GUMILYOV JOURNAL OF HISTORY
ISSN: 3080-129X. eISSN: 3080-6860

Research Article
IRSTI 03.41.91

https://doi.org/10.32523/3080-129X-2025-152-3S1-48-67

Traditions of House Building in Kazakhstan: Archaeological Perspective on the Evolution of Dwellings

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Abstract. The article is devoted to a comprehensive study of the evolution of housing forms in the territory of Kazakhstan from the perspective of archaeological data covering the period from the Eneolithic to the late Middle Ages. The main attention is paid to the peculiarities of house-building traditions in different natural-geographical zones - steppe, foothill, mountainous and high-mountainous - with the analysis of constructive, technological, and functional characteristics of dwellings. The article traces the formation and development of various types of dwelling and household buildings: from ground and semi-ground structures of frame-pillar construction of the Bronze Age to log and stone buildings of the Final Bronze Age and Early Iron Age. Special attention is paid to regional archaeological complexes – settlements of Asy-I, Turgen-II, Tasbas, Kalakay, Talapty, as well as sites of Central Kazakhstan: Begazy, Atasu, Buguly-I, and others, where rich stratigraphic and architectural materials are revealed. On their basis, the construction technologies, internal layout, organisation of economic space, heating and storage systems, as well as traditions of choosing a place for settlement are analysed. It is established that already in the Late Bronze Age, the principles of dwelling zoning, stable roof forms, typology of hearths and sufas were formed, which was reflected in the later ethnographic architecture of Kazakhs. The issue of continuity of architectural forms and principles between ancient buildings and traditional dwellings of Kazakhs of the New Age, including types of winter dwellings (qystau), is also considered. The choice of location for settlements, the orientation of entrances, the methods of insulation and lighting of dwellings, and the types of building materials (wood, clay, stone, straw, reed) are closely linked to the climate, terrain, and economic specialisation of the population (agriculture, livestock householding, crafts). Archaeological and ethnographic parallels reveal the stability of building traditions determined by climate, resource environment and economic specialisation of the population. The materials of the article are relevant for the reconstruction of the everyday life of the ancient population of Kazakhstan, the analysis of economic models, and the social structure of society. The work contributes to the study of cultural continuity and local specifics of the architectural heritage of the Eurasian steppes.

Keywords: dwelling; archaeology; Kazakhstan; Bronze Age; building traditions; architecture; stationary constructions; wintering

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For citation: Ganiyeva A. Traditions of House Building in Kazakhstan: Archaeological Perspective on the Evolution of Dwellings. *Gumilyov Journal of History.* 2025. Vol.152, no.3S1, pp.48-67. https://doi.org/10.32523/3080-129X-2025-152-3S1-48-67

Source of funding: The article was prepared as part of the fundamental scientific research of the Committee of Science of the Ministry of Internal Affairs of the Republic of Kazakhstan, BR20280993 «Kazakhstan in Antiquity and the Middle Ages: systematization and analysis of archaeological sources»

Традиции домостроения на территории Казахстана: археологический взгляд на эволюцию жилищ

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Аннотация. Статья посвящена комплексному исследованию эволюции жилищных форм на территории Казахстана с позиций археологических данных, охватывающих период от энеолита до позднего Средневековья. Основное внимание уделяется особенностям домостроительных традиций в различных природно-географических зонах – степной, предгорной, горной и высокогорной – с анализом конструктивных, технологических и функциональных характеристик жилищ. В статье прослеживается становление и развитие различных типов жилых и хозяйственных построек: от наземных и полуземляных сооружений каркасно-столбовой конструкции эпохи бронзы до срубных и каменных построек финальной бронзы и раннего железного века. Особое внимание уделено региональным археологическим комплексам – поселениям Асы-I, Тургень-II, Тасбас, Калакай, Талапты, а также памятникам Центрального Казахстана: Бегазы, Атасу, Бугулы-I и другим, где выявлены богатые стратиграфические и архитектурные материалы. На их основе анализируются технологии строительства, внутренняя планировка, организация хозяйственного пространства, системы отопления и хранения, а также традиции выбора места для заселения. Установлено, что уже в эпоху поздней бронзы формируются принципы зонирования жилища, устойчивые формы кровли, типология очагов и суф, что отразилось в более поздней этнографической архитектуре казахов. Также рассматривается вопрос преемственности архитектурных форм и принципов между древними постройками и традиционными жилищами казахов Нового времени, включая типы зимовок (қыстау), хозяйственных построек и планировочных решений. Выбор места под поселения, ориентация входов, способ утепления и освещения жилищ, типы строительных материалов (дерево, глина, камень, солома, тростник) тесно связаны с климатом, рельефом и хозяйственной специализацией населения (земледелие, скотоводство, ремесла). Археологические и этнографические параллели позволяют выявить устойчивость строительных традиций, обусловленных климатом, ресурсной средой и хозяйственной специализацией населения. Материалы статьи актуальны для реконструкции повседневной жизни древнего населения Казахстана, анализа хозяйственных моделей и социальной структуры общества. Работа вносит вклад в изучение культурной преемственности и локальной специфики архитектурного наследия евразийских степей.

Ключевые слова: жилище; археология; Казахстан; бронзовый век; строительные традиции; архитектура; стационарные постройки; кыстау

Для цитирования: Ганиева А. Традиции домостроения на территории Казахстана: археологический взгляд на эволюцию жилищ. *Gumilyov Journal of History.* 2025. Vol.152, no.3S1, с.48-67. https://doi.org/10.32523/3080-129X-2025-152-3S1-48-67

Источник финансирования: Статья подготовлена в рамках фундаментальных научных исследований Комитета науки Министерства науки и высшего образования Республики Казахстан BR20280993 «Казахстан в древности и средневековье: систематизация и анализ археологических источников».

