



Article

Akchakhan Fortress: Research and Results for 2022-2024

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Abstract: Ancient Khorezm was a major center of civilization in Central Asia, where monumental fortresses played a crucial role in political, religious, and urban development. The Akchakhan fortress, located in present-day Karakalpakstan, represents one of the most significant sites of this civilization, yet its architectural and cultural layers remain insufficiently studied. Although earlier expeditions provided partial insights, the stratigraphy, construction technologies, and religious-political functions of Akchakhan fortress have not been fully understood. This study analyzes the results of archaeological excavations conducted between 2022–2024, focusing on the fortress's defensive systems, monumental structures, and material culture. Excavations revealed multi-phase construction of gate labyrinths, entrance and exit ramps, and inner citadel structures, alongside Afrighid- and Kushan-period ceramics, monumental religious buildings, and fresco fragments. Evidence indicates continued habitation and ceremonial practices into the 7th–8th centuries AD. The research demonstrates for the first time that Akchakhan fortress was not only a fortified settlement but also a central religious and political hub, with distinct construction technologies including lime-rich mortar, ceramic flooring, and mural decoration. These findings contribute to understanding early medieval urban planning, religious-political authority, and architectural innovation in Central Asia, positioning Akchakhan fortress as a key case study for the cultural and technological development of ancient Khorezm.

Keywords: Akchakhan fortress, archaeological research, ancient Khorezm, monumental structure, gate labyrinth, entrance ramp, Afrighid period, Kushan period, inner citadel, architecture, stratigraphy, ceramic findings, Zoroastrianism, palace, temple.

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1. Introduction

The Akchakhan fortress, one of the ancient monuments located in Uzbekistan, has been drawing the attention of local and foreign scholars in recent decades. The fortress holds a significant place in the ancient history of Khorezm, and its architectural, urban planning, and religious ceremonial aspects are considered an important scientific resource in modern archaeology. Building upon the earlier works of scholars such as V. Yagodin and G. Khodzhanizayov, research conducted by the Karakalpak-Australian and Karakalpak-Chinese People's University archaeological expedition in 2022-2024 has contributed to a deeper understanding of the city walls, gate labyrinths, monumental structures, and the layout of the inner fortress. This article analyzes new scientific findings and archaeological discoveries based on the fieldwork carried out during these years [1].

2. Materials and Methods

The research at Akchakhan fortress employed systematic archaeological field methods between 2022 and 2024, combining stratigraphic excavation, architectural surveying, and material culture analysis. Excavations were conducted in different parts of

the fortress, including the southeastern gate labyrinth, the central monumental structure, and the inner fortress, with each area selected for its potential to clarify construction phases and functional roles within the settlement. Trench excavation followed east–west and north–south orientations, enabling the documentation of stratigraphic layers, collapsed walls, and architectural reconstructions. Manual digging tools were primarily used, complemented by mechanical cleaning where thick sand layers had accumulated. The excavation of rooms, corridors, and ramps involved precise measurement of dimensions, slope angles, and construction materials, allowing the identification of multi-stage building practices. Ceramic findings were carefully collected, classified typologically, and dated by morphological features, linking occupational phases to the Afrighid and Kushan periods. Architectural remains, including raw brick, mud-brick walls, plaster layers, and ceramic-tiled floors, were documented in situ through photographs, scaled drawings, and digital mapping. Special attention was given to traces of fire, ash, slag, and building stones, which were analyzed as evidence of destruction, reconstruction, or ritual activity. Murals and fresco fragments were extracted using conservation-grade adhesives and protective fabric to ensure preservation. The interdisciplinary collaboration of Uzbek, Karakalpak, Australian, and Chinese institutions ensured methodological rigor and consistency in excavation, analysis, and interpretation. This approach provided a comprehensive reconstruction of the fortress's developmental sequence, defensive system, and cultural significance, laying the foundation for further scientific assessment of ancient Khorezm's urban, religious, and political structures [2].

3. Results and Discussion

The Akchakhan fortress, one of the centers of ancient Khorezm civilization, is an archaeological monument of particular importance due to its architectural and urban planning features. Recent research has yielded significant scientific results in determining the construction and stratigraphy of the city walls.

