed Decoration, E) Remnants of a Gypsum Dado In-Situ (Wilkinson, 1986).

C. Tepe Sabz Pushan: The Sabz Pushan complex extends north to south and consists of four adjacent sections, three separated by walls in the north and one in the south, divided by a narrow street. Surrounding these structures are smaller rooms belonging to private residences. Except for the large halls and iwans adorned with gypsum-based stucco ornaments, the sections functioned as domestic spaces (Anonymous, 1939). Sabz Pushan yielded the most complete and elaborate gypsum-based stucco ornaments discovered by the Metropolitan Museum of Art. These wall ornaments, often painted in white, yellow, blue, and red, feature scrolls and palm-leaf motifs set within square or hexagonal frames, reminiscent of Samarra. Some motifs include bird heads holding palm leaves, echoing Sasanian metalwork (Ansari, 1986). A notable rectangular panel (240 × 95 cm), discovered during unauthorized digging, is now in the Metropolitan Museum of Art (Wilkinson, 1986: 211–212). According to archaeologist Walter Hauser, the gypsum-based stucco ornaments were executed over a single course of baked bricks coated with a 0.5 cm layer of clay mixed with straw, followed by multiple thin gypsum layers (up to five) applied sequentially. Each layer was smoothed before the next was added, with a final 2 cm layer serving as the base for detailed plasterwork. The technique relied entirely on gypsum’s adhesive properties, without incisions or scratches to bond layers (Hauser, 1936) (Figs. 8 and 9).

D. Qanat Tepe: Excavation at Qanat Mound was prompted by the accidental discovery of a layered gypsum block by a local farmer. The mound, located southwest of Alp Arslan Mound, revealed only a single gypsum-based stucco ornament. This fragment, from the northern edge near area AA3, includes part of a dado with a curved half-palm leaf and a circular motif on a collapsed wall. Heavy surface wear left only traces of its original decoration (Wilkinson, 1986: 259). Additionally, a small polychrome gypsum figurine of a semi-nude, headless woman was found in area AA2, featuring a molded central necklace (Fig. 10).

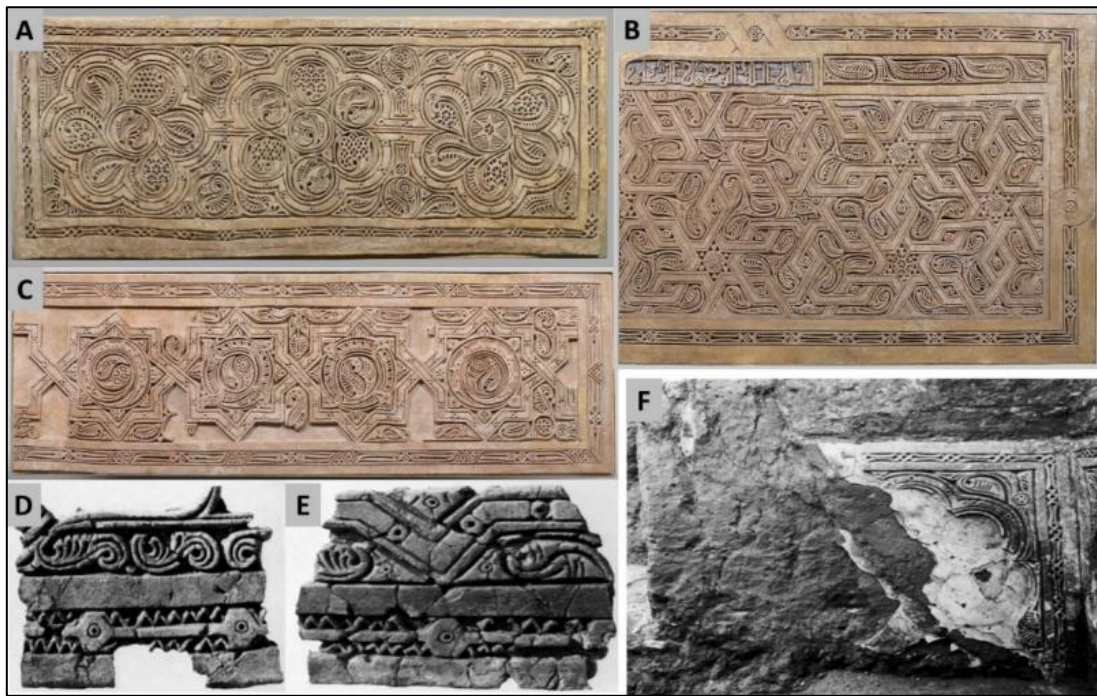


Figure 8. Gypsum Ornament Discovered at Tepe Sabz Pushan: A-B-C) Restored Gypsum Dados, D-E) Gypsum Fragments with Vegetal and Geometric Motifs, F) In-Situ Gypsum Dado Remnants (Wilkinson, 1986).