Қазақстан аумағындағы үй салу дәстүрлері: тұрғын жайлардың эволюциясына археологиялық көзқарас

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Андатпа. Мақалада Қазақстан аумағындағы тұрғын үй формаларының дамуын археологиялық деректер негізінде жан-жақты зерттеу қарастырылады. Зерттеу энеолит дәуірінен бастап кейінгі ортағасырларға дейінгі кезеңді қамтиды. Негізгі назар әртүрлі табиғи-географиялық аймақтарда – дала, тау етегі, таулы және биік таулы өңірлерде үй салу дәстүрлерінің ерекшеліктеріне, құрылымдық, технологиялық және функционалдық сипаттамаларына аударылған. Мақалада қола дәуіріндегі жер үсті және жартылай жертөле түріндегі қаңқалы-бөренелі құрылыстардан бастап, кейінгі қола және ерте темір дәуірлеріндегі бөренелі және тас үйлердің қалыптасуы мен дамуы талданады. Айрықша назар келесі аймақтық археологиялық кешендерге аударылған: Асы-I, Түрген-II, Тасбас, Қалақай, Талапты, сондай-ақ Орталық Қазақстандағы Беғазы, Атасу, Бұғылы-I және басқа да ескерткіштер. Бұл ескерткіштерде стратиграфиялық және сәулеттік материалдар молынан табылған. Олардың негізінде құрылыс технологиялары, ішкі жоспарлау, шаруашылық кеңістікті ұйымдастыру, жылыту мен сақтау жүйелері, сондай-ақ қоныстану орнының таңдалу дәстүрлері талданады. Кейінгі қола дәуірінің өзінде тұрғын үйлерді аймақтарға бөлу қағидаттары, шатыр формаларының тұрақтылығы, ошақ пен сыпа типологиясы қалыптасқаны анықталған. Бұл белгілер кейінгі қазақ этнографиялық архитектурасынан да байқалады. Сонымен қатар, көне құрылыстар мен жаңа заман қазақтарының дәстүрлі тұрғын үйлері арасындағы архитектуралық формалар мен қағидаттардың сабақтастығы мәселесі қарастырылады. Бұған қыстау типтері, шаруашылық құрылыстары мен жоспарлау шешімдері жатады. Қоныстанатын жерді таңдау, кіреберіс бағыты, жылу сақтау мен жарықтандыру тәсілдері, құрылыс материалдарының түрлері (ағаш, саз, тас, сабан, қамыс) климатқа, жер бедеріне және халықтың шаруашылық ерекшеліктеріне (егіншілік, мал шаруашылығы, қолөнер) тығыз байланысты. Археологиялық және этнографиялық параллельдер климат, табиғи ресурстар және шаруашылық бейімделу арқылы қалыптасқан құрылыс дәстүрлерінің тұрақтылығын көрсетеді. Мақала материалдары Қазақстандағы көне халықтардың күнделікті өмірін, шаруашылық үлгілерін және қоғамның әлеуметтік құрылымын қалпына келтіру үшін маңызды. Зерттеу Еуразия далаларындағы сәулет мұрасының мәдени сабақтастығы мен жергілікті ерекшеліктерін зерттеуге өз үлесін қосады.

Түйін сөздер: тұрғын үй; археология; Қазақстан; қола дәуірі; құрылыс дәстүрлері; сәулет; тұрақты құрылыстар; қыстау

Introduction

Archaeology plays a key role in the study of stationary structures and sites of ancient architecture, as it provides scientific methods for analysing and reconstructing historical objects. Archaeological methods make it possible to determine the chronology of sites, to study cultural layers, and to reveal the peculiarities of everyday life and economic activities of ancient inhabitants.

Since ancient times, people have built dwellings to protect themselves from natural factors and to create space for their livelihood. These structures not only protected from unfavourable conditions, but also reflected the social and cultural norms of the society in which they originated. Dwellings were an important element of the social order, and we can trace changes in construction technology, levels of societal development, and interaction with the natural environment.

The purpose of archaeological research is to comprehensively reconstruct various aspects of ancient peoples. In the past, archaeology was predominantly focused on mound excavations and the study of funerary complexes, which formed a limited view on the life of ancient societies. However, modern research based on the study of settlements and stationary structures allows for a more in-depth and detailed reconstruction of the daily life of ancient peoples, their economic systems and social structures.

The evolution of ancient dwellings offers a unique perspective on how our ancestors adapted to changing environmental conditions, developed innovative solutions for survival and expressed their cultural and social ideals through the architecture of their houses. Studying changes in construction technologies, material use and layouts of houses provide deeper insight into the development of human societies, their interaction with nature and internal social structures.

Research methods

A range of research methods is employed within the scope of this study, each playing a critical role in the analysis of cultural complexes and settlements. The basic methods include:

1. Archaeological excavation. This foundational method involves the systematic excavation, documentation and cataloging of material remains from ancient cultures. It allows for the precise reconstruction of cultural development stages and the daily life of ancient peoples.

2. Comparative-historical analysis is a key approach in archaeology; this method involves comparing archaeological data and artifacts from various regions and historical periods to identify common patterns, trends and cultural interconnections.

3. Typological analysis. This method classifies artifacts based on their types, shapes and functions. It enables researchers to establish artifact chronologies, trace the evolution of technologies and crafts and draw conclusions about the social organization and economic activities of ancient communities.

4. Architectural analysis. During settlement studies, special attention is paid to architectural features such as layout, building types and functional purpose. Examining construction materials, building techniques and engineering solutions helps to reconstruct the social structure and technological level of the society.

5. Photogrammetry and 3D modeling. Modern technologies like photogrammetry and 3D modeling are used to accurately document archaeological sites and artifacts. These tools allow

for virtual reconstruction of settlements and structures, making it possible for researchers and the wider public to visualize them in their original form.

6. Ethnoarchaeology. A research method in which data from modern ethnic groups is used to interpret ancient cultural practices. Ethnographic evidence helps to clarify the function and purpose of artifacts and aids in reconstructing the social and economic life of ancient communities.

7. Geographic information systems (GIS) and remote sensing. These modern technologies enable the study of landscape changes, the identification of ancient settlement locations and territorial analysis from above.

These methods facilitate the exploration of complex cultural processes that occurred in ancient Kazakhstan and contribute to the reconstruction of a multifaceted picture of the region's historical development.

Prerequisites for the study

In historical science, the typology of dwellings serves as an important tool for classifying and studying the diverse forms of residential structures that developed across various regions and cultures. Scholars have proposed numerous classification systems for dwellings, based on differences in construction, materials, function and period of use.

N.N. Kharuzin's typology is based on the distinction between portable and permanent dwellings, a particularly relevant approach for nomadic societies, where mobility was a crucial factor for survival (Kharuzin 2011). His approach highlights the relationship between a population's way of life and its choice of dwelling type.

