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## On Ancient Agriculture in Arid Regions of Central Asia: The Case of the Uvs Nuur Basin

*The Uvs Nuur Basin is one of the largest arid basins in southern Siberia and Central Asia. The local economy is based on pastoralism. Small-scale irrigation farming is practiced in river valleys. Satellite images of the basin reveal traces of ancient farming, which was much more extensive than that practiced at present. In the central part of the basin, in the Tes-Khem valley, dense irrigation networks are observed, along with numerous associated and hitherto unknown ancient settlements. Presumable remains of an ancient city, surrounded by a network of irrigation canals, were discovered on the west coast of Lake Uvs Nuur. Field studies confirmed the results of image analysis. Parts of ancient irrigation systems, and the ruins of the city and separate settlements, were documented on the ground. For the first time, paleobotanical studies of buried soils and peatlands on ancient fields in the central Uvs Nuur Basin revealed seeds of *Triticum* sp. Remains of trees and grasses found in the same associations suggest that parts of the basin that are now deserted were covered by forest-steppe landscapes, and the climate was milder at the time when agriculture was practiced. Tentative results of radiocarbon dating suggest that the city existed during the High Middle Ages. Our results point to a greater role of agriculture at that time as compared to the present.*

Keywords: Tuva, Uvs Nuur Basin, satellite images, ancient agriculture, irrigation, paleobotany, *Triticum* sp., wheat.

### Introduction

The Uvs Nuur Basin, assigned to the Great Lakes Basin of Western Mongolia, is a vast closed drainage area, with the Uvs Nuur salt lake located in its central part. The main elements of the territory are plains lying at hypsometric levels of 750–1000 m a.s.l. The forms of relief, the type of rock weathering, the character of the soil formation, and the flora and fauna reflect the effect of the proximity of the Central Asian deserts. The landscapes are dominated by dry steppes including sandy, stony, desertified ones, as well as vast massifs of wind-blown sands (Prirodniye usloviya..., 1957: 246–250).

The main waterway of the basin is the Tes-Khem River, originating from the spurs of the Khangai ridge and running into Lake Uvs Nuur in its eastern part. Low-water rivers, which lose themselves in deposits of subaerial deltas after exiting the mountain valleys, flow down mainly from the Tannu-Ola ridge, which frames the north of the basin. The rivers of the southern frame, the Khan-Khukhii ridge, are also low-water. The rivers nourished by glaciers of Turgen and Tsagaan Shuvuut Uul high-mountain ridges in the western part of the basin are sufficiently full-flowing and deep. They fall into numerous streams and creeks in the downstream reach of the lacustrine basin. Large areas of this basin are swamped, and certain portions

of mountain slopes are also flooded, which is caused by discharge of groundwaters along the permeable zones of tectonic faults.

The basic activity of the population is nomadic cattle-breeding. Small-scale agriculture (mainly, irrigation farming) is practiced in river valleys. Researchers of Central Asia (according to Y.I. Drobyshev, Central Asia comprises Mongolia, Buryatia, and Tuva, plus the Inner Mongolia and Ningxia Hui autonomous regions and Qinghai and Gansu provinces included in the PRC, as well as the northwestern part of the Tibet Autonomous Region (2014: 54)) noted the presence of fields and also remnants of irrigation canals and ancient fallow lands in this territory, including the Tuvan and Uvs Nuur basins (Semenov, Potanin, 1877: 667; Radlov, 1894: 12; Kazimirsky, 1942; Bichurin, 1950: 40, 223; Kiselev, 1951: 255, 513, 570; Kon, 1952; Dulov, 1952; Kyuner, 1961: 57–58; Weinstein, 1969: 9; Kyzlasov, 1984: 12–13, 23, 45, 102–103; Mannai-ool, Dostay, 1996: 129; Ashak-ool, 1984; Prudnikova, 1999; and others). The overall characteristics of ancient irrigation systems in Tuva were obtained by remote sensing methods, such as aerial photography and interpretation of images from space (Prudnikova, 2005; *Antropogenniye preobrazovaniya...*, 2011: 207–247). The first data on the age of the irrigation systems in the Khemchik Basin were derived, which suggest the existence of irrigation farming in this territory in the Bronze Age (Prudnikova, Prudnikov, Spivakov, 2008). In general, analysis of the paleogeographic conditions and history of development of ancient Tuva has demonstrated that agriculture was practiced here during all significant historical epochs of the Middle and Late Holocene (Prudnikova, 2005). By analogy, the existence of irrigation farming in the territory of neighboring Mongolia was also presumed. It has been proven that the Wall of Genghis Khan in the Khovd River valley is the principal canal of a gigantic irrigation system (Prudnikova, Prudnikov, 2009).