During the 2022 field season, the main focus was on the labyrinthine structure in the front part of the gate complex, where a ramp - that is, a walkway - was discovered. Determining the dimensions, structural elements, and location of this ramp provided new information about the construction technology of the Akchakhan Gates. This indicates that ramps were used as an important means of movement in the infrastructure of ancient cities.

Additionally, excavation site 07 in the upper city - the central monumental structure - has been poorly studied, and as a result of this year's work, its foundation structure and surrounding architectural elements (rooms, streets) were identified[3].

The Karakalpak-Australian Archaeological Expedition has been conducting systematic and ongoing studies of the city center located in the Akchakhan fortress area for many years. Research has identified three main archaeological sites in the Upper City area: the central monument (Object A or "mausoleum"), the ceremonial complex ("temple"), and the inner fortress (conventionally called "palace"). While the first two sites have been studied through detailed archaeological excavations, the third - the inner fortress - was only subjected to brief research in 2011.

The functional content of the central monument has been interpreted as having a religious character. Although specific archaeological evidence of fire worship - such as ash layers or traces of burning - has not been identified, the site is interpreted as a sacred area associated with rituals. In particular, the presence of a large room in the northeastern wing and the possibility of accessing an open terrace through the adjacent ramp provide grounds to assume that mass religious ceremonies were held here.

The location of the object in the center of the Akchakhan fortress allows for its interpretation as a structure of high religious and political significance. Researchers believe that this central monument may have hosted seasonal festivals within the framework of Zoroastrianism (particularly Gāhāmbār) or ceremonial events with the participation of kings and priests as part of palace rituals .

Excavations in the area of the eastern pedestal (Pedestal 2) were aimed at identifying the continuation of trench No. 09, which was studied in 2019. The excavation work was complicated by 4-5-meter layers of sand formed as a result of strong winds. An area of approximately 20×6 meters was cleaned using manual labor and special equipment.

During the cleaning process, stones potentially originating from the Sultanuyzdag Mountains, as well as large slag formations created under high temperatures, were discovered. The majority of the stones are unworked and are located 20-25 meters east of the pedestal. This situation refutes the notion that they directly became architectural elements. Although previous studies had associated these stones with the central monument, new data necessitate a reconsideration of this assumption[4].

The findings indicate the need for a more in-depth analysis of architectural and urban planning practices related to the selection and placement of building materials in the Akchakhan fortress.

During excavations near the eastern pedestal, a dense layer of raw brick and clay was uncovered, possibly belonging to the remains of a structure from the later stages of the central monument or to collapsed parts of a structure located north of the pedestal. The fact that almost all stone fragments were found within this layer suggests they may have been used as building material in the late period, but there is currently no concrete evidence to support this hypothesis.

Ceramic fragments from the Afrigid period found in this layer (in trenches 07.02 and 07.03) indicate that habitation or construction activity continued in this area during subsequent stages.

After cleaning, a trench measuring 15 meters long and 1.6 meters wide was excavated. The excavation of this small area was determined by the thickness of sand layers and debris remaining from the cleaning process. The excavation work was carried out from east to west, in the direction of the eastern pedestal. As a result, despite the narrowness of the area, three rooms were identified. These rooms may have been part of a single functional structure.

07-excavation work, 04-trench digging. Three rooms (P1, P2, P3) were discovered during the trench excavation:

Room P1: unfinished brick floors and walls; ceramic finds dating to the Kushan period.

Room P2: walls and floor covered with ceramic tiles, plaster was used; not a living space, possibly used for religious or official purposes[5].

Room P3: unfinished brick floor; ceramic finds dating back to the ancient Khorezm period.

The rooms are interconnected and represent a later construction phase of the central monument. The bricks and ceramics discovered during the excavations contribute to the study of material culture.

The ceramic material is not diverse in form, consisting mainly of wall fragments. Almost all the ceramics were found in the wall collapse layers. The majority of ceramic fragments were found in rooms P1 and P3, while fewer ceramics were found in room P2. Based on typological and morphological characteristics (shape, ornamentation, decoration), most of the ceramics from the trench date back to the beginning of the Common Era, to the late ancient Khorezmian or early Kushan periods.