A.A. Popov proposed a more detailed classification, dividing dwellings into above-ground, semi-dugouts, pile dwellings and underground dwellings (Popov 1961). This approach focuses on construction techniques and adaptation to natural conditions, which is particularly important for the study of archaeological sites associated with different climatic zones.

Researcher O. Zhanibekov also identified two key categories of dwellings: mobile and stationary (Zhanibekov 1995). His classification focuses on the economic and cultural lifestyle of the people, where a nomadic lifestyle required the construction of easily dismantled and portable dwellings, while a sedentary population built permanent structures.

Z.P. Sokolova proposed a typology based on the structural features of dwellings, including frame, log, frame-log and frameless constructions (Sokolova 1998). This approach allows for a deeper exploration of the evolution of construction technologies and materials used by different people.

S.Zh. Zholdasbayev, based on his study of Kazakh settlements from the 15th to 18th cc., developed his own typology that includes *qystau* (winter dwellings), *qystaq* (winter settlement complexes), fortifications-mounds (temporary fortifications) and *kent* (settlements) (Zholdasbayev 2017: 148). This classification reflects the diversity of settlement forms and their functional purposes, providing insights into the economic and social organization of the population.

A.Z. Beisenov, in his research on the dwellings of the Saka people in the eastern part of the Kazakh hills (7th–5th cc. BC), identified three types of structures: sub-rectangular ground-level buildings, circular yurt-like houses and multi-component dwellings (Beisenov 2017). This approach highlights architectural innovations and their relationship to the social and cultural changes during the Saka period.

Dwellings may also be classified according to their duration of use: shelters for short-term stays (a few days), temporary dwellings (up to two months) and permanent houses. This typology helps to better understand the seasonal and social dynamics of ancient communities.

Results

The first stage in the formation of a sedentary culture

The discovery of the earliest ancient dwellings in the steppe regions of Kazakhstan is associated with the Eneolithic period and the identification of the Botay archaeological culture. This culture was discovered by the well-known Kazakhstani archaeologist V.F. Zaibert.

Dated to approximately 3700–3100 BC, the Botay culture spread across the Ural-Irtysh basin, covering vast territories including the Irgiz and Torgay rivers in the south, the Priirtysh region in the northeast and the tributaries of the Ural River in the west (Zaibert 1993: 149). Archaeological excavations have revealed more than ten Eneolithic settlements, including such well-known sites as Bestamak, Solenoye Ozero-1, Livanovka, Krasny Yar and others (Mertz 2019: 82). These settlements were primarily located in the upper reaches of the Tobol, Ubagan, and Torgay rivers, as well as along the elevated banks of steppe lakes, providing access to water and fertile lands for subsistence activities.

The Botay culture is notable for its unique dwelling structures. Over 80 residential and utility buildings have been identified, 15 of which had direct access to natural water sources. During the settlement's existence, about 250-300 dwellings were constructed. Botay dwellings were distinguished by a variety of shapes, including circular, oval, polygonal and sub-rectangular plans. According to V.F. Zaibert, the predominance of round-shaped houses can be explained by the wind patterns of the steppe and the need to retain heat during harsh winters (Zaibert 1993: 34, 141).

Various materials were used in the construction of Botay dwellings, including wood, reed, clay, animal hides and turf. A significant technological innovation was the use of adobe construction techniques, which were not characteristic of earlier cultures in the forest-steppe zone (Zaibert 1993: 17). This reflects the syncretic nature of Botay architecture, which combined local building traditions with innovative practices.

The area of semi-dugouts in the Botay settlement ranged from 30 to 120 m^2, which met the residents' needs for fairly compact but functional dwellings. The height of the dwellings reached 2.5 m, which allowed for effective heat retention during cold winters. The construction of the houses was based on a sturdy support system: after digging a pit, wooden posts 3-4 m high and 15-20 cm in diameter were installed around its perimeter and in the centre. These posts served as the basis for a polygonal hip roof consisting of 12-16 rows of wood (Zaibert 1993: 141). Often, household buildings and dwellings were connected by passageways. The difference between industrial buildings and dwellings was their location away from the dwellings. They were smaller in area and often did not have hearths.

A key feature of the construction technique was the use of turf for roofing. The turf covering was laid on a wooden lattice framework and sometimes coated with clay, which improved insulation and protected the structure from wind and precipitation. This method not only ensured the building's resilience to the harsh steppe climate but also kept an interior warmth during the cold season.

The interior layout of the dwellings included a central hearth, small utility pits along the walls and niches for storage (Zaibert 1993: 120). Sleeping areas were located opposite the entrance. Archaeological evidence indicates that the dwellings served not only as living spaces but also played important economic and ritual roles. These findings demonstrate a high level of organization in the daily life of the ancient inhabitants of Botay, making this region a key for studying the early stages of sedentary life and the development of architectural traditions in the steppe zone.

During the Eneolithic period, a sedentary, diversified cultural and economic system developed in the Ural-Kazakhstan steppes, with horse breeding (early horse breeders) playing a key role. Hunting on horseback, fishing and various domestic crafts served as important additions to their way of life (Zaibert 2009: 294).

In 1983, a Botay dwelling was reconstructed as part of an experimental project. The reconstructed structure fully met expectations: during the summer, the interior remained cool and dry, while in the autumn and winter seasons, there were no drastic temperature fluctuations. With proper maintenance including regular snow removal and drainage of meltwater the dwelling remained habitable for as long as its roof structure could withstand the elements, approximately 15-20 years (Zaibert 2009: 71). The reconstruction of the Botay dwellings represents the first scientific experiment aimed at studying the unique historical experience of early builders, shedding light on architectural skills and construction traditions during the Eneolithic period.

Second stage

The Bronze Age in Kazakhstan spans roughly from the 25th to the 8th cc. BC and is marked by the significant development of productive economies, the increasing complexity of social structures and the formation of permanent settlements. Archaeologically, this period is represented primarily by the Andronovo cultural complex, which includes several local variants such as the Sintashta, Alakul, Fedorovo and Begazy-Dandybay cultures. Over the course of the 20th century, more than one hundred Bronze Age settlements were identified across Kazakhstan.