Nevertheless, ancient agriculture of Central Asia is understudied, and its study remains a very pertinent issue, since the majority of modern authors project the present arid conditions of the region onto past epochs, and assign a minor role to farming in their economic set-up (Carruthers, 1914: 13; Drobyshev, 2014: 7), or characterize the population as nomadic cattle herders at all times (Carruthers, 1914: 7–8; Serdobov, 1971: 92, 215–216; Grach, 1980: 39–44). This does not always correspond with reality. Continued study of little-known chapters in the history of the region, and

paleogeographical reconstructions, will enable us to trace the environmental changes in this territory and to determine the causes thereof. Moreover, studies of ancient irrigation are of the utmost practical interest, since they allow the possibility of using the ancient irrigation lands at the present time.

Interpretation of aerial and space images of the territory of Northern Mongolia helped to discover signs suggesting that traces of ancient agriculture were, possibly, distributed across the whole mountain frame of the Uvs Nuur Basin. A distinctive pattern of irrigation systems revealed the large areas of ancient irrigation. In addition, probable remains of an ancient city were discovered on the west coast of Lake Uvs Nuur, in the Khundelen-Gol River valley; and numerous traces of presumable settlements associated with ancient irrigation systems were found in the Tes-Khem River valley. No ruins of the city or settlements are marked on the old maps plotted by researchers of the Uriankhai Territory. These objects and remnants of irrigation systems in the Tes-Khem valley were not presented in the archaeological description of the Uvs Nuur Basin (Hudiakov, 1986). There are no references thereto in the monograph by Drobyshev either (2014). Thus, finding the solution to this issue is very topical from the viewpoint of several scientific disciplines.

### Research objective, methods of study

Interpretation of surface, identification of ancient farming objects on satellite images with subsequent in-situ clarification is one of the basic methods for studying ancient agro-irrigation landscapes. The purpose of this paper is to verify in-situ the results of the interpretation of satellite images of the Uvs Nuur Basin territory, which could be used as evidence of the existence of widely developed irrigation farming in the past in the Tes-Khem valley, and of settlements, including the object identified as a fortified settlement. It was proposed to determine the age of these settlements, and to reconstruct the conditions of their locations.

To achieve this purpose, a Russian-Mongolian scientific research expedition was undertaken to the Uvs Nuur Basin in summer 2013, supported by the Russian Geographical Society (Project No. 31/2013-H4), aimed at landscape observations and complex scientific field studies. Paleobotanical studies were conducted by the paleocarpologist V.L. Koshkarova (V.N. Sukachev Institute of Forest,

SB RAS, Krasnoyarsk). Radiocarbon dating of the objects was conducted in laboratories of research institutes at Novosibirsk (Laboratory of Cenozoic Geology and Paleoclimatology of the V.S. Sobolev Institute of Geology and Mineralogy, SB RAS) and St. Petersburg (Radiocarbon Group of the Archaeological Technology Laboratory of the Institute for the History of Material Culture, RAS). Archaeological study of the discovered objects was also planned; but, since the Mongolian team failed to provide their archaeologist, only visual examination of the present-day outer surface of the monuments was performed.

