The Explorer’s Club

Flag #134 Report

Rise of the Horseback Warrior Nomads – Archaeological Expedition to the Republic of Tuva, Russia, 2017

Gino R. Caspari TM `15

Flag #134 in the wind on top of Russian expedition vehicle.
Arzhan 0/Tunnug I – Survey of an early royal kurgan in the Uyuk Valley (Tuva Republic, Russia)

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Highlights
- Survey and test excavations were conducted at one of the earliest Scythian kurgans in Tuva.
- Preserved wood was found at around 40cm depth.
- Preserved wooden beams were found at 100cm depth.
- The kurgan is the largest frozen tomb known to date.
- Other than originally thought, the burial is larger than Arzhan I.

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1. **Project preparation**

First analyzed and identified through satellite imagery, legendary among archaeologists in Tuva, the gigantic royal kurgan in the swamp along the Uyuk River was the object of this expedition’s interest. A research stay of expedition leader Dr. Gino Caspari in 2016 with the Hermitage Museum and the Russian Academy of Sciences led to the cooperation and laid the foundation for the project. Two aerial photos were available from a local Tuvinian pilot, but other than that no maps or other published data was available. In order to gain a better understanding of the site and its surroundings as well as for planning of the logistics, high-resolution satellite imagery was ordered through a grant from the Digital Globe Foundation. Judging from the optical satellite data it appeared clear that there is a radial structure of wooden beams or logs underneath a thick package of stones. The parallels to the royal kurgans Arzhan 1 and Arzhan 5 were apparent, but it was unknown how old the monument is and why it was built in an area which is very untypical for early Scythian kurgans (monuments of this period were usually erected on the river terraces). Arzhan 0/Tunnug I today lies in the middle of a swamp. This led to the following questions:

1. How old is the monument?
2. What is its place within the cultural development of the Prehistoric Uyuk Valley and in a larger context Tuva and Southern Siberia?
3. Why does it lie in the swamp?
4. Are there any peripheral monuments near it?

Additionally to the scientific inquiries some practical questions needed to be answered:

5. What institutions can be chosen as partners for further cooperation?
6. What are the legal requirements?
7. What are the logistical problems to excavate this kurgan?

The objectives of the first campaign were to find answers or preliminary explanations for these questions. There was a hope to recover organic material since overall preservation circumstances in Tuva are rather good, however, due to the wetness of the place and changing water levels it was not a given after all.

2. **Mapping activities**

A drone was flown over the burial mound in a regular flight pattern while shooting pictures with 70% overlap. Then a high-resolution 3D-model and ortho-photographs were generated through a structure from motion approach with the software Agisoft. The model has an accuracy of 4cm and was used as the main decision making tool for the further steps of the project. Accurate mapping helped defining the best locations where we would be likely to answer our questions. Figure 1 shows said 3D-model as a heat map. Elevations are displayed as a range of colors from red (high) to blue (low). The radial structure underlying the stone package is clearly visible through the differences in elevation. The deeper parts inside the kurgan (green/yellow) are most likely collapsed wooden chambers which were covered with logs and a layer of stones. The logs broke and the stones fell into the chambers creating stone-filled pits without vegetation. Plants are not growing on top of the pits because the stone package drains the water and no substrate is available.
Relatively quickly it became clear that we would have to put the site under protection of the local Tuvinian heritage administration and that further excavations will be necessary. We installed 10 ground control points around the kurgan by sinking long wooden poles into the alluvium. The location of the monument and the coordinate system were cross-referenced with known fixed points in the area. With establishing the fixed coordinate system for the site early on, one of the main preparations for future excavation is already finalized and insures exactitude during the coming campaigns.

Walking over the rugged surface of the mound we were able to recognize a large number of vertical stones. These could be from the original structure and were mapped with the total station (theodolite) in order to see if there are obvious patterns emerging without excavation. The map point cloud shows a number of stone cists on top of the kurgan similar to Arzhan I, the points for vertically positioned stones are inconclusive though. The mound appears to be largely untouched apart from a somewhat disturbed periphery because of earlier attempts to source stones for a road through the swamp. It is possible that – because of its hidden position in the swamp – it might be entirely untouched (figure 2).
3. Surface Cleaning

The rules established by the Russian Cultural Heritage Administration allow for cleaning of surfaces of covered objects and destroyed parts of structures visible on the surface of not more than around 20m². Figure 3 shows the areas we decided to work on.
Figure 3: Selected areas for surface cleaning. (J.Blochin)
3.1 Area 1

Area 1 yielded the most information (figure 4). It was chosen through the analysis of the 3D-model by looking at pits that seemed to be impacted/destroyed. We cleaned the eroded stones first and cut a clear profile. Only a few centimeters under the surface remains of wood were found.