According to researchers, Central Kazakhstan was the most densely populated region during the Bronze Age (Orazbayev 1970: 198). Archaeological evidence shows that the largest and most architecturally significant dwellings were located in the river valleys of the Atasu and Nura, as well as in mountain gorges (Margulan et al., 1966: 197). During excavations conducted in the 1950s–1960s, at least 30 settlements were recorded in this region. Scholars noted a high level of construction expertise, large settlement areas (ranging from 30 to 80 residential and utility structures in sites such as Buguly-I, Shortandy-Bulak and Atasu) and the scale of architectural complexes such as Aksu-Ayuly-II, Buguly-III, Begazy, Sangru-I and Belyasar (Margulan et al. 1966: 198).

The dwellings had a variety of shapes – square, rectangular, and ellipsoidal, with walls made of either earth or stone (Margulan et al. 1966: 204). These houses were constructed as semi-dugout structures with frame-post construction or as fully above-ground buildings. Inside many of these structures, archaeologists discovered workshops for metal smelting and pottery production (Margulan 1998: 233). Both simple single-chamber dwellings and more complex multi-chambered structures have been found, such as six-chamber dwellings at the Buyen settlement and large dwellings at Buguly-I, with an area of up to 1,500 m2.

Later research revealed the existence of two distinct construction horizons: earlier rectangular dwellings and later circular ones. Above-ground structures began to appear during the Begazy-Dandybay culture, when walls were constructed using stone and wood (Ulutau, Karkaraly-2 and Suuk-Bulak). In forest-steppe areas, timber was used to reinforce walls and build support structures, while in steppe regions, stone and sod constructions prevailed. A key architectural feature of dwellings from this period was the use of complex roofing systems supported by wooden posts. At the Buguly settlement (7 hectares in area), the remains of around 100 structures have been preserved, approximately half of which were residential (Margulan 1998: 250).

With the transition to the Late Bronze Age, proto-urban settlements began to emerge in Central and Eastern Kazakhstan, such as Myrzhyk, Buguly I, and Kent (Beisenov et al. 2014: 82; Mertz 2017: 498). In large settlements like Kent (30 hectares) and Semiyarskoye (67 hectares), archaeologists identified up to 300 structures, indicating a significant population density (Varfolomeyev et al. 2017: 12; Mertz 2017: 499). A major technological development during this time was the use of frame posts and the construction of stone walls that divided dwellings into multiple compartments.

In the Atasu archaeological micro-region (Central Kazakhstan), three major Bronze Age settlements were investigated: Atasu 1, Atasu 2, and Myrzhyk. The Atasu 1 settlement represents a spatially organized site where 23 residential structures were discovered, arranged in a circular layout and ranging in size from 80 to 250 m2 (Margulan et al. 1966: 207). At the center of the site, archaeologists uncovered a large residential building. Nearby, three round utility structures were found, indicating a functional zoning of space and the presence of collective economic activity. Remains of copper smelting facilities were also identified.

The Myrzhyk settlement covers an area of approximately 40,000 m2. The spatial layout of the site is organized along a broad street that divides the settlement into two symmetrical parts. A total of 37 buildings were identified, distributed on both sides of this central axis.

The Atasu 2 settlement, covering an area of approximately 11,600 m2, consisted of 49 buildings grouped into two longitudinal rows oriented along the riverbank. The linear structure of the settlement with repeating housing modules may indicate an even distribution of living space among family groups.

Several settlements dating back to the Late Bronze and Early Iron Ages have been identified in the Taldy River valley (Central Kazakhstan): Akkezhen, Azhar, Azhar 2, Saurambay, Bada, Baibala 2 and Shokpartas. The settlements are located in naturally protected areas – on hills, slopes and at the foot of mountain ranges. The largest is Akkezhen, which has up to 80 buildings, including large ground structures with remains of stone walls. Smaller settlements, such as Azhar, Azhar 2 and Shokpartas, include up to 10 residential structures (Varfolomeev 2019).

The materials from the Chaglinka 1 settlement (Northern Kazakhstan) show various types of dwellings, including irregular rectangular buildings with flat roofs, yurt-like wooden structures with hipped roofs and figure-eight-shaped dugouts consisting of two chambers connected by a narrow passageway (Orazbaev 1970: 140).

The typology of dwellings in the Shagalaly 2 settlement (11 dwellings studied) demonstrates the stability of certain building traditions, among which the frame-post technique stands out. Early houses had a semi-underground structure: part of the dwelling was dug into the ground, while the other part was built of wood and additionally insulated with branches and other

natural materials. Such permanent houses were used for a long time and were repeatedly repaired. The stratigraphy of the settlement indicates that most of the buildings of the second construction horizon were erected on the site of earlier dwellings. In some cases, the walls of the new houses coincide with the boundaries of the old ones, although the buildings themselves are significantly larger. The fundamental difference between these structures and the previous ones is that they are already above ground and include production and economic outbuildings (Sakenov 2024: 157). The materials from Shagalaly 2 have made it possible to trace the complex process of economic, cultural and historical development of the Bronze Age people in northern Saryarka.

Analysis of archaeological data indicates a high degree of stability in settlement patterns in the Saryarka region, from the Bronze Age through to the late Middle Ages and modern times. Many Kazakh winter camps were located in the same areas where permanent settlements existed during the Palaeometallic period (Margulan et al. 1966: 198). Such spatial continuity indicates the important role of natural factors (water sources, protected terrain and pasture resources) in the choice of locations for long-term residence. It is noteworthy that the planning features of Bronze Age settlements in many cases demonstrate structural similarities with later forms of nomadic camp organisation (Margulan et al. 1966: 200), which allows us to speak of cultural and functional continuity in the traditions of housing construction over thousands of years.

Bronze Age settlements in the mountainous region of Zhetysu demonstrate stable forms of sedentary lifestyles adapted to the conditions of the high mountain and foothill environment. They were located mainly at the exits of gorges and on the terraces of the northern slopes of the mountains, near water sources, which indicates a thoughtful choice of habitat in terms of access to natural resources. Construction was carried out using available materials – wood, clay and stone. The main type of dwelling was a semi-dugout frame-post structure, usually rectangular or square in shape, with an area of 60 to 120 m^2, dug 1-1.5 m into the ground. Smaller household buildings were located nearby. The structure of the settlements included up to 10–12 manors built around water sources. The interior space of the houses was functionally zoned with hearths, utility niches and outbuildings. In some cases, pens for livestock were built next to the dwellings (Goryachev 2023: 54). The materials discovered indicate an established and stable tradition of construction, reflecting the social organisation and economic specialisation of the Bronze Age population in the mountainous regions of Zhetysu.