### **In-situ confirmation of the existence of ancient agriculture**

In the course of our expedition throughout the basin we observed traces of ancient irrigation systems, land allotments, and irrigation fields, in various places: on the proluvial-colluvial plumes of the mountain slopes of the Tannu-Ola ridges, on the spurs of the Sangilen mountains, in the northwest part of the basin, on vast desertified plains, in the valleys of rivers, and in small oases among hummock-ridged eolian landscapes. The valley of the Tes-Khem River (the main stream of the basin) is covered by irrigation canals along almost its whole length (Fig. 1). The scope of irrigation works is very considerable. At present, principal canals many kilometers long look like blind creeks up to several

meters wide; however the raised clay slopes allow irrigation systems to be recognized in them. Their irrigating grooves are confined by elongated chains of woody vegetation. In the steppe part, water for irrigation systems was taken directly from the river: the canal sections adjacent to the river's course are often positioned at a right angle to it. This hampers the outflow of the water due to gravity, and suggests either its high level, frequent precipitation that facilitated the rise of the water, or the existence of specially equipped elevators to supply water to the canals. The irrigated areas were from hundreds of square meters to tens or even hundreds of hectares. The irrigation systems had cellular, weblike, fan-shaped, or other structures. At present, ancient irrigation canals are covered by fluvial sediments.

With the permission of the administration of the Uvs Nuur Reserve, several sections of soil, including those on ancient agro-irrigation landscapes of the Tes-Khem valley, were established for scientific studies. These revealed highly humus and sufficiently thick horizons of ancient soils under recent fluvial sediments. Certainly, water (in our case, the inexhaustible source of the Tes-Khem River) is the primary requirement for the development of farming, but the presence of fertile soil is of no less importance. In one of the soil sections, an example of the physical removal of a fertile horizon (a drastic reduction of fertile layer without any traces of erosion) can be observed. Extraction of soils for



*Fig. 1.* Remains of irrigation systems in the lacustrine basin of the Tes-Khem valley (the arrows point to the beds of ancient irrigation canals).

relocation to new fields was noted by P.K. Kozlov during his travel across Western China (1947: 286).

Special features of the basin's relief are favorable for the development of sai agriculture, the traces of which are preserved along its entire mountain frame. Irrigation of land allotments in the lower reaches of small mountain rivers and intermittent streams (sais) decaying on the valley plain is one of the earlier (Neolithic) stages in the development of irrigated farming (Shishkin, 1981: 8–24). Therefore, the presence of traces of this in the Uvs Nuur Basin may point to a considerable age for the agriculture in this territory. Possibly its appearance is related to migrants from ancient farming regions: for example, the Aral Sea region. Meanwhile, the absolute age of buried soils under the bed of a canal of an ancient fan-shaped system in the Tarlashkyn-Khem valley (the northern framing of the Uvs Nuur Basin), which is  $2110 \pm 50$  years, gives evidence that advanced irrigation farming already existed in the Uvs Nuur Basin at the turn of the Christian era (Prudnikova, 2015).

The conducted paleobotanical studies have allowed the character of the vegetation cover in the central part of the basin to be determined. The vegetation species' composition is evidenced by the results of analysis of individual samples selected in 2013.

Sample No. 13. The upper reach of the Nariin Gol River, the right slope. Peat-bog. The depth of sampling is 1 m. The content of fossil plant macroremains in the residual fraction is: *Picea obovata* Ledeb. (16 acerous leaf fragments and 8 bark fragments); *Pinus sylvestris* L. (five bits of cone scales, 13 small charcoals); *Larix sibirica* Ledeb. (two acerous leaf fragments); *Betula alba* L. (a fragment of female ament scale); *Carex pediformis* C.A. Mey. (2)\*; *Carex* sp. (3); *Arabis pendula* L. (2); *Campanula rotundifolia* L. (1); *Artemisia commutata* Bess. (3); *Bromopsis inermis* (Leyss.) Holub (3).

Sample No. 7. The upper reach of the Nariin Gol River, the right slope. Gray fine-grained sand. The depth of sampling is 23–33 cm. The content of plant macroremains is: *Pinus sylvestris* L. (four small charcoals), *Padus avium* Mill. (4), *Fragaria viridis* Duch. (2), *Salsola* sp. (3), *Suaeda* sp. (1), *Eleocharis* sp. (2), *Carex enervis* C.A. Mey. (2), *Draba nemoresa* L. (2), *Triticum* sp. (2), *Atriplex* sp. (1), *Chenopodium album* L. (39), *Ch. rubrum* L. (2).

These data mean that local vegetation was represented by spruce-deciduous sedge-grass

community, and its surroundings by steppe pine forests. The presence of forest in the central part of the Uvs Nuur Basin during the Late Quaternary\* points to a milder and more humid climate in this region of Central Asia. At present, the common pine (*Pinus sylvestris* L.) is absent in most of the basin, including its center (Mongolskaya Narodnaya Respublika, 1990: 74).

