

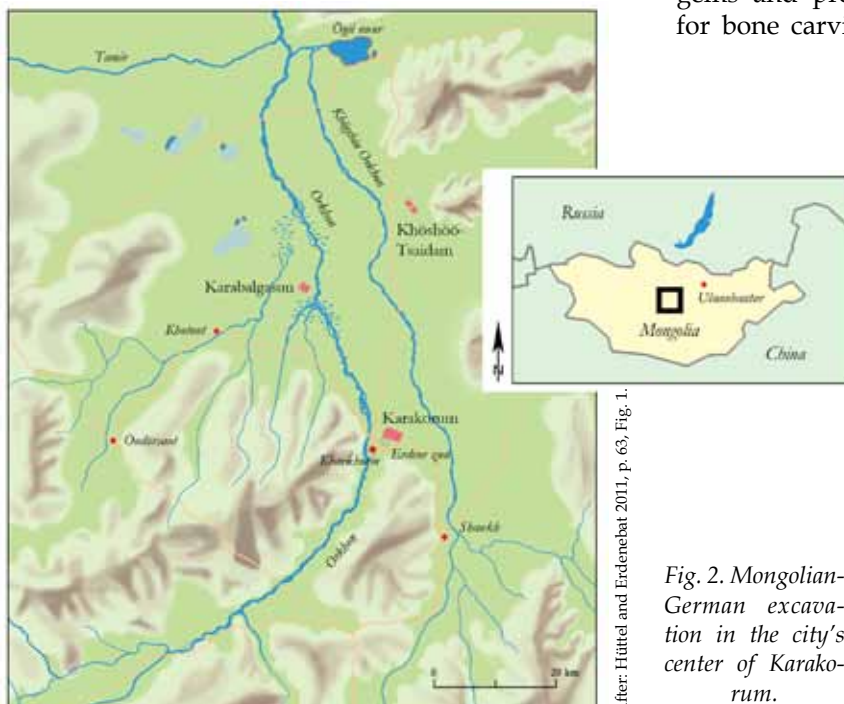
PRODUCTION SITES IN KARAKORUM AND ITS ENVIRONMENT: A NEW ARCHAEOLOGICAL PROJECT IN THE ORKHON VALLEY, MONGOLIA

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Between 2000 and 2005 archaeologists and students of the Institute of Archaeology, Mongolian Academy of Sciences, and the Department of Pre- and Early Historical Archaeology, University of Bonn, excavated parts of a craftsmen quarter in the center of the old Mongolian capital Karakorum (Fig. 1) where – according to William of Rubruck, a Franciscan monk, who stayed there several months during spring 1254 (cf. Rubruck/Jackson 1990) – a Chinese population lived and worked in the 13th century CE. The excavations in the center of the first capital of the Mongol Empire were carried out within the Mongolian-German Karakorum Expedition with the goal in the first instance of answering questions concerning the founding, the duration of settlement and the end of occupation of the entire town. In addition, interest focused on the profession and occupation of the people living in the urban center (Bemmann et al. 2010).

Fig. 1. The Orkhon valley in Central Mongolia with the main historical places of Khöshöö Tsaidam, Karabalgasun and Karakorum.



During six excavation campaigns trenches up to 4-5 m depth were opened, extending down to the natural ground of the Orkhon valley (Fig. 2) where structures and findings prove that what was uncovered here are parts of the craftsmen quarter which Rubruck mentioned. Based on stratigraphical observations the length of occupation can be divided into three successive settlement periods with up to six building phases which can be dated to the 13th and 14th century CE (Pohl 2010).

Within the variety of workshops excavated so far metal trade is dominant. Gold and silver smithies are represented as well as workshops for nonferrous metal and iron. In some cases the work with different metals could be observed in one and the same workshop. However, all the remains of metal trade belong to the final production stage. Traces of the supply of raw materials and/or smelting furnaces are totally absent which is certainly due to the topographic situation in the centre of a densely settled city area. Apart from the metal trade, ateliers specialized in glasswork, gems and precious stones, and in addition, shops for bone carving or for the processing of birchbark