Archaeological materials from the settlements of Turgen-2, Asy-2, Tasbas and Kalakay demonstrate the stability of economic and cultural traditions and developed architectural practices in the Late Bronze Age (Goryachev 2011). Houses were mainly built using semi-dugout techniques: they were cut into slopes or dug into the ground, which provided thermal insulation. The structural basis consisted of a frame-post construction installed in dug foundation trenches. The walls were reinforced with wattle and daub and coated with clay, while the roof – flat or gabled- was covered with logs and filled with turf or earth. At the Turgen 2 settlement, dwellings had a hipped roof laid on vertical support posts up to 3 m high and coated with clay. The entrance was located in the south-west and had the form of a corridor (1.2 × 2 m). The floors were usually made of clay, in some cases covered with stone tiles. The interior of the dwellings was functionally organised: the layout of the rooms included a central hearth, sometimes made of stone, stationary shelves, places for storing food, as well as utility pits and ash pits. The space

was divided into areas for cooking, resting and storage. The presence of portable clay hearths indicates the complex structure of everyday life. A comprehensive analysis of architectural solutions, construction technologies and the interior of dwellings allows us to conclude that these settlements functioned as permanent or seasonal residences.

The traditions of house building are vividly represented in the materials of the Butakty-1 settlement (south-eastern outskirts of Almaty). The houses-manors were square-shaped semi-dugouts with a frame-post structure (11 x 11 m; 15 x 15 m). The walls were constructed from hewn logs coated with a clay mortar mixed with brick-coloured vegetable dye. The hipped roof rested on a square frame in the centre of the house, supported by four pillars, with an opening above the hearth for smoke pull. The floor was covered with a mixture of liquid clay and organic additives, sloping slightly towards the centre. An oval-shaped hearth with a horseshoe-shaped clay rim (1.2 x 2.2 m) was located exactly in the centre of the dwelling (Maryashev, Goryachev 2019).

The residential and domestic architecture of the Bronze Age in Eastern Kazakhstan (in particular, in the settlements near the village of Kanay and the village of Trushnikovo) was characterised by large semi-dugout structures with walls buried deep into the ground. The roof structures were flat, which, as A.G. Maksimova points out, is one of the characteristic features of traditional Kazakh house construction in this region (Maksimova 1959: 92). Adjacent to the main living space were household buildings, the construction of which reproduced the principles of the main structure, including a solid roof and similar wall construction. Already in the Bronze Age, log-type buildings appeared in the territory under consideration, which indicates the development of construction technologies and the complication of architectural forms.

The settlements of Toksanbay, Aitman and Manaysor 1–3, located in the north-eastern Caspian region, show a consistent tradition of house construction adapted to the specific features of the terrain and natural conditions of the region. Houses were built on outcrops – isolated sections of the chinka slope using local materials, mainly shell limestone slabs. The basis of the structure was a pit, partially formed by natural depressions, which were finished by hand. Massive slabs were installed vertically around the perimeter of the pit, on top of which horizontal stone masonry was laid. Inside, there were hearths, utility pits and utility boxes made of slabs covered with clay mortar mixed with reeds, which were characteristic of the Toksanbay settlement. The roof was constructed on wooden pillars, mainly made of saxaul, with a reed floor, possibly covered with a mixture of clay and ash. A distinctive feature of the buildings was their stepped arrangement on the slope and the use of the natural landscape in their layout (Loshakova 2023: 75). The architectural techniques and construction methods date back to the Neolithic and Eneolithic traditions of the region, demonstrating the continuity of forms and methods of building dwellings up to the ethnographic present.

The settlements of the Late and Final Bronze Age in Kazakhstan are characterised by a variety of dwelling structures (Maryashev, Gumirova 2011: 277). A comparative analysis showed a tendency towards a decrease in the size of houses (from 140–210 m^2 to 70–100 m^2) and an increase in building density, which may indicate a reduction in the size of family groups and the transition of part of the population from sedentary to nomadic cattle breeding (Tkacheva 1999: 41).

Dugouts and semi-dugouts varied in depth: from 1.3 to 1.6 m for dugouts (Asy-1, Semirechye, Kent) (Maryashev, Gumirova 2011: 265; Varfolomeev et al. 2017: 32; Margulan 1998: 307) and

from 20 to 90 cm for semi-dugouts (Akkezhen, Atasu, Sorkuduk). Their area ranged from 25 m^2 to 100 m^2 and more (Evdokimov et al. 2002: 35; Beisenov et al. 2014: 81; Sorokin 1962: 53).

Hearths were used for heating, with their number varying from 2 to 9 per dwelling (Beisenov et al. 2014: 81; Maksimova 1959: 93; Karabaspakova 2011: 113; Sorokin 1962: 53). The outer walls could be made of stone or woven materials with clay plaster, as well as wood (Margulan 1998: 200). Log buildings were found in the house construction of Eastern Kazakhstan and the Upper Irtysh region (Chernikov 1960: 26; Tkacheva 2008: 88).

The roofs of dwellings were flat (Maksimova 1959: 92), gabled, hipped (Maryashev, Goryachev 2019; Sakenov 2011: 336; 2019: URL), or yurt-shaped (Karabaspakova 2011: 113; Kadybaev et al. 1992: 58) and were supported by wooden pillars. The floors were levelled with stone slabs or tamped down with clay plaster (Margulan 1998: 307; Tkacheva 2008: 86).

Bronze Age dwellings in Kazakhstan demonstrate a complex evolution from simple shelters to permanent residential complexes. The architecture reflects both the level of economic development and the social stratification of the population. Regional features of dwellings indicate the existence of local building traditions that were formed in the context of the natural landscape.

The third stage of sedentary culture

The basic principles and technologies of construction established in the Bronze Age were preserved and developed in subsequent periods, which is clearly visible in traditional Kazakh dwellings up to the present day.