In the buried soil horizons of land-plots in the upper Nariin Gol, remains of *Triticum* sp. (wheat) seeds were found for the first time. In the sections of ancient agro-irrigation landscapes of the Tes-Khem, seeds of *Panicum* sp. (panicum) and *Avena* sp. (oats) have been discovered. Apart from cultivated plants, *Setaria viridis* L. (green bristle grass), *Cerastium arvense* L. (starry grasswort), *Agrostemma githago* L. (common corn cockle), *Chenopodium glaucum* L. (pigweed), *Linum perenne* L. (perennial flax), and others are represented. Generally, the presence of such weeds is typical of old-arable soils that were long used for sowing of cultivated grain varieties.

The simultaneous presence of the common pine, the Siberian larch, the Siberian spruce, and wheat points to the fact that forest communities and forest-steppe landscapes existed here rather recently, at least at the time of medieval agriculture, when the Uvs Nuur Basin was not represented by desertified landscapes with massifs of wind-blown sands, as it is today.

### In-situ confirmation of settlements

As noted above, the presence of numerous and varied traces of settlements associated with ancient canals was presumed in the Tes-Khem valley (Fig. 2). Indeed, these were recorded on the ground. The preservation of buildings varies. Some are fully destroyed, and are represented by accumulations of clay masses with gravel and rubble. However, certain buildings still have the remains of walls. Judging by the outlines, the settlements were represented by accumulations (often chaotic) of small adobe houses rectangular in plan view (Fig. 2, 1–3), sometimes with the presence of large manors (Fig. 2, 4–6). In the vicinity of several “crescent-shaped” structures, there were elongated buildings with inner cellular structure (Fig. 2, 7, 8), which resembled constructions located along the inside perimeter of the Uyghur fortress of Por-Bazhyn,

\*Hereinafter, the digits in brackets designate the number of discovered macroremains.

\*This is also confirmed by recent (2016) data of carpological analyses of samples taken on the left slope of the Nariin Gol River.