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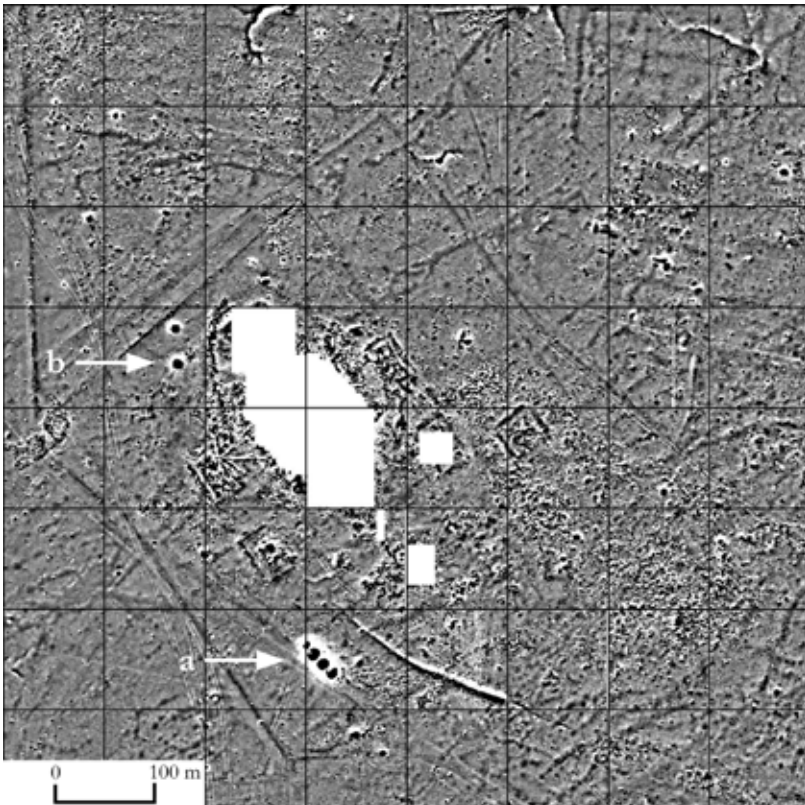
Fig. 2. Mongolian-German excavation in the city's center of Karakorum.



After: Hüttel 2004, p. 193, Fig. 15.

were established near the crossroads of Karakorum. All these different disciplines are proven by raw materials, semi-finished objects, workshop debris and the final products in an extensive variety of artifacts.

But the center of the city was not the only place for production sites in Karakorum during the 13th/14th century CE. In the 2000 excavation campaign a complex of four big *Mantou*-kilns was excavated by our colleagues from the German Archaeological Institute



After: Erdenebat and Pohl 2005, p. 171, Fig. 2.

Fig. 3. Aerial picture from the excavation of the "Great Hall" and the kiln site in the southwestern part of the city area.

right next to the great hall believed to be the main building of the temple of the Yüan Dynasty (Fig. 3). These kilns were identified by a geomagnetic survey in 1999 (Fig. 4a) and were used for firing bricks and/or architectural sculpture (Franken 2005). Another kiln northwest of the great hall was excavated during summer 2002, having been identified by the same geomagnetic survey (Fig. 4b). Here, a kiln probably for the production of grey pottery was uncovered (Hüttel 2003). But even outside the walled city area production sites have been discovered. Some 3.5 km southwest of the city center a third complex of altogether 14 kilns was uncovered in the floodplain of the Orkhon River in 2008 and 2009 (Erdenebat and Hüttel 2011; see Fig. 5). Here too clay figures, architectural sculpture and plastic decoration were produced.

All these features provide evidence of production sites not only in the center of Karakorum but also in the vicinity of the town. But none of the sites excavated and explored so far pertain to the metal trade. How

artisans were able to receive their fresh supply of iron or copper is still unclear. One possibility has been discussed by our Japanese colleagues excavating for more than a decade at Avruga, Delgerkhan sum, Khentii aimag. Citing metallurgical analysis, Masami Osawa presumes that a number of iron ingots found in their excavations were imports from China (see below). This would support the note of the Persian historian Rashid al-Din who wrote that the population of Karakorum was supplied by five hundred wagons of freight every day. However, he talks only about foodstuffs: "And he had issued a yasa to the effect that every day five hundred wagons fully loaded with food and drink should arrive thither from the provinces to be placed in stores and then dispensed therefrom" (Rashid/Boyle 1971, p. 62). Supply of other materials

Fig. 4. A portion of the geomagnetic survey in the southwestern quarter of Karakorum showing the temple area with several kiln sites.



After: Hüttel and Erdenebat 2011, p. 81, Fig. 44.

Fig. 5. The kiln site in the floodplain of the Orkhon River.