Figure 9. Gypsum Ornament Discovered at Tepe Sabz Pushan: A-B) Gypsum Dados with Vegetal and Geometric Motifs, C-D) Gypsum Ornament with Vegetal Motifs and Inscriptions (Wilkinson, 1986).

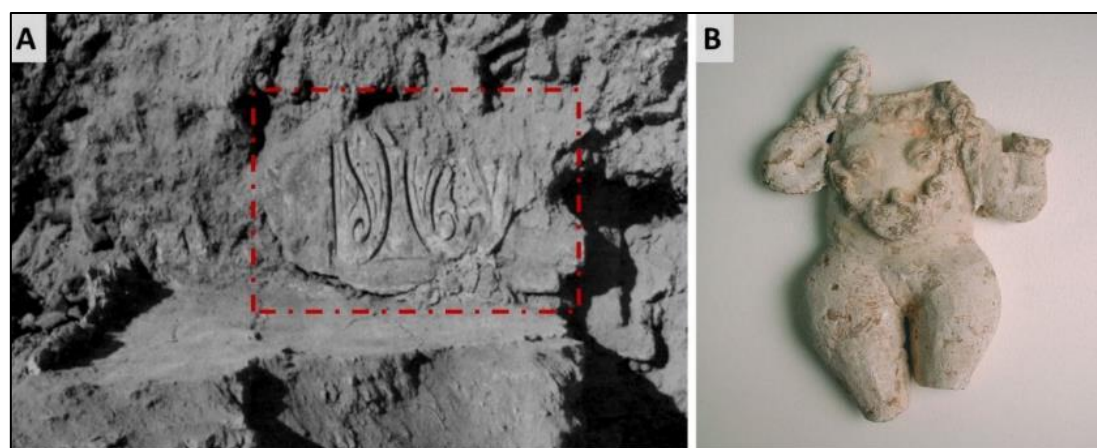


Figure 10. Gypsum Ornament Discovered at Qanat Tepe: A) In-Situ Gypsum Dado, B) Female Figurine (Wilkinson, 1986).

4.3. Shadyakh

Shadyakh was a garden and palace complex established by Abdullah ibn Taher in the early 3rd century AH, with surrounding residences for his soldiers (Fig. 11). After the Ghuzz invasions, residents of Neyshabur resettled in Shadyakh, which was later fortified and developed by Mu'ayyad, a servant of Sultan Sanjar. Over time, Shadyakh became the renewed center of Neyshabur, linking with older city neighborhoods (Molavi, 1976; Karimi, 1960). Today, the site lies near modern Khayyam and Attar tombs and includes areas such as workshops, stables, storage rooms, and a central reception hall (Fig. 12).