Research on early Iron Age settlements in Northern and Central Kazakhstan, the Irtysh River region, Zhetysu and the Eastern Aral Sea region remains largely unexplored.

The Saka settlements located in the valleys of the Ili and Charyn rivers, as well as in the foothills of the Zailiyskiy Alatau, including sites such as Tsyganka 8, Tuzusay, the Talgar group and Kainazar, demonstrate stable centres of settlement where agriculture and crafts developed. Despite the modern influence of urbanisation, the preserved archaeological sites provide an insight into the life and economic processes of those times. The topography of the settlements and the nature of economic activity, including the cultivation of wheat, barley, millet and irrigation methods, have been determined (Baipakov 2004: 33).

During the Early Iron Age, the Usuns in Zhetysu began to build fortified settlements and cities surrounded by walls (Akishev 2013: 15-16). A characteristic feature of these cities was the presence of large areas devoid of buildings, which was associated with the tradition of combining nomadic and sedentary lifestyles, as well as economic activities.

In recent studies, scientists have collected data on the layout and structure of ancient Saka settlements in the Shu-Ili Mountains and the Zailiyskiy Alatau. These studies focus on the topography of sites and architectural traditions in Zhetysu. The settlements had a clear ecological and economic connection. Large settlements with a developed irrigation system (Kyzylbulak, Butakty and Almaarasan), consisting of several dozen manors, were located in the foothills and valley zone. In the gorges and highlands (Turgen-2, Eshkiolmes) there were permanent winter quarters with southern exposure, protected from the winds and provided with seasonal water sources. In the steppe and semi-desert areas of the Shu-Ili Mountains, there are small household complexes of cattle breeders – 1–2 dwellings with household buildings and

pens. The settlements were located near natural resources: springs, clay deposits and metal deposits, which ensured their self-sufficiency. The dwellings were of various shapes, adapted to the conditions of the mountainous, foothill and plain areas. Semi-dugouts were the most common type of dwelling. They were rectangular, square or round in shape, dug 0.5–1 m into the ground and built using a frame-post technology with stone, wood and clay. Protoyurts are above-ground rounded structures, probably used as seasonal dwellings, characteristic of high mountain areas. The roof was gabled or hipped, supported by pillars. The construction used beams, reeds, animal skins or wood, depending on natural conditions. The interior space of the houses was divided into rooms or sections, with a hearth often located in the centre. Sometimes the hearths were placed outside the dwelling (tandyr). The floors of the dwellings were tamped with clay and the walls were sometimes reinforced with stone masonry or coated with clay (Maryashev, Goryachev 2019: 95).

Since 2019, archaeological research has been conducted on a complex of Early Iron Age settlements in the Akbauyr tract (Eastern Kazakhstan). The complex is considered a specialised metallurgical production centre with a developed economic system (Samashev, Zhuniskhanov et al. 2024: 68). Most of the buildings are irregular rectangles or ovals with rounded corners. Their foundations are made of two rows of stone blocks laid flat and the walls are built of large slabs placed parallel to each other, with the gaps filled with medium-sized stones. To support the roof, support posts were sometimes dug into the ground and sometimes installed on an ancient horizon. The passages are mainly oriented to the northeast and the floors were covered with light grey loose sandy loam or levelled with ash for insulation (Samashev, Zhuniskhanov et al. 2024: 69).

At the Akbauyr II settlement, round stone structures with adjoining extensions were discovered. These above-ground dwellings, built from massive granite blocks, had thick walls, which probably helped to retain heat. In some cases, the floors of such dwellings were made of natural outcrops of coarse-grained grey granite, which were covered with clay to improve thermal insulation. The inhabitants of the settlements often rebuilt their houses and added new utility rooms. The architectural features of the Akbauyr buildings demonstrate the continuity of Late Bronze Age building traditions (Samashev, Zhiniskhanov et al. 2024: 71).

As a result of research on the urban-type trade and craft settlement of Karakabak (Aralo-Caspian region), the remains of three household buildings were discovered, separated by courtyards or street spaces covered with loose loess containing ceramics and animal bones. The buildings had a multi-room structure with foundations made of adobe blocks (40 × 40 cm, 55 × 40 cm) and stone masonry on clay mortar. The construction technique, which involved laying blocks on a rock base or cultural deposits, indicates the influence of imported technologies and adaptation to local conditions. Most of the rooms were residential, equipped with sofas, benches with tiled facades and hearths of various shapes. The floors were coated with clay plaster. Remains of sacrificial altars made of unfired clay and bases for wooden structures supporting the floors have been identified. Important features included regular redevelopment, the destruction of sections of walls and the use of materials for secondary construction (Astafiev, Bogdanov 2019: 19). Karakabak's city status is indicated not only by the layout of the houses, the presence of streets and the abundance of remains of human activity, but also by the existence of a powerful defensive structure consisting of a wall and moat. Researchers believe that the settlement was founded in the 3rd c. and underwent three periods of construction, covering a time span of no more than 300 years (Astafiev, Bogdanov 2019: 24).

To date, archaeologists in Kazakhstan have accumulated a significant amount of material on the study of stationary structures throughout the country. In the eastern part of Central Kazakhstan alone, more than 50 Early Iron Age settlements are known (Beisenov, Duisenbay et al. 2019: 7), 12 of which have been excavated. The features of the topography and planigraphy, methods of building construction and classification of ceramics have been identified. The authors of the excavations emphasise the ethnocultural proximity of the region to the synchronous cultures of the eastern steppe area of Eurasia (Beisenov, Duisenbay et al. 2019: 22). Three types of Saka dwellings were identified: rectangular houses with stone or stone-wood partitions and thick walls (1-1.5 m wide), built using a double-row masonry method (Tagybaybulak, Keregetas-2), rounded or yurt-like dwellings and multi-component structures with several rooms.

Rounded dwellings usually had stone foundations and wooden frame structures. An example of this type is the settlement of Tuyetas, where a dwelling with a central circular room 3–3.5 m in diameter and several attached rooms was discovered (Beisenov et al. 2014: 6). Yurt-like houses with hipped roofs are also found at other Saka sites, including Sarybuirat. In Saka-era dwellings, roofs could be either flat or conical (Beisenov 2017: 76).