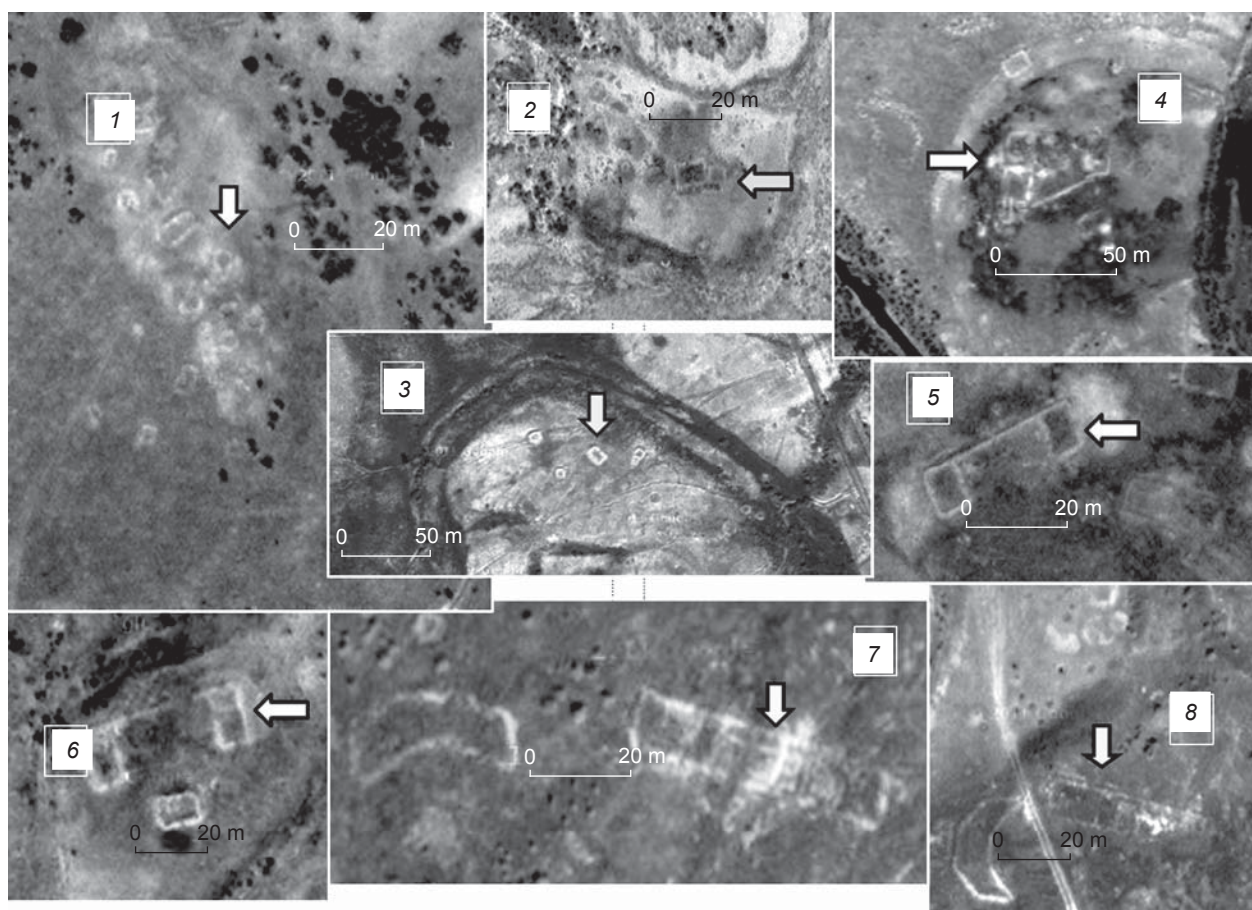


Fig. 2. Remains of settlements in the Tes-Khem valley.

1–3 – traces of settlements; 4–6 – various forms of manors; 7, 8 – traces of “crescent-shaped” structures and adjacent elongated buildings.

in the east of Tuva (Arzhantseva et al., 2008). The canals and buildings are presumably of various ages, and may pertain to several historical periods.

The object revealed at the west coast of Lake Uvs Nuur, and preliminarily identified as a city, indeed proved to be a fortified settlement. It is located at a large distance from modern highways, and has no access roads. The fortified settlement is situated on a dry terrace on the right slope of one of the Khoit-Khendlen-Gol River creeks, some 10 km from the present-day west coast of Lake Uvs Nuur. It is oriented with its long sides along a NNE–SSW axis (Fig. 3).

A system of irrigation canals approaches the walls of the fortified settlement from the west and south sides (Fig. 3, 1). It seems as if the settlement was built on the fields with the already existing canals, i.e. it is younger than they. After construction of the town walls, the initial branched canals within the city were corrected, and their directions were changed. One of them, in the southwestern part, sharply changes its

direction at an angle of 90° and approaches the internal structure, behind which it branches off and leaves the settlement in the northeastern sector. The northeastern corner of the settlement stops at the Khoit-Khendlen-Gol River channel, where a lake-shaped expansion is observed (Fig. 3, 2).

The city was enclosed with light adobe walls (Fig. 3, 3), which clay material comprised a large share of sand, gravel, and rubble. The thickness of the town walls is about 3 m, their current height does not exceed 1 m. The town gate is not well-defined. In the southern part of the settlement, rather well-preserved remains of square and rectangular structures are located (Fig. 3, 4). Their walls are made of light sun-dried bricks (of average size 30 × 20 cm) laid flat and on edge (Fig. 4, 1). Small additional premises adjoin the walls of the main structures. Remains of adobe walls have also been discovered. Canes and tree-branches were used to reinforce structures, or for some other purposes. Brickworks often contain grass and straw interlayers; clay and sun-dried plaster elements are preserved at



*Fig. 3.* Fortified settlement in the Khoit-Khendlen Gol valley and its vicinities.

1 – beds of canals; 2 – lake-shaped expansion of the river, a possible location of a mill; 3 – the town wall of the fortified settlement; 4 – remains of internal structures; 5 – clay masses outside of the city, possible ruins of ancient buildings; 6 – traces of a city dump; 7 – locations of millstones; 8 – location of a cast iron boiler fragment; 9 – location of a plate with lettering; 10 – location of a soil section outside the town wall, established in June 2013.

certain places. Burnt tree-trunks that were used as supports for some constructions, as well as rectangular holes (30 × 40 cm) from burned-out or destroyed supports, are encountered. At several locations, among ruins, remains of multi-story buildings are present (Fig. 4, 2).