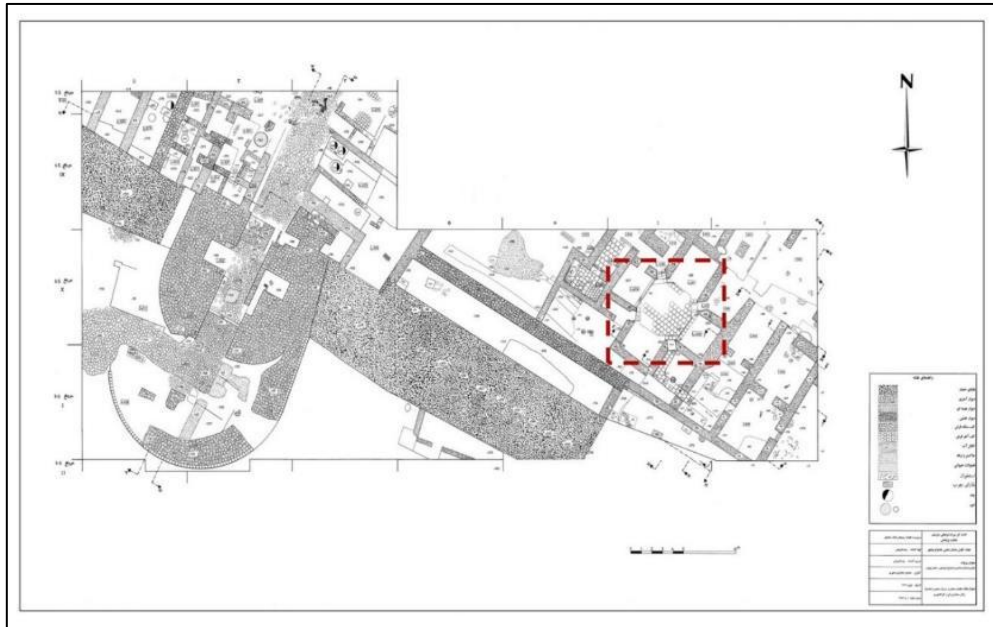


Figure 11. Shadyakh Site Plan: Location of Gypsum Ornament Discoveries (Red Rectangle) (Khorasan Razavi Cultural Heritage Archive).



Figure 12. Shadyakh Archaeological Site: A-B-C) Shadyakh Site, D) Bar-i Am Hall (Niayesh Khaksar, Shadyakh site, 2021).

The reception hall, an octagonal central space with four surrounding iwans, displays the most significant gypsum-based stucco ornaments. Iwans differ in dimensions and elevation, with the northwestern iwan featuring a prominent plaster mihrab decorated with colored gypsum-based stucco ornaments and inscriptions (Figs. 13 and 14). These ornaments include geometric, arabesque, honeycomb, and calligraphic motifs. Iron nails were used to reinforce some gypsum-based stucco ornaments, visible on mihrabs and wall panels. Additional decorative pieces include polychrome gypsum-based fragments, human and partial human figures, and ceremonial scenes in relief (Fig. 15).



Figure 13. Gypsum Ornament Discovered at Shadyakh Archaeological Site: A) View of the Bar-i Am Hall and Accumulation of Gypsum Ornament on the Hall Floor, B) Gypsum Ornament (Shebh-e Kaloukband), C) Gypsum Relief with a Fragment of a Human Figure, D) Gypsum Reliefs with Vegetal Motifs and Inscriptions (Niayesh Khaksar, Shadyakh site, 2021).



Figure 14. Gypsum Ornament Discovered at the Shadyakh Site: A) Gypsum Frame with Vegetal Motifs Adjacent to Shebh-e Kaloukband Ornament, B) Gypsum Frame with Vegetal and Geometric Motifs, C) Gypsum Frame with Vegetal Motifs, D) Fragment of a Gypsum Inscription in Thuluth Script, E) Fragment of a Gypsum Inscription in Kufic Script (Niayesh Khaksar, Shadyakh site, 2021).






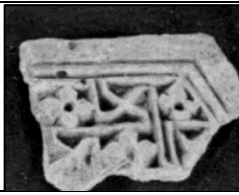
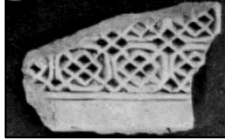


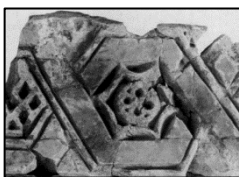
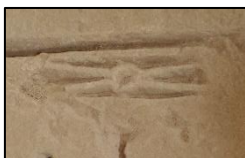


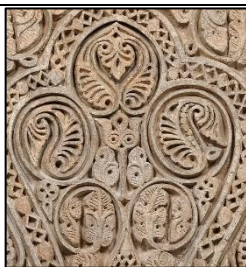
Figure 15. Heads of Gypsum Figurines Discovered at Shadyakh Archaeological Site (Labfaf Khaniki, 2024).