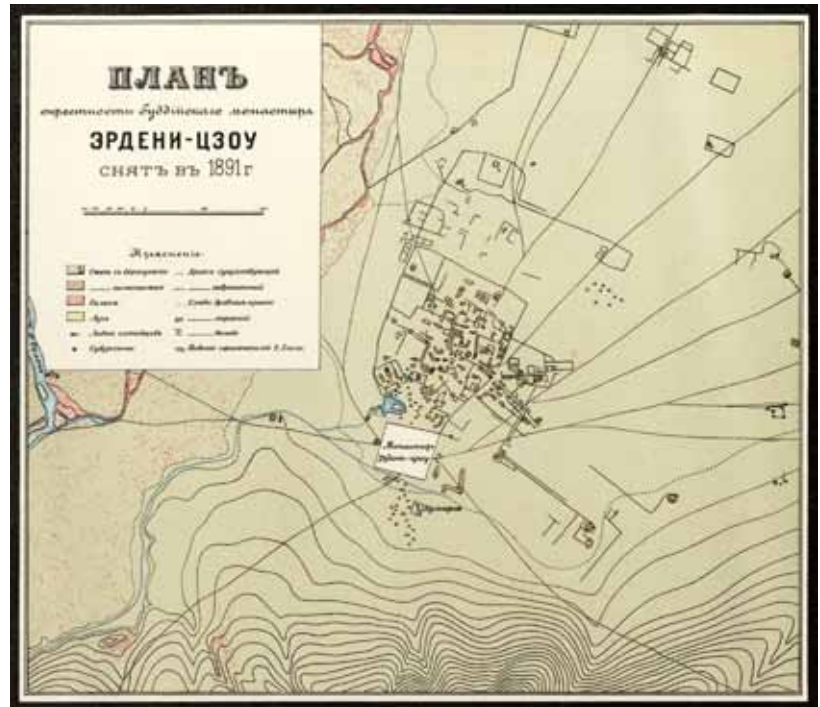
of Karakorum. The selected sites were discovered and surveyed by members of the Mongolian–German geoarchaeological project in 2008 and 2009 (Ahrens et al. 2008; Bemmam et al. 2011). In both places traces of slag and/or the surface contour of the respective structures made excavations promising.¹

The Survey beyond the Eastern City Wall of Karakorum

Since the first topographic work done by the Orkhon expedition under the German–Russian turkologist Wilhelm Radloff at the end of the 19th century it

is not mentioned here but certainly took place. On the other hand, the question of raw material supply and the smelting of iron or copper ore in the steppe area has so far remained unanswered. Even if we know about iron deposits not far from Karakorum – and the necessary fuel exists due to the extensive woodlands of the Khangai Mountains – we do not have any hint about a medieval smelting industry in the Orkhon valley.

To address this question is the aim of new field project begun in 2011 based on a financial support by the Gerda Henkel Foundation, Germany. A survey outside the city wall of Karakorum was to determine whether there were additional metal workshops in these areas. Furthermore, we intended to start excavations in two different places farther away from the city (Fig. 6) to enlarge our knowledge about production sites in the urban hinterland



After: Radloff 1893, Fig. 36.

Fig. 7. Topographic map of Erdene zuu and Karakorum from the Radloff expedition of 1891.

has been known that large areas outside the city wall were covered by structures of various kinds. Especially north and east of the wall, roads, walls and building platforms are visible in the map of the Radloff expedition (Fig. 7). Unfortunately, due to modern cultivation of the land since the 1950s, large areas beyond the city wall of Karakorum in the north and east including a small part of the city wall were increasingly leveled and destroyed by plowing. Not only the modern farming but also the increasing numbers of cars running across the abandoned city



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Fig. 6. The Orkhon Valley with Karakorum and the excavation sites at Baga nariin am and in the Bayan gol.

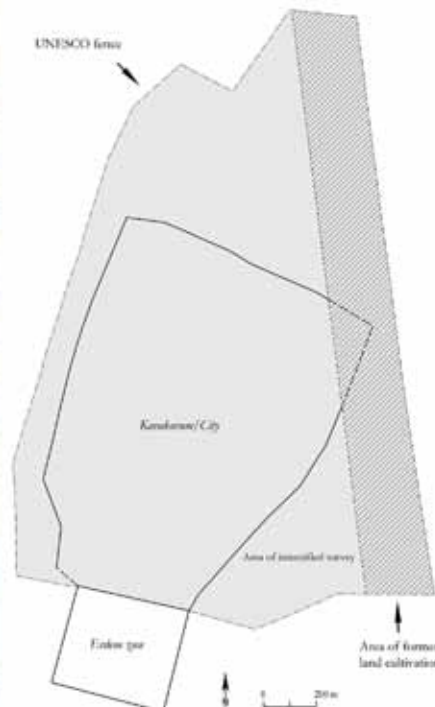


Fig. 8. Karakorum and Erdene zuu. Satellite picture and map with the UNESCO fence and the former land cultivation area.