The structures in the northern part of the settlement are fully destroyed, and represent solid clay masses with rare sun-dried brickbats (possibly, these are more ancient structures). There were fires in the city, obvious traces of which are observed in several areas: the clay and bricks have acquired a reddish hue, grassy interlayers have burned out, and abundant ash deposits are noticed.

Outside the town walls, in the adjacent territory, large and small objects were revealed in the satellite images. These were considered settlements, and indeed, they turned out to be so. In general, regular outlines of these destroyed structures are preserved (see Fig. 3, 5). A large dump, the traces of which are recorded in the form of a humic spot, was located southward of the city (see Fig. 3, 6).

In the southern part of the settlement, an intact millstone and a fragment (ca 35 × 25 cm) of another millstone with hewed-out grooves (see Fig. 3, 7; 4, 3, 5), and also, presumably, the remains of a stone structure of rotary mill were discovered (see Fig. 4, 4). The diameter of the intact millstone is

about 2 m. There is a circular hole at the center, and a small rectangular recess at the edge. The millstone has fully “grown into the ground” and is covered by recent fluvial sediments, therefore its thickness was not determined. It is not clear, either, whether it is the upper millstone (the runner) or the lower millstone. It can be tentatively assigned to the second group, according to the classification by R.S. Minasyan (see (Sarapulov, 2013)). The millstones are hewed out of medium-grained granite (red and white). Their presence suggests that either a water-mill (probably at the place of the lake-shaped expansion of the river) or an animal-powered mill was available in the city.

In the southern part of the settlement, a small fragment of a cast-iron boiler was found on the surface of one of the premises (see Fig. 3, 8). It is adorned with relief decoration: a meander ornament engirds the upper part; below, an image of tree (with a bird?) and, possibly, a fallow deer are discernible. Rare potsherds are encountered on the present-day surface of the settlement. These are glazed ceramics with predominantly light turquoise green, or various blue-and-white, glazes. More rare are unglazed easel ceramics. In the dump area, fragments of ware are more varied; certain samples are decorated with overglaze drawings. Taking into account the large population of this territory in the past, the presence of the Altyn Khans’ headquarters in the basin, and