The complex defensive system in front of the southeastern gate of Akchakhan fortress, particularly the G-shaped labyrinth structure, is one of the unique examples of fortress architecture. Archaeological research in this area began in 2001-2003, with additional data recorded in 2022. The labyrinth covers an area of 28×28 meters, and it has been determined that the walls and entrance structures have undergone several stages of reconstruction.

The work from 2001-2003 reveals that the entrance ramp was renovated during the third stage of construction, after which the fortress likely suffered an attack - this is evidenced by layers of fire, charcoal, ash, and deep holes in the towers. The multiple

reconstructions of the southern wall in section A-A2 indicate efforts aimed at increasing the wall's strength.

The 2022 excavations further enriched these findings. The slope of the entrance ramp is approximately 16°, and its construction has not yet been fully determined. Nevertheless, based on studies from 2018-2019, it is presumed to have been built using technology and materials similar to those of the exit ramp. The exit ramp is positioned at a 90° angle and provides a complex vertical connection with the entrance path[6].

Layers around the ramp (020-023) revealed that its edge did not reach the fortress wall, indicating that a specific technological gap was left during construction. Thick layers of sand limited the possibility of excavation and comprehensive planning.

These results confirm that the gate structures of the Akchakhan fortress underwent complex and gradual development not only in terms of defense but also in architectural solutions.

Excavation 10 (northeastern corner of the central building)

1. Purpose: to determine the structure of the building[7].
2. An area of 47.5 square meters was excavated.
3. In the clay layer, no finds related to wall paintings were discovered, but useful details about the building's interior layout were collected.
4. The finds indicate the presence of an open area (courtyard or hall).
5. Alluvial deposits were found on the south side - this area may have been uninhabited for a long time.
6. Perimeter walls with a height of at least 1 meter were identified.

As a result of excavations carried out in the area of the southeastern gate of the Akchakhan fortress during the 2023 archaeological season, important scientific information about the city gate system and its adjacent ramps was obtained. The research complemented the results of work from 2001-2003 and 2018-2022, revealing in greater depth the architecture of the fortress's interior structures, especially the entrance labyrinth and access ramp.

During the excavations, it was determined that the labyrinth is square-shaped (28×28 m), with an entrance width of 5 m and a gate width of 3.9 m. The gate tower (10×8 m) served a protective function, guarding the entrance to the labyrinth. The wall, ramp, and road system were constructed and modified in different periods, which is evident from fire traces in architectural layers, clay floors and ash layers, as well as changes in brickwork.

One of the most significant discoveries - the presence of an entrance ramp - was archaeologically confirmed. It is reinforced with a 15-30 cm thick layer of compressed clay and is constructed as an ascending structure corresponding to the height of the tower. This ramp rises from the inner labyrinth along the gate axis and leads to the 2-meter platform of the city wall. Thus, the entrance and exit ramps were built using the same construction technology (sand, raw brick, and clay).

During the excavations, ceramic fragments dating back to the 2nd-1st centuries BC were found, including rim parts of large jars and mugs. These findings indicate life activity in Akchakhan-kala and the simultaneous development of civilian life alongside fortification structures. In the later layers, vessels from the Kushan period have been identified[8].

Simultaneously, the ramp's coverage with a leveled clay floor, changes in architectural levels at the entrance, and the narrowing of the gate passages attest to the dynamic development of the fortress's defense system. This scientifically distinguishes the Akchakhan fortress as a monument in Central Asia featuring multi-level, complex gate architecture.

Archaeological sites designated as A, B, G, and V have been identified in the Upper City area. Initially, object A was interpreted as a "burial ground," but later it was re-evaluated as a Central Monument. Object B, as a result of multi-stage excavations, was

identified as a "ceremonial complex," though it was initially referred to as a "palace" or "inner fortress" .

Object "V" - a rectangular inner fortress - began to be studied after 2010. There are observation towers in its northwestern corner, and an entrance was discovered here in 2011. The excavations clearly revealed the entrance, foundation, stone walls, and internal structures.