(left) Source: GOOGLE Earth; (right) Copyright © University of Bonn.

area made it necessary at the end of the 1990s to protect the site for future research. In this context Japanese researchers were charged with determining the area to be protected by UNESCO in the 1990s (Kato 1997).

As a result of that work, a fence was built surrounding Karakorum and parts of the land outside of the city wall. This latter area was chosen for survey in our project (Fig. 8). The intensity of archaeological structures in this area between the city wall and the fence varies from huge settlement hills, walls and platforms, especially along the east-west main road running to the eastern city gate, and burial structures in the north, to areas without any visible archaeological features. Some areas are disturbed by ruins of modern buildings or overlaid by unregulated piles of rubbish. Such areas with a high density of modern use were not surveyed. The vegetation varies from very low grass and herbage to tall bushes and nettles reaching heights over 1 meter growing on Aeolian sand (Fig. 9), which makes the discovery of surface finds very difficult.



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(left) Fig. 9. Field survey beyond the eastern city gate of Karakorum.

(below) Fig. 10. Re-opened irrigation ditch east of Karakorum.

Along the UNESCO-fence a ca. 200 m wide strip of a terrain used for agriculture extends northwest to southeast (Fig. 8). For the irrigation of the fields ditches were constructed on the territory of Karakorum in the strip described above. At the beginning of the fieldwork in summer 2011 the removal of the pipes inside the irrigation ditches was started, so that we had the chance to survey 24 ca. 200 m long and ca. 1.40 m deep ditches and profiles for finds and archaeological

structures (Fig. 10). To localize the collected finds each ditch was marked with a number (beginning with ditch 1 in the southeast up to ditch 24 in the northwest) and divided in 5 m sections, so that the finds can be localized accurately to within 5 meters. Moreover each starting and end point was leveled with a tachymeter.

The investigation of the trenches showed that building structures, which were to be expected especially in the area outside the eastern city gate, had apparently been destroyed almost completely by plowing and the construction of the irrigation ditches. Roof tile concentrations mainly found in the debris of the ditches show that this area had been built partially with permanent dwellings. Only in trench 6 were remains of a more deeply seated mud-brick wall in the

southern profile documented. In trench 11 were some human bones that belonged to an almost completely destroyed burial. Parts of a human skull and long bone fragments were documented at the bottom of the ditch. More severely damaged bones and one bone bead were found in the debris and in the northern profile of the ditch, where we started to excavate the burial. Only three bones and badly preserved wood remains, as well as three coffin nails came to light. The dating of this feature cannot be verified due to lack of grave goods and the almost complete destruction of it. The other finds from the trenches consist mostly of Chinese glazed ceramics and the local gray unglazed ware (on the Chinese ceramics found during the survey, see the separate contribution by Anne Heussner). Because of the intensive intervention in the land from agricultural practices and the construction of irrigation ditches substantial displacement and destruction of finds must be expected, so that an evaluation and interpretation of the finds in this area is extremely difficult.

The other areas between the city wall and UNESCO fence were surveyed on the basis of the grid system established in 1999 in the course of the excavations in Karakorum. Systematic exploration was started in the southwest section of Karakorum's eastern wall at the point where the wall meets the northeastern corner of the Erdene Zuu monastery. Starting from this square, the areas east and north of it were examined systematically. The eastern border of our survey was the agricultural area with the distinct irrigation ditches (see above); to the west the city wall of Karakorum was defined as the survey boundary. An area of ca. 5.5 ha in the southeastern part of the survey area has not been studied, because some modern ruins and rubbish dumps led us to expect significant displacement and disturbance of archaeological finds and features. Altogether approximately 23 ha have been examined for archaeological finds during the campaigns 2011 and 2012.