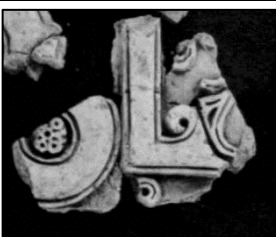
5. Analysis of Gypsum-Based Stucco Ornament Motifs











Motifs in Architectural Ornament, particularly in gypsum-based stucco ornaments, are generally classified into six main groups: geometric patterns, vegetal motifs, calligraphic inscriptions, mythical creatures, human-animal figures, and objects. These motifs are usually presented independently but arranged harmoniously through repetition, symmetry, and mirrored compositions within a unified system, often framed by geometric borders to maintain visual order. In early Islamic centuries, due to aniconic restrictions, geometric and vegetal motifs dominated gypsum-based stucco ornament design, though rare human and animal motifs also appear (Makinejad, 2017: 63–64; Najafian et al., 2024). In the Neyshabur archaeological sites, motifs fall into four principal categories: geometric, vegetal, calligraphic, and human-zoomorphic, often integrated within a single panel. Geometric motifs include rectangles, hexagons, the Seal of Solomon, interlaced patterns, swastika-like forms (as seen in Qish Palace and Khurbah-al-Mefjjar), triangular arabesques, and honeycomb designs (Azhde Kari). Stylized vegetal motifs—such as vine and leaf patterns, palm leaves, four- or multi-petaled flowers—typically appear within or around geometric frames. Calligraphic inscriptions, mainly in Kufic, Thuluth, and decorative scripts, often repeat phrases like “Limalik” or “Bismillah al-Rahman al-Rahim” and are frequently integrated with geometric or vegetal designs. Human and zoomorphic motifs are rare but include figurines and busts, exceptional given the aniconic context of the early Islamic era in Iran. Most motifs were executed by carving into the gypsum substrate, with fine grooves in frames and borders; some were produced using molds. The craftsmanship of certain pieces demonstrates remarkable delicacy and sophistication (Table 1).

Table 1. Classification of Gypsum Ornaments Based on Motif and Technique

Motif	Picture	Excavation Site	Current Location / Repository	Technique
Geometric		Tepe Sabz Pushan	Met Museum	Geometric knot executed with incised detailing Triangular interlacing executed using the carved gypsum base technique
		Tepe Sabz Pushan	Met Museum	Framing executed with incised detailing Triangular interlacing executed using the carved gypsum base technique

	Tepe Sabz Pushan	Met Museum	Simple geometric knot executed with incised detailing Triangular interlacing executed using the carved gypsum base technique
	Tepe Madrasedh	Met Museum	Framing executed with incised detailing Square and broken cross divisions executed using the carved gypsum base technique
	Tepe Madrasedh	Met Museum (?)	Simple geometric knot Executed using the carved gypsum base technique
	Tepe Madrasedh	Met Museum (?)	Battlement motif Molded gypsum-based stucco ornament (stamp technique)
	Tepe Madrasedh	Met Museum (?)	Geometric knot executed with incised detailing Internal motifs executed using the carved gypsum base technique
	Vineyard Tepe	Met Museum (?)	Geometric knot executed with incised detailing Internal motifs executed using the carved gypsum base technique
	Shadyakh	Shadyakh Site	Shebh-e kalookband relief gypsum-based stucco ornament Executed using the carved gypsum base technique
	Shadyakh	Shadyakh Site	Simple geometric knot executed with incised detailing Triangular interlacing executed using the carved gypsum base technique
	Shadyakh	Shadyakh Site	Simple geometric knot Executed using the carved gypsum base technique
	Tepe Sabz Pushan	Met Museum	Vegetal motifs, including arabesques, boteh-jeqqeh, thistle leaves, lotus, simple leaves, and buds Executed using the carved gypsum base technique

Vegetal		Tepe Sabz Pushan	Grand Museum of Khorasan	Vegetal motifs, including arabesques Executed using the carved gypsum base technique
		Tepe Sabz Pushan	Met Museum	Vegetal motifs, including arabesques, boteh-jeqqeh, thistle leaves, lotus, simple leaves, and buds Executed using the carved gypsum base technique Six-petaled flowers executed with incised detailing
		Vineyard Tepe	Met Museum (?)	Vegetal motifs, including arabesques, lotus, and buds Executed using the carved gypsum base technique
		Vineyard Tepe	Met Museum	Abstract vegetal motifs within an arched frame Executed using the carved gypsum base technique
		Tepe Madraseh	Met Museum (?)	Vegetal motifs, including arabesques, lotus, and buds Executed using the carved gypsum base technique
		Tepe Madraseh	Met Museum (?)	Abstract vegetal motifs (interior) Executed using the carved gypsum base technique
		Tepe Madraseh	Met Museum	Abstract vegetal motifs Executed using the carved gypsum base technique In three layers (possibly with a single preliminary layout)
		Shadyakh	Shadyakh Site	Simple arabesque motifs Executed using the carved gypsum base technique
		Tepe Madraseh	Met Museum (?)	Relief gypsum-based stucco ornament featuring a calligraphic inscription Executed using the carved gypsum base technique with incised detailing