These findings unveil the significance of Akchakhan-Kala as a political and religious center, enabling scientific analysis of cultural architectural and construction styles[9].

Researchers hypothesize that life in the urban area continued uninterrupted until the early Middle Ages . The initial excavations in 2010 yielded important results in studying the city's ancient structure and defense systems.

In 2023, new research objectives were set to determine the construction period of the site, establish its connection with the ancient settlement of Akchakhan-kala, and conduct an in-depth study of its defense systems.

The entire brick wall was not found on the northern side of the "Inner Fortress," and the outer wall remained buried under the ruins of the Upper City fortress wall. The external surface of the northeastern wall was cleaned, and its construction material and techniques were examined.

It was discovered that the dimensions of the bricks used in this wall differed significantly from those of the ancient period (42×24×10-12 cm vs. 30-33×7-10 cm). Additionally, the thickness of the lime layer between the bricks is much greater than the clay-lime mortar of antiquity - sometimes reaching 20-40 cm. This suggests that lime was used not as a binding material, but for other purposes.

These findings contribute to a better understanding of the development of construction technology and defense systems, as well as the historical layers of the city.

The stratigraphy of the inner area of the "Inner Fortress" reveals the presence of collapsed barrier and sediment layers in both the inner and outer parts of the wall. These layers were formed as a result of the destruction of the Upper City fortress, and among them, large brick fragments and ceramic shards dating back to the beginning of the Common Era were found.

According to the analysis of the layers, the foundations of the new walls were built on top of collapsed barriers, situated on uneven, curved surfaces. This situation indicates that the construction technology differed from that of ancient times[10].

The findings in square B2 - a ceramic vessel, a flatbread, and a large storage jar - date back to the 7th-8th centuries, that is, to the Afrighid period. While walls of buildings from the Middle Ages were not found in the interior space, ceramics and pottery items confirm that people lived here during this period. These findings are not related to the ancient construction of the Upper City fortress, but rather reflect the activities of a later period.

Another important aspect of construction methods is the widespread use of ceramic tiles in Akchakhan-kala. In ancient layers, they were used for sewerage, roads, flooring, and wall covering, demonstrating the uniqueness of their culture and technology.

During archaeological research in 2023, a number of ceramic vessels from the early Middle Ages (7th-8th centuries AD) were discovered in the "Inner Fortress" area of Akchakhan-kala, which are considered important evidence proving the existence of life in this area. Among the finds are household items such as intact and broken large storage jars, pitchers, ceramic vessels, and lamps, the shape, decoration, and structural features of which have been studied.

Of particular interest are the jug and pitcher identified in the 008th layer of the A2 square deposit. The jug was preserved intact, with a closed shape, two-ringed handle, and outward-bent mouth. Its dimensions are: height - 86 cm, mouth diameter - 40 cm, body - 55 cm, base - 22 cm. Gypsum and wood additives were detected in the jug's composition. Its surface features linear patterns, resembling 7th-8th century jugs found in the Samarkand-Kashkadarya oasis [11].

The pitcher found in square B2 is preserved only with its lower part. Although its morphological reconstruction was not fully carried out, it is assumed that the height of the vessel was greater than the maximum diameter of its body.

A simple-shaped ceramic vessel with a handle, its mouth tilted outward, and a piece of its lid were also found. The height of this vessel is 14 cm, the mouth diameter is 12 cm, and the body is 15 cm. Gypsum and wood additives in its composition and traces of ash on the surface indicate that it was used as a kitchen utensil. This type of vessel is also believed to date back to the 7th-8th centuries.

One of the most noteworthy finds is a lamp, which has been preserved intact. This lamp with a shallow reservoir, a drain hole, and a smooth surface, with a diameter of 7.5 cm and a height of 2.5 cm, was probably a special ceramic object used for lighting indoor spaces.

The fact that these ceramics were discovered together with soil in the same layer indicates that they belong to the same period. Household utensils found in the inner fortress area suggest the domestic and functional purpose of this territory. Notably, no traces of buildings have been found in this area; only artifacts related to economic activity have been identified.