The number and density of archaeological finds was relatively low in the southern area, where archaeological structures are barely visible on the surface, while the quantity of finds rose noticeably in the area of the eastern city gate and in the areas directly at the city wall. Along the east-west trending road, many settlement mounds and platforms are visible; Roof tile concentrations in this area also indicate that houses of Chinese character existed.

The main part of the find material obtained during the survey was ceramics (see below and the contribution

of Anne Heussner in this volume). In addition, numerous iron and bronze objects were collected, including eleven coins and numerous coin fragments. All of these are Chinese bronze coins dating mainly to the 11th century (Song Dynasty), with one exemplar from 18th century.

A large group of finds are small four-sided iron objects (total 115 pieces), obtained especially in the southwestern part of the study area, where no archaeological structures are visible on the surface, and further north in the area of the street and the eastern city gate. Most of the iron objects are 4-5 cm long, but



Photo © University of Bonn.

Fig. 11. Iron ingots from the survey east of Karakorum (a-c) and from Baga Naarin am (d-f).

there are also some smaller exemplars from 1.7 to 3.5 cm (Fig. 11 a-c). The cross section in the majority of the pieces is 1 cm x 1 cm, but there are also smaller (0.6 cm - 0.8 cm) and larger ones (1.1 cm - 1.2 cm). Almost all the pieces have a square cross section; in a few cases the cross sections can also be rectangular. Ten of the 115 exemplars have at one end (in four cases on both sides) a circular opening only a few millimeters in diameter and 2-8 mm deep. During the excavations in the Chinese craftsmen-quarter of Karakorum many of these iron bars came to light as well.

The find collection of Avraga, Delgerkhaan sum, Khentii aimag, a site dating to the time of the Mongol Empire, includes also a number of such four-edged iron objects (Shiraishi and Tsogtbaatar 2009, p. 559, Fig. 11). In size and shape they resemble strongly the findings from Karakorum. On the basis of an analysis of macro-and micro-structures and the chemical composition of the iron, the authors presume that these objects are iron ingots for further processing (Osawa 2005, p. 45). Osawa's analyses and interpretation suggest that the four-sided iron objects of Karakorum are also ingots. Whether the ingots were processed directly in front of the gates in the surveyed area, or whether the bars were traded there for craftsmen in the city cannot be clearly decided yet.

Also uncertain is the source of these ingots. For the ingots of Avraga, Osawa presumes a mine in China (Jinlingzhen [Jinfeng], Shandong Province) as the place of manufacture (Osawa 2005, p. 54). Evidence of a local production site for ingots or metal smelting sites were not found in the areas outside the city wall of Karakorum during the survey. Chemical analyses of the Karakorum ingots might give information about their origin (perhaps China or the urban hinterland of Karakorum). Furthermore, such analyses can give information about the designated use of the ingots (cast iron or wrought iron) and can help to classify types and elaborate chronological aspects of the ingots.

Other finds that would provide evidence of metal-processing services outside the city wall are slags. In the course of the survey only a few slags were found,



Fig. 12. Fragment of a small melting pot found during the survey.

mostly from areas disturbed in modern times. The rim sherd of a small melting pot with bronze remains inside found in the area of the city gate (Fig. 12) could indicate at least bronze processing, maybe on

Source: GOOGLE Earth.



Source: GOOGLE Earth.

a small scale, at this spot but cannot provide evidence of metal-processing services in this area. Among the other metal finds are eight wheel hubs, numerous iron nails and fragments of unknown function, as well as several indeterminable bronze objects. In addition to objects of iron or bronze, there were sixteen glass beads, six ceramic game pieces, one fragment of an ink stone and two fragments of loom weights.

Overall, the survey finds correspond to the known spectrum and still offer no clear evidence of metal-working industries outside the city walls. The high number of the iron ingots described above may indicate, however, the processing of iron or a trade with the ingots in the surveyed areas.

Baga Nariin am – an Open Settlement of the Mongol Period Southwest of Karakorum

Some 6 km southwest of the center of Karakorum a slightly flat terrace is situated directly on the western bank of the Orkhon River. The terrace has a triangular shape with an eastern border marked along its entire length by the concave banks of the Orkhon, the southern end by the valley of a western tributary of the Orkhon and the northwestern border by the rising slopes of the Khangai Mountains (Fig. 13). The terrace was surveyed twice by members of the Mongolian-German project “Geoarchaeology in the Steppe” headed by Jan Bemann during spring and fall 2009 (Bemann et al. 2011). The distribution of structures visible on the surface shows that the complete settlement can be divided into two different parts. In a southern part traces of settlement are concentrated along a small road running from southwest to northeast which descends to the floodplain of the Orkhon and crosses the river in the direction of Karakorum by a

ford. In the northern part of the settlement the terrace to the Orkhon is divided into two levels. A line of platforms is situated on the upper terrace, while several mound-like structures and undercut banks form a lower terrace (Fig. 14).