Calligraphic Inscription		Tepe Madraseh	Met Museum	Molded gypsum-based stucco ornament (possibly stamp technique) Low-relief calligraphic inscription
		Tepe Sabz Pushan	Met Museum	Relief gypsum-based stucco ornament with a calligraphic inscription on a plain background Executed using the carved gypsum base technique
		Tepe Sabz Pushan	Met Museum	Relief gypsum-based stucco ornament featuring a calligraphic inscription Executed using the carved gypsum base technique
		Shadyakh	Shadyakh Site	Relief gypsum-based stucco ornament with a calligraphic inscription on a plain background Executed using the carved gypsum base technique
		Shadyakh	Shadyakh Site	Relief gypsum-based stucco ornament featuring a calligraphic inscription Executed using the carved gypsum base technique
		Shadyakh	Shadyakh Site	Relief gypsum-based stucco ornament featuring a calligraphic inscription Executed using the carved gypsum base technique
Figurine & Zoomorphic		Tepe Sabz Pushan	Met Museum	Relief gypsum-based stucco ornament with animal motifs Executed using the carved gypsum base technique
		Vineyard Tepe	Met Museum (?)	Relief gypsum-based stucco ornament featuring animal motifs Executed by carving the gypsum base
		Shadyakh	Grand Museum of Khorasan	Bass Relief gypsum-based stucco ornament depicting a human head Executed by carving the gypsum base, with the plaster applied in three layers
		Qanat Tepe	Met Museum	Bass Relief gypsum-based stucco ornament with a human figure Executed using molding technique, followed by carving and final finishing

6. Conclusion

The study of gypsum-based stucco ornaments from early Islamic archaeological sites in Neyshabur provides valuable insight into the art, culture, and history of this important city. These ornaments, discovered in sites such as Old Neyshabur (including Madrasedh, Sabz Pushan, Vineyard, and Qanat mounds) and Shadyakh, reflect the artistic taste and technical skill of craftsmen, while also conveying information about historical developments, cultural interactions, and societal beliefs. The diversity of motifs—including geometric patterns, vegetal designs, calligraphic inscriptions, and human-zoomorphic figures—demonstrates Neyshabur's rich cultural and artistic heritage. Geometric motifs, such as rectangles, hexagons, the Seal of Solomon, and interlaced patterns, alongside vegetal motifs like vine leaves, palm leaves, and multi-petaled flowers, contribute to the visual elegance of these works. Calligraphic inscriptions, mainly in Kufic and Thuluth, often convey religious expressions or phrases such as "Limalik", highlighting the community's cultural and social identity. Human and animal motifs, though less common, provide rare insights into societal attitudes and beliefs, marking a significant exception to early Islamic aniconism. The techniques employed—carving, molding, and polychromic—demonstrate exceptional craftsmanship and attention to detail, with colors including white, yellow, blue, red, and black enhancing their visual impact. Comparative studies with similar sites in Samarra and Na'in reveal Neyshabur's extensive cultural and artistic connections, while its unique features reflect an independent artistic identity. Overall, the study and preservation of these gypsum-based stucco ornaments are essential for understanding the history, cultural identity, and artistic achievements of Neyshabur during the early Islamic period, ensuring their legacy for future generations.

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Author Contributions

The first author was responsible for conceptualization, methodology, formal analysis, and writing the original draft. The second author handled validation, writing, review and editing, and supervision.

Conflict of Interest

The authors report no conflicts of interest.

Data Availability

Raw data are available from the authors upon request.

Endnote

Interview with Dr. Meysam Labaf-Khaniki, conducted via email.

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