Figure 4: profile of area II with remains of wood. (K. Langenegger)

At the lower end of the profile the first wooden beams showed up as predicted from the satellite imagery (figure 5). All wood pieces were sampled for further analysis in the laboratory. For control purposes we dug 10cm below the beam and suddenly a layer of gray clay came off the ground. Underneath it the soil was frozen. Measurements with a thermometer quickly let it drop close to the freezing point (figure 6). Cleaning the side profile of area 1 it became apparent that the ice was a regular occurrence at around 1m depth. A test drill in area 2 later showed that the kurgan is fully frozen from one side to the other and thus constitutes the largest frozen tomb in Eurasia.
Figure 5: Preserved wooden beam in the cleaned profile of area 1. (K. Langenegger)

Figure 6: Thermometer on the lower border of area 1 with frozen soil (degrees Fahrenheit), above it preserved wood. (K. Langenegger)
3.2 Area 2

Area 2 was set on the western side of the kurgan in the hope of defining the border of the architectural structure (figure 7). In the upper part, the constructive stones were clearly visible on the surface. Unfortunately, the edge seems to be destroyed, therefore the actual size of the object could not be determined through this area. The satellite image provided an explanation: since a palaeo-channel (ancient riverbed) used to flow close to the burial, the shore line might have eroded large parts of the northwestern edge of the kurgan. According to regulations, with a survey license no excavation of the constructive parts of a monument is allowed, therefore we had to stop digging once we reached the stone layer clearly associated with the burial. On top of the stones a number of ceramic fragments were found in a pit. They might date to the 1st cent. AD but only one rim shard was found. Underneath the stone package a number of undistinctive shards were found that might date to the Bronze Age.

![Figure 7: drone shot of area 2 with eroded border of the kurgan. (T. Wallace)](image)

3.3 Area 3

With area 3 we tried to determine the outer border of the kurgan by selecting a stone ring (usually a peripheral monument) and cleaning it thoroughly. After the first 20cm it became clear that what we had thought of as stone rings or other peripheral structures were in fact parts of the main structure of the kurgan which had been shifted through taphonomic processes. Area 3 is close to the border of the monument but possible still the original stone construction (possibly also an eroded part, but unlikely so). Using the easternmost edge of area 3 and the center point of the kurgan we can now estimate the original size of the object to about 140m in diameter. This is 30m wider than Arzhan I and makes Arzhan 0 the largest kurgan of its kind in Eurasia. Four bone fragments were found (one of them possibly from a horse). The bones will be taken to the lab for further examination.
3.4 Area 4

Area 4 was opened up along a row of stones in the periphery of the kurgan. The stones proved to have rolled down from the mound and were loosely placed in the soil. Around them only clean grown soil was found under which a light alluvium starts that is void of finds.

3.5 Area 5

Area 5 was a clean area dug outside the periphery of the kurgan with the aim of understanding the geology of the site. Under an upper layer of grown black soil a thick layer of light alluvium was found. In about 1.2m depth a compressed ancient surface was identified. Samples were taken for 14C-analysis. We estimate that this ancient surface is a lot older than the kurgan.

4. Samples

A number of samples were taken (wood, bone, and soil) which will be used for dating and further geological analysis. Especially the clean wooden samples from the constructive wooden beams will provide us with a date for the monument. 14C-dates of bones and the ancient soil will show a range within which to place the construction of the kurgan. Furthermore, soil samples of the profile in area 1 will be analyzed with the following methods:

a. grain size analysis  
b. particle size analysis  
c. organic carbon analysis  
d. water extract analysis  
e. calcium carbonate analysis  
f. microbiological analysis  
g. microelements analysis

Results will be communicated once available.

5. Problems

The site lies in a swamp and is hard to reach depending on water levels. Even with a strong tractor it is quite often impossible to get through to the monument (figure 8). Wading through knee-deep swamp we were happy that it is too cold for leeches but swarms of mosquitoes and encephalitis-carrying ticks are a nuisance. Logistics of the place are problematic but the monument lies on relatively dry ground and thus can be excavated. The location of the kurgan as well as its state of preservation demand a quick yet carefully planned excavation within the next few years.
6. Conclusion

The 2017 expedition to Tuva showed that what was hypothesized via a remote sensing survey can largely be confirmed. Arzhan 0/Tunnug I is a royal kurgan with a structure similar to the earliest Scythian kurgan Arzhan I. Contrary to what was believed before, it is a lot bigger than Arzhan I and possibly older (the dating of the wood samples will bring clarity). It is also the largest frozen kurgan in existence. Similar to frozen kurgans in the Altai region the permafrost is directly below the stone package forming an ice lens (discontinuous permafrost), for the surrounding areas the layer of frozen soil lies a lot deeper. This is exciting because the kurgan will with a very high likelihood yield frozen mummies, horse carcasses, wooden objects, textiles etc. The preservation conditions, age, setting, and size make this monument unique and give it a very high scientific value. No other frozen kurgans of this size are known in Eurasia. It is, however, also a danger because with the global rise in temperature these treasures are in immediate risk of being lost. Large excavation campaigns need to be carried out throughout the next 3 years to excavate the complete object and preserve the knowledge we can gain from it. The planning has already begun.
7. Team

From left to right, from back to front:
Trevor Wallace: filmmaker
Jegor Blochin: technical lead
Anatolij Luboshnikov: driver
Gino Caspari: expedition leader
Jegor Mazurkievich: cook
Katarzyna Langenegger: volunteering archaeologist
Maxim Eltsov: soil scientist
Kezhik Mongush: volunteering archaeologist
Valeria Makarova: volunteering archaeologist
Timur Sadykov: Russian expedition leader, license holder
8. Acknowledgements

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