Recent studies show that the inner fortress structure in Akchakhan-kala was built not during the main construction phase of the settlement, but after the settlement's decline - in a later stage. After the Kushan period, the town was abandoned for several centuries, but during the Afrighid period, a small fortified castle (of the donjon type) was constructed here. This situation is connected with the feudal structure characteristic of the early Middle Ages in Khorezm.

Therefore, it can be confidently stated that life in Akchakhan-kala continued into the 7th-8th centuries AD. Ceramic materials found in the "Inner Fortress" area scientifically confirm this periodization[12].

Research work conducted at Akchakhan-Kala in 2024 was carried out in collaboration with researchers from the Karakalpakstan Branch of the Academy of Sciences of the Republic of Uzbekistan, the Archaeology Department of the Karakalpak Research Institute of Humanities, and the People's University of China. During the 2024 excavations, rooms F1 and F2, located in accordance with the northern parallelogram-shaped building of Akchakhan-kala, were studied. Both rooms were constructed using mud bricks, with half-bricks widely utilized in the wall construction. Room F1 had been in use for an extended period, with traces of water erosion and natural layers indicating long-term use and activity across different periods. A column foundation is present in the center, and pits containing large storage jars were identified around the walls. This room may have served as a storage area, living space, or for ceremonial purposes.

Room F2 is bounded by walls Q1 and Q2 and features a corridor structure. The room measures approximately 8×7 meters, with a floor covered in mud bricks. On the surface, traces of fire were found - burnt soil, charcoal, ash, gypsum particles, and several intact jar bases, confirming long-term domestic activities.

The semi-circular wall Q7 (height 0.62 m), constructed in room F2, is also made of unbaked brick. On the north side of the wall, a large, fully preserved pitcher was discovered. A fragment of a mural (fresco) was found in the lower part of the Q1 wall of room F2, with linear traces in white and light yellow colors. The fresco is 10.7 cm long and approximately 1.5 cm thick.

Mural fragments were also found on the exterior part of F2 and on the northern side of the Q1 wall. White, black, and red pigments are observed: black linear contours, with red used as the main pigment of the painting. However, no patterns are discernible, as the fragments are severely damaged.

In the Q5 area, white (gypsum), black (contour), and red colors are observed in the murals found on the south wall of the circular tower. Some fragments reveal geometric shapes - square patterns. These fragments are detached pieces of wall decorations.

The discovered mural fragments were carefully extracted using specialized techniques: they were excavated using special tools, cleaned of dust and dirt, and reinforced with AC33 adhesive. The surface is covered with protective fabric.

These frescoes hold significant artistic and historical importance as examples of monumental wall decoration art that existed in the Khorezm region during the early Middle Ages (7th-9th centuries). Their color scheme, technical execution, and placement provide valuable information about local feudal architecture and interior decorations[13].

As a result of archaeological excavations in the upper part of the Akchakhan-Kala shahristan, important architectural objects conditionally named A, B, and V were discovered. These objects are closely related to the city's **religious, political, and defense** systems, illuminating the complex social structure of ancient urban culture.

Object A, although initially interpreted as a "mausoleum," subsequent analyses provided grounds to reinterpret it as the city's **central monument**, that is, a centralized religious or symbolic structure. This approach emphasizes the semantic and visual central role of Object A in the overall urban plan.

Object B was identified as a "temple-palace," which was part of the ceremonial complex. Such dual-function structures - symbolizing the unity of religious and political power - were widespread in the architecture of early medieval Central Asian cities.

Object V began to be studied in 2010 at site 11.01. According to the architectural plan, this structure measuring approximately 90x70 meters had an 8-meter gate discovered in its northern wall. Only the northern and eastern walls have been fully studied, with the remaining parts still under sand. The tower-like entrance and ramp element, discovered during the excavations, in terms of construction technology, belong to the early Middle Ages, proving the continuity of life in the city during this period[14].

Results of excavations in 2024.

During the 2024 excavations, work carried out **at excavation site No. 11.02 (12x10 meters)** focused solely **on the interior of** object V. As a result of the excavations, a room (room 1) was uncovered near the northern outer defensive wall. Its dimensions are approximately 5.5 x 4.5 meters, with a height of 90 cm. The walls were constructed of raw bricks measuring 33x30x8 cm, with a high gypsum content detected. This brick composition represents a rare, non-traditional construction method in the region.