In the Akmola region, the early Saka settlements of Kenotkel 10, Taskora, and Taskora 1 have been studied. Three main planning schemes stand out: linear (Taskora-1), nested (Taskora) (Khabdulina 2017: 46) and complex structure, as in the Sarybuirat settlement, where all buildings are united by a common layout covering up to 10,000 hectares (Beisenov, Shulga 2017: 18). The sites under study provide a valuable material that reflects the development of sedentarisation, culture and the way of life of the tribes.

Medieval architecture in Kazakhstan continued to develop the traditions established in previous eras, including elements of both nomadic and sedentary lifestyles. One of the key types of dwellings of this period was above-ground structures and semi-dugouts, which gradually became more complex with the addition of defensive and public buildings.

An important feature of the architecture of medieval cities was the presence of fortifications, which emphasised the importance of defence in conditions of constant conflict and external threats. Fortified settlements in Kazakhstan, as in other parts of Central Asia, often had fortress walls, citadels and shakhristans – elements that served both for defence and for housing administrative and religious centres (Voronina 1969: 185).

Archaeological research in southern Kazakhstan shows that there were some advanced urban settlements. In settlements like Otyrar, Sauran and Turkestan, the architectural ensemble included both residential areas and public buildings, like mosques, baths and caravanserais. Construction was mainly carried out using pakhsa, brick and stone, which ensured the durability of these structures.

The architecture of nomadic peoples remained important even after many societies transitioned to a semi-sedentary lifestyle. The tradition of building yurt-like dwellings continued into the Middle Ages. This was due to the need for mobility, especially during winter and summer migrations. An example of such dwellings is the settlement of the Turks and Karluks in the foothills of the Zailiyskiy Alatau. Here, the remains of buildings have been found that combined elements of traditional nomadic architecture with permanent structures characteristic of a sedentary lifestyle.

Fortified settlements – tortkuls, small enclosed towns with strong walls, occupied a significant place. Such settlements existed along trade routes, providing control over strategically important

routes and protection for caravans. The settlements of Karamergen, Agashyak, Talgar and others were important hubs in the trade and communications system on the Great Silk Road (Baipakov, Erzakovich 1970: 38).

Medieval dwellings in southern Kazakhstan, starting from the 6th-7th cc., included two main types: single-room rectangular houses and two-room buildings with a linear layout. One-room houses, which accounted for 85% of all excavated dwellings, had an area of 12 to 45 m^2. Two-room houses, which accounted for about 15%, were organised according to the principle of enfilade connection of rooms (Baipakov 1986: 83-85).

The urban buildings of the Otyrar and Turkestan oases (6th-10th cc..) were densely built up, divided by streets oriented along an east-west line. Houses were built of adobe bricks and turf and sometimes of stone, especially in wealthier homes. Construction took into account the climatic conditions of the region, which were reflected in the layout and materials used for construction. Important elements of the houses were the sufa and tandyrs. Some houses had hearths and fireplaces. Hearths were divided into two types: rectangular ones dug into the sufa and round ones with "hearth" platforms. There were also two types of built-in fireplaces: horseshoe-shaped and rectangular. The houses had partition walls and storage rooms made of adobe bricks. The edges of the sufa were also made of adobe bricks. Fired bricks were used extremely rarely. A number of houses in Karatobe had sanitary facilities with tashnau (Smagulov 2010a: 165).

Houses in Zhetysu of the 7th-8th cc., such as those at the Krasnaya Rechka and Lugovoye sites, demonstrate the use of a linear "comb" layout. The basis of such buildings was the connection of long, narrow rooms through a central corridor. Raw bricks were used to build the walls and the arches were covered with dome structures, with a transition to the dome through arched-stepped trompes (Baipakov 1986: 87).

By the middle of the 9th-10th cc., the traditional one- and two-room houses with sufas and hearths remained in this region. Houses with a centric layout, where the central space served as a connection between living and utility rooms, began to be actively used in the southern regions of Kazakhstan. Domed roofs and the central location of the hearth can also be traced in the architecture of the dwellings of Turkic tribes.

In the second half of the 13th c. and the first half of the 14th c., new types of dwellings appeared in Otrar. The first type included two- or three-room houses with a courtyard, located along a single axis. The second type consists of houses with four rooms arranged in a cross-shaped or four-part layout. These dwellings have a sub-square plan, with storerooms located to the left and right of the iwan, courtyard or living room with a tandyr. The number of rooms in such houses can increase to five or six. The third type consists of houses with two or more sections. Each section includes two or three rooms, one of which necessarily serves as a living space. Changes followed in the interior: the narrow sufa along the walls is replaced by a wider one, the area in front of the tandyr is usually paved with bricks and in the centre of the room, at the edge of the sufa, there are often remains of a wooden beam, brick pavement or stone slab, indicating the presence of a wooden column that supported the roof (Akishev et al. 1982).

As a result of studies of 150 houses in Otyrar, it was established that 75% of them were linear structures with a series of passageways consisting of two to five rooms (Akishev et al. 1982: 127). A single type of both one-room and multi-room dwellings was identified. One-room houses consisted of a heated room with an iwan and a front hall with a total area of about 30

m^2, a significant part of which was occupied by a sufa. Multi-room houses had either a linear layout with rooms arranged in a line or a compact layout with rooms located on adjacent sides (Akishev et al. 1982: 124).

The Otyrar type of dwelling, characteristic of medieval cities (e.g., Zhalgyz-Tam and Kultobe), was based on a layout reminiscent of the interior of a nomadic yurt. It evolved with the introduction of sedentary lifestyles and Islam, continuing to be used until the 20th century. This type of dwelling spread to other regions, including the Volga region and the Urals, where it influenced construction in the cities of the Golden Horde (Smagulov 2010: 88).

The houses of the 13th c. of the settlement of Sarayshik (Western Kazakhstan) featured traditional elements such as sufas, tandyrs and tashnaus, as well as fireplaces characteristic of the cities of the Syrdarya region (Tasmagambetov 2001). The houses in Otyrar were built of adobe bricks mixed with straw, using burnt bricks for floors and to reinforce stoves. In some areas, such as the Kultobe settlement, houses were built of flagstone (Akishev et al. 1982: 132).