A Geomagnetic Survey Using SQUID Technology

In 2009 a geomagnetic survey was carried out on the terrace of Baga Nariin am on the basis of SQUID gradiometers (SQUID = Superconducting Quantum Interference Device) – sensors,

Fig. 13. The terrace of Baga Nariin am from the east.

Fig. 14. The northern settlement area of Baga nariin am with an upper and lower terrace. View from the north.



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which provide highest magnetic field gradient resolution even during fast movement over the ground. This motorized system has been developed at the Institute of Photonic Technology (IPHT) in Jena, Germany (Linzen et al. 2009) to enable precise magnetic survey of large areas in the order of tens of hectares within a reasonable amount of time. Currently, we attain a measurement speed up to 60 km/h by use of a metal-free cart carrying the SQUID gradiometers and an off-road car as pulling vehicle (Fig. 15). Using this setup we map archaeological sites by scanning long but narrow rectangular loops and a progressive shifting of the loop positions by 1.5 meters respectively. In doing so, the magnetic information of the ground is recorded with three



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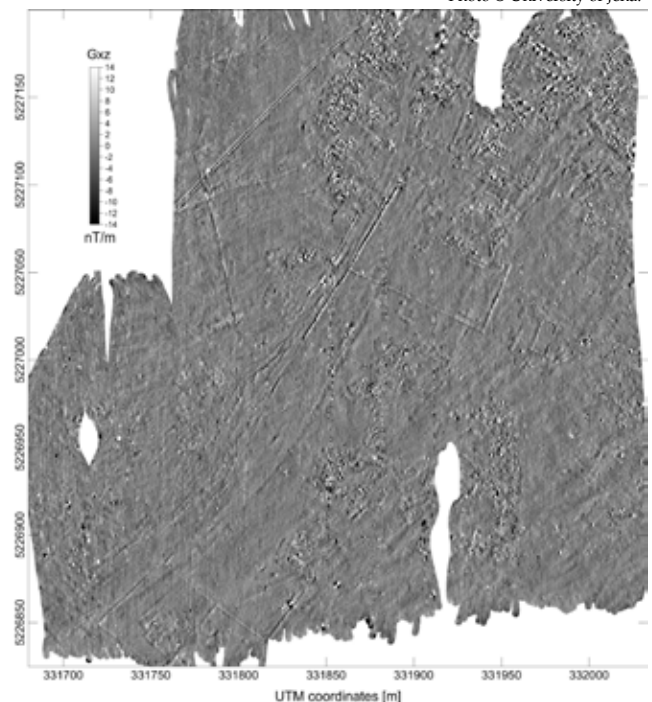
Fig. 15. The SQUID system surveying large areas in the middle Orkhon Valley. The SQUID sensors are located inside three helium cryostats (orange) mounted on the left end of the cart. The lateral distance from the sensor position to the back of the off-road car is 6 m. The data acquisition unit (white cover box) is mounted at about one-third of the distance.

SQUID sensor channels in parallel, which eventually lead to a measurement line spacing of 0.5 m. This way, magnetic survey at a rate of 1–3 hectare per hour can be performed. In spite of the high measurement speed the recorded magnetic maps have a local resolution of only a few centimeters because of the high SQUID sampling rates (1000 measurement points per second), the differential GPS technique used and a self-made data acquisition unit. A first magnetic impression of the investigated area can already be given during the measurement by real-time visualization of the SQUID data on the operator's laptop inside the car. The detailed data post-processing results in a magnetic map of high resolution and a topographic representation of the scanned area. Both data sets are geo-referenced, which allows precise combined analysis as well as integration into other GIS data such as aerial images.