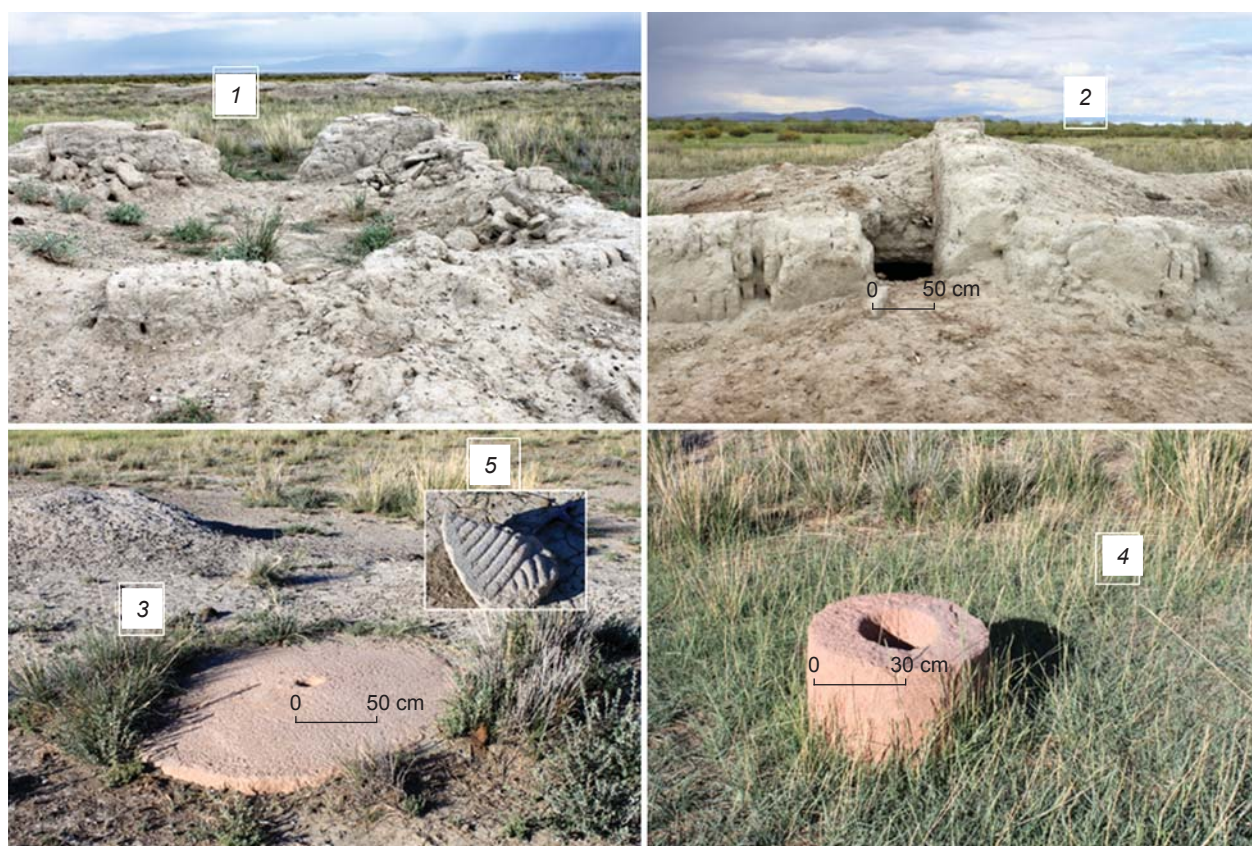


Fig. 4. Elements of the fortified settlement in the Khoit-Khendlen Gol valley. Photograph by T.N. Prudnikova, 2013.

1 – walls of structures composed of sun-dried bricks; 2 – preserved remains of the second floor of the building; 3–5 – millstones and a part of the stone structure of a mill.

numerous “Chinese guards” along the southern slope of the Tannu-Ola Ridge (Ritter, 2007), ceramics may be of various ages.

Among the ruins of one of the inner rooms (see Fig. 3, 9), a small plate (ca  $12 \times 5$  cm) with poorly preserved lettering written in black ink was discovered. In the opinion of V.P. Zaytsev, Researcher of the Department of Far Eastern Studies at the Institute of Oriental Manuscripts RAS (St. Petersburg), these are hieroglyphics (Chinese, Jurchen, or Khitan large script).

A soil section outside the town wall (see Fig. 3, 10) has allowed clarification of certain points in the history of the city, which existed for a long time and survived epochs of desolation. At some point in time, the town wall was actually leveled to the ground. A topsoil of thickness ca 10 cm, rich in humus, had enough time to form on the rampart’s remains. Then, the wall was heightened; a clay addition ca 60 cm thick is preserved on top of the buried soil layer. This may be indicative of revival of the city at a new historical stage. According to the results of radiocarbon analysis

(conducted by L.A. Orlova in the Institute of Geology and Mineralogy, SB RAS), the age of the soil horizon (recorded in a probe trench) buried on the town wall is  $1010 \pm 40$  years (SOAN-9196). At this stage of studies, this suggests that destruction of the town wall and the formation of a soil layer on its debris took place at the end of the 1st millennium AD.

In terms of its shape and size (ca  $215 \times 155$  m), the fortified settlement resembles similar medieval sites of neighboring Tuva, of which there are about 20 (Kyzlasov, 1959). The nearest Uyghur fortified settlements are located just 100–150 km away. The Uyghur period (the Early Middle Ages) is associated with the flourishing of agriculture in the ancient Tuva (Prudnikova, 2005). Therefore, it can be assumed that the city discovered in the Uvs Nuur Basin was established in the Early Middle Ages: “even Arabian geographers mentioned the vast scale of building of towns, fortresses, and settlements in the Central Asian Uyghur state in the 8th century AD” (Kyzlasov, 1998: 11–12). The city could also have been founded at a later time—for example, by the Yenisei Kyrgyzs

who destroyed the Uyghur state in 840. The ancient farming culture of the Yenisei Kyrgyz people is widely known. After the victory over the Uyghurs, the military settlers in the new territories facilitated development of irrigation farming, which was widely developed during that period in the Minusinsk Basin (Istoriya Khakasii..., 1993: 73; Sunchugashev, 1989: 9–10, 15; Serdobov, 1971: 108).