Kazakh sedentary and semi-sedentary dwellings, such as qustau (winterings), resemble late medieval Otyrar houses in their characteristics (Akishev et al. 1982: 134). Researchers note similarities in layout, interior, construction methods and materials. The linear layout of the Kazakhs' permanent dwellings echoes that of ancient dwellings on carts (Smagulov 2010a: 228).

Qystau were two- or three-room dugouts or semi-dugouts of a round or ellipsoidal shape, located on plains and along river banks. In the mountains, winter quarters were most often above-ground structures. These dwellings were located around large settlements such as Sauran, Ayakkamyr, Basmakyr and others and were sometimes surrounded by ramparts or moats (Zholdasbayev 2017: 149). Later winter quarters no longer had fortification elements.

Winterings (qystau) in the Kazakh steppe differed in regional specifics, determined by climatic conditions, terrain and the availability of natural resources, including flora and fauna. The structure of a winter settlement usually included living quarters, household buildings for storing property and keeping livestock (barns), as well as open auxiliary structures. When choosing a place for wintering, preference was given to areas near water bodies – rivers and lakes. Building materials were selected taking into account natural conditions and could include wood, reeds, stone and clay. The architectural appearance of household buildings varied depending on the number and composition of livestock and the quality of construction and materials used depended on the economic status of the clan.

In the territory of Northern Saryarka, stationary residential and household complexes such as Sarkyrama, Kozykosh and Bozok 2, located in the suburban area of Astana, have been studied. In Sarkyrama, a well-preserved site of the late Middle Ages was discovered – quzeu (Dukombayev 2020: 158). The Kozykosh settlement includes over 80 residential and household buildings dating back to two stages of the territory's development – from the mid-19th to the mid-20th cc. (Tleugabulov 2022: 28). Five buildings have been documented at the Bozok 2 winter camp, three of which are residential houses and two are household buildings (Ganiyeva, Sakenov 2023: 151).

Discussion

The evolution of residential architecture in Kazakhstan demonstrates the gradual development of sedentarism from the Eneolithic period to the Middle Ages. Archaeological data allow

us to trace important changes related to technological innovations, adaptation to climatic conditions, as well as the cultural and economic way of life of the population.

One of the most important cultural stages was the Eneolithic period, represented by the Botay culture (3700–3100 BC), when new construction technologies were used in dwellings, such as adobe techniques, turf roofs and support systems for tent structures. The semi-dugouts of the Botay people reflect effective architectural solutions that provided thermal insulation and protection from natural factors. These early settlements already showed signs of a sedentary lifestyle.

The Bronze Age (2nd millennium BC) is characterised by a transition to more complex architectural forms and an increase in the size of settlements. Proto-urban complexes such as Kent and the Semiyarskoye settlement appear in Central and Eastern Kazakhstan. These settlements demonstrate population growth and a more complex social organisation. An important technological achievement was the use of frame pillars and the construction of stone walls, which made it possible to divide rooms into residential and utility areas. The construction of large multi-room houses and industrial premises became evidence of increased production capacity and specialisation of the economy.

The architecture of the Early Iron Age, when Saka and Usun settlements spread across Kazakhstan, occupies a special place in research. These cultures combined elements of nomadic and sedentary lifestyles, which were reflected in their architecture. Saka dwellings varied in form, from simple ground structures to multi-room dwellings with circular and oval layouts typical of yurt-like structures. The Usuns built fortified settlements with fortress walls, demonstrating an increase in sedentariness and defensive capabilities.

The medieval period in Kazakhstan reflects complex urbanisation processes. Urban settlements such as Otyrar, Sauran and Turkestan became important centres of trade, crafts and culture.

The architecture of these cities included fortified walls, shahristans and citadels, demonstrating a high level of urban planning and defence. These cities showed close ties to the Great Silk Road and were important hubs in international trade.

Kazakh winter dwellings (qystau) continued the traditions of sedentary house building, especially among semi-sedentary communities. The construction of winter dwellings from adobe bricks, turf, and stone ensured a sustainable existence in the steppe climate. They reflected local differences depending on the natural conditions of the region, but retained common features, such as the connection of the residential building with household buildings and the use of local building materials.

The study of settlement complexes remains one of the most promising areas of archaeological science. The architecture of dwellings is an important source of information reflecting the level of social and technological development of ancient societies.

Conclusion

The study demonstrates that the evolution of residential architecture in Kazakhstan is the result of complex, centuries-long processes of human adaptation to the natural environment, social conditions and cultural transformations. Archaeological materials covering the period from the Eneolithic to the late Middle Ages allow us to trace a consistent line of development

of architectural forms – from the semi-dugouts of the Botay culture to Kazakh winter dwellings and fortified settlements.

The architectural features identified during the research (layout, zoning, building materials and roof typology) show a high degree of adaptation to regional conditions: climate, terrain, and resource base. Construction principles such as frame-and-post foundations, the use of natural materials and the organisation of interior space, have existed for thousands of years, which testify to cultural continuity.

Based on an analysis of archaeological sites in Kazakhstan, it can be argued that the principles of house construction established in the Bronze Age were not only preserved but also developed, transforming into the architectural forms of the Early Iron Age, the Middle Ages and ethnographic modernity. This confirms the importance of archaeological data as a key source for studying social, economic and cultural processes.

Thus, the study of house-building traditions makes a significant contribution to the reconstruction of the everyday life, economic structure and cultural identity of the peoples who inhabited the territory of ancient Kazakhstan. It demonstrates that architecture is not only a reflection of material culture but also an important indicator of historical dynamics and the sustainability of traditions.

Acknowledgements

The author expresses his gratitude for the scientific advice provided by Candidate of Historical Sciences M.K. Khabdulina and PhD S.K. Sakenov.

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Conflict of Interest Statement: the author declares no conflicts of interest. ***Мүдделер қақтығысы туралы мәлімдеме:*** автор мүдделер қақтығысының жоқ екенін мәлімдейді***. Заявление о конфликте интересов:*** автор заявляет об отсутствии конфликта интересов.

Мақала туралы ақпарат / Информация о статье / Information about the article.
Редакцияға түсті / Поступила в редакцию / Entered the editorial office: 01.08.2025.
Рецензенттер мақұлдаған / Одобрена рецензентами / Approved by reviewers: 06.09.2025.
Жариялауға қабылданды / Принята к публикации / Accepted for publication: 21.09.2025.