The SQUID system has proven its applicability in the Mongolian steppe during two field campaigns in spring 2009 and autumn 2010 respectively. Seventeen sites with a total area of more than 300 hectares corresponding to 2000 driven line kilometers were prospected within 32 measurement days. The terrace area of Baga Nariin am was investigated with the system in 2009. The whole 350 m x 800 m wide area was surveyed within two days. The southern half of this is shown as a SQUID magnetogram in Fig. 16. A variety of magnetic anomalies are visible representing buried archaeological remains. Rectangular structures indicate building foundations. Remarkable linear and in parts more than 50 m long anomalies were detected in the middle and southwest of the area. A subsurface

Fig. 16. SQUID magnetogram of 350 x 350 m² size representing the southern part of Baga Nariin am. The viewing direction is north.

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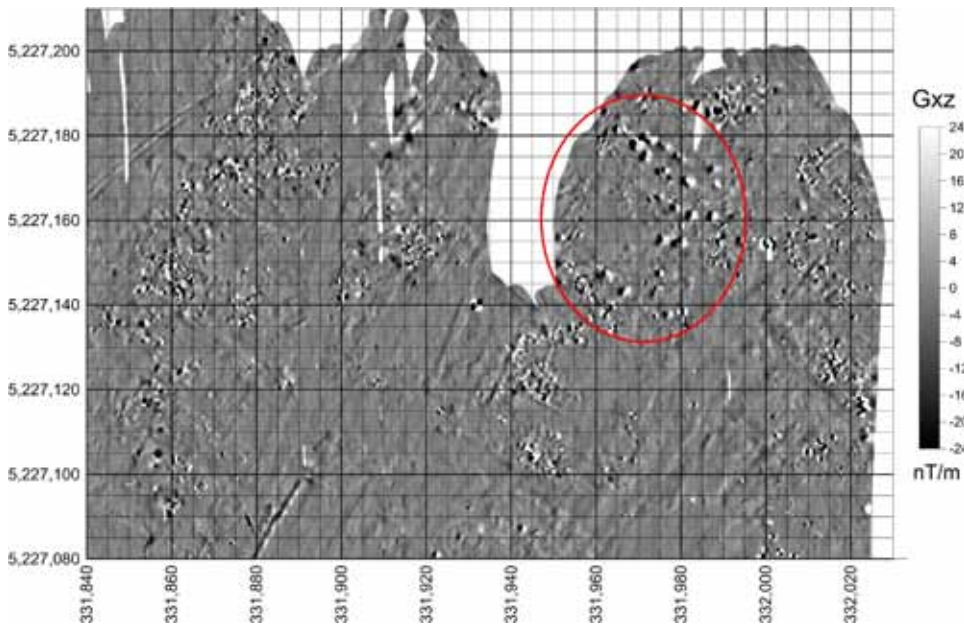


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Fig. 17. Enlarged northeast part of Fig. 16. The grey scale is changed to ± 24 nT/m for better visibility of the interesting point anomalies (encircled in red). The grid spacing is 5 m.

modeling on the basis of these magnetic data results in structures with a V-shaped cross section buried in a depth of 0.7 – 1.2 m. A hint about the filling material of the structure is given by the noticeable high difference of the magnetic susceptibility between the modeled structure and its environment. Fired bricks or soil with a fraction of volcanic rock or slag from metallurgy can be supposed. Even higher iron content is expected for a series of point anomalies in the northeast – see the upper right corner of Fig. 16 and Fig. 17. Intensity, shape and extension of these anomalies indicate remains of medieval furnaces. Thus, one focus of the 2012 excavations was on this area.

A Dragon Kiln in Mongolia?

Unfortunately the area intended for excavation on the basis of the geomagnetic survey was occupied during the 2011 campaign by several cattle-breeders with their animals and yurts. So we selected another place in the northern area of the settlement where traces of highly fired and melted bricks were visible on the surface of a small mound of the lower terrace. Here we opened first a 5 m x 5 m trench (KC 5/1-45). When the turf had been removed, large areas of burned soil came to light filled with rubbish of bricks which continues in parts of the trench down to the natural ground at a depth of nearly two meters. The depth of this feature was unexpected, as was the fact which became clear during the course of excavation that here a multi-phased occupation could be uncovered. The first

occupation is characterized by several pit houses which were built into the terrace. Due to the fact that the remains of these pit houses were mostly destroyed by later construction, only few observations could be made. In the eastern profile of trench KC 5/1-45 the depression of two pit houses is clearly visible. The northern pit house is 60 cm deep; the southern one

has a depth up to 90 cm (Fig. 18). In the western profile another pit house is visible with a depth of up to 1.6 m (Fig. 19). The floor of that house was covered with wooden planks, from which we could collect a sample



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Fig. 18. Baga Nariin am, trench KC 5/1-45. Eastern profile with pit houses.

for dendrochronological dating. A provisional dating by our colleagues from the dendrochronological laboratory of the German Archaeological Institute in Berlin is probably the 1230s CE.