In the southern corner of the **room, a G-shaped structure, a square structure made of brick and clay, and a furnace attached to the external wall were discovered. The furnace has a diameter of 35 cm and a height of 25 cm. The layer of ash and charcoal found nearby, along with handmade ceramic fragments, suggests that this room was associated with domestic and economic activities.**

Near the southeastern wall of the room, a square stone measuring 35x35x10 cm was found. A coin made of copper alloy, a round object with a hole in the center, a fragment of a bone ring, and miniature vessels were discovered on the floor surface. In the early medieval layer, the walls of four rooms were built of bricks measuring 42x40x10 cm, with a height of 50-55 cm and a width of 80-85 cm. The floors of the rooms are covered with ceramic tiles of various sizes (42x42x3-4 cm, 32x30x3-4 cm, 30x20x3 cm).

Excavations reveal that initially, an underground brick platform with sand was constructed, followed by the erection of the ancient building's walls, and finally, the floor was covered with ceramic tiles. Rooms 1 and 4 are functionally empty, with the main findings related to vessel wall fragments dating back to the 1st-2nd centuries AD.

Research conducted in 2023-2024 confirmed that the Akchakhan-Kala site, located in the southwestern corner of the "Inner Fortress," is a fortified building from the early Middle Ages, containing utility rooms. The walls of this building are characteristic of early medieval fortifications, and old walls were utilized to conserve construction materials and labor.

In the southern area, a trench measuring 40x1.5 m was excavated, revealing a two-tiered structure of the fortress wall and a corridor situated between the inner and outer

walls. The inner wall is constructed of clay bricks, measuring approximately 40x42x12 cm. Vertical cracks and multi-layered brick layers in the middle section of the walls indicate phased construction. The bricks on the outer wall are decorated with symbols resembling the letter "R."

Aqchakhan-qala **is a complex archaeological ensemble** that provides important information about the early medieval urban planning system, religious-ceremonial, and defensive architecture of Central Asia. The varied functional orientations of objects A, B, and C determine their place in the social and political structure of the city. In particular, the internal structure of object V and the data found within it indicate that this structure was connected not only with defense **but also with economic and daily life**. The research also serves to illuminate **differences in regional construction technologies**[15].

At the site of three excavations dating back to the 1st-4th and 6th-8th centuries AD, small fragments of ceramics (excavation 11) were found. Numerous traces of fire effects in the northern area (Excavation 10) indicate that this area was associated with religious buildings, not dwellings or warehouses.

The fortress walls in the southern region (Excavation 12) have a complex structure, and it has been established that significant human and material resources were expended on their construction. This site held a high status and likely served as the central town of Khorezm during the period under consideration.

The northern excavations conducted in 2023-2024 provided new insights into the town's role in political and religious life. According to the results of excavation 11, the structure previously referred to as the "inner fortress" or "Palace" was actually a fortress dating back to the early Middle Ages, with its outer walls built on top of ancient buildings. Beneath these ancient buildings, rooms from the antiquity period have been discovered. These archaeological layers confirm that the structure was erected after the town had been destroyed by natural factors.

The findings indicate that Akchakhan-kala and its surrounding areas were actively inhabited during the early Middle Ages .

4. Conclusion

Archaeological research conducted at the Akchakhan-Kala monument in 2022-2024 revealed its complex and multi-stage developmental history in greater depth. Excavations of the labyrinth structures in front of the southeastern gate of the fortress, entrance and exit ramps, central monumental building, and sections of the inner fortress provided important evidence of activities related to architecture, urban planning, and religious ceremonies. The discovered ceramic items, especially vessels from the Afrighid and Kushan periods, prove that life in this region continued until the 7th-8th centuries. The research contributes to the scientific substantiation of Akchakhan fortress's role in the history of Khorezm and its significance as a religious and political center. Further in-depth study of this monument and analysis of its architectural and cultural layers remain one of the urgent directions of modern archaeological science.

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