The discovered additional structure of town walls suggests a prolonged existence for the settlement, i.e. it could have been restored after the departure of the Kyrgyzs from the Uvs Nuur Basin—for example, under the onslaught of the Khitans, who started occupying a dominant position in Central Asia in the 10th century. The Khitans built their cities, which extended in a chain-like manner from east to west, and resettled Chinese and Bohai farmers there (Drobyshev, 2010; Istoriya Dalnego Vostoka..., 1989: 196). According to Drobyshev, at the turn of the 10th–11th centuries garrison fields were created along the borders of the Khitan Empire; the border guards were obliged to till these fields and store grain to supply the army (2010). The Khitans had their own writing systems (“large” and “small”) (Bembeyev, 2003). A sample of hieroglyphics found at the fortified settlement argues for the presence of the Khitans in this region, as does also its age.

At the end of the 11th century, in the area of the Talas and Chu rivers, a small state of the Qara Khitais (the Kara Khitans), Western Liao (Si Liao, 1124–1211), was established (Vasiliev, 1998: 62). In the opinion of L.R. Kyzlasov (1959), in the 12th–13th centuries the center of its northern province was located in the territory of Tuva. The Qara Khitais sowed almost all varieties of grain (wheat, barley, millet, etc.) known in China at that time, and manufactured large millstones for mills. Later, the Mongols who squeezed out the Qara Khitais also built cities and created military-agricultural settlements in the captured territories. The earliest data on such settlements in Tuva pertain to 1220 (Kyzlasov, 1969: 138–143). Thus, the city discovered in the Uvs Nuur Basin could have existed at least till the 14th century.

## Conclusions

Analysis of satellite images of the Uvs Nuur Basin, and subsequent in-situ verification of their interpretation results, using science-based methods, allow us to confirm the presence of extensive evidence of

ancient irrigation in this area; to see the overall picture of irrigation systems; to identify their lengths, types, and special features; to calculate the areas of land allotments and the degree of disturbance and drying out of landscapes; and to record the remains of farming settlements associated with irrigation systems. The large scale of irrigation works points to a considerable size for the population that inhabited this territory earlier. A branched pattern of irrigation systems suggests a sufficiently high level of irrigation development. Humus-rich buried soils, which present a favorable condition for farming, as well as kernels of *Triticum* sp., *Panicum* sp., and *Avena* sp. cultivated grains, have been discovered on the ancient agro-irrigation landscapes. The results of paleobotanical studies showed that arid regions in the central part of the Uvs Nuur Basin were, in the past, forest-steppe landscapes. The simultaneous presence of forest-steppe plants and grain crops suggests the existence of farming here.

The existence of an ancient fortified settlement earlier unknown to science and preliminarily dated back to the Early Middle Ages has also been confirmed. The presence of irrigation systems surrounding the settlement and the occurrence of millstones in its territory make it possible to attribute this site to the farming settlements. The discovered example of hieroglyphics (Chinese, Jurchen, or Khitan large script) may argue for the medieval age of the fortified settlement.

The obtained data shed new light on the region's history. At the beginning of the 2nd millennium AD, the natural environment was as yet relatively undisturbed, and therefore favorable for farming, of which extensive evidence has survived to the present day. In view of this, it is wrong to label the currently arid areas of the Uvs Nuur Basin and Central Asia as infertile and “actually unsuitable for farming” in past historical epochs (Drobyshev, 2014: 370). The main reason for desertification of the basin is deforestation, which caused the reduction of the groundwater level. In this regard, we may refer to the opinion of Kozlov, who pointed to an unlimited forest loss on the Alashan Ridge, leading to drying-up of brooks and wells, and predicted the coming impoverishment of the region (1947: 122–123). The role of overgrazing by cattle should not be downplayed either. The discovered ancient agro-irrigation landscapes of the Uvs Nuur Basin are a potential source of food resources, since many areas that were irrigated in ancient times are quite suitable for farming today.



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