Fig. 19. Baga Nariin am, trench KC 5/1-45. Western profile with pit house.



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Fig. 20. Baga Nariin am, trench KC 5/1-45. Southern profile with the pit of the kiln.

A younger period of occupation is marked by an extensive kiln construction of which we could find only the remains of a pit during the 2011 campaign. This pit was filled completely with debris of bricks. However, in the lowest parts four sloped standing bricks in the southern profile represent the reverse side of a construction, whose character remained to be identified (Fig. 20).



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Fig. 21. Baga Nariin am, trench KC 5/51-95. Kiln from the south.

To clarify this situation this year we opened another 5 m x 5 m trench south of the excavation area of 2011 (KC 5/51-95). Here as well layers of burned soil full of rubbish of bricks came to light directly under the turf. Digging deeper, step by step revealed remains of brick constructions which made clear that we had obviously uncovered a big kiln. A north-south oriented, rectangular chamber of the kiln was cut into the ground using the natural soil as its western border, while the northern and the eastern front are marked by brick walls (Figs. 21, 22). Alongside the western and eastern wall of the kiln buttresses built of bricks at intervals of 70 cm – 80 cm hold an arch of the furnace chamber. The ceiling, however, had collapsed at some point, so that only the rudiments of the arches are visible. The chamber of the kiln has a length of at least 5 m, but the southern entrance area has not been uncovered yet due to the fact that the artificial mound under which the kiln is located extends ca. 5 m more to the south. During the 2012 campaign we reached a level more than 2 m below the surface. Since we had

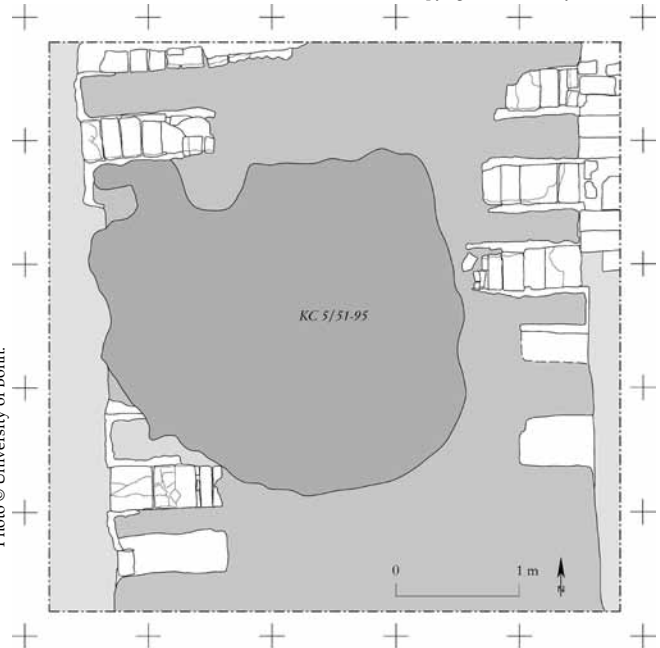


Fig. 22. Baga Nariin am, trench KC 5/51-95. Plan of the kiln.

not reached the natural soil we opened a small test pit on the rear wall (Fig. 23). But even after 50 cm the bottom of the kiln could not be reached. Realizing that we could not finalize our work during this year we closed the trench by filling.



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Fig. 23. Baga Nariin am, trench KC 5/51-95. Selected trench in the northern part.

Even if the excavation of the kiln could not be completed this year, it is possible to discuss some architectural aspects for further research. The main construction features are the arches built by bricks which cover a rectangular firing chamber. Both architectural features are known from a kiln type with a markedly larger total length called a "Dragon kiln" in Chinese archaeology. According to Kerr and Wood "the dragon kiln was essentially a narrow tunnel built up a low slope" (Kerr and Wood 2004, p. 347). The tunnel structure is created by the arches of our kiln. However, due to the fact that we could not reach the natural ground we have as yet been unable to determine the configuration of the kiln bottom. Judging from the surface topography a gradual slope would be possible, but to prove this requires further excavation.

Even that kiln was not the last phase of occupation at this place. During the use of the kiln the ceiling collapsed, leaving a big depression. This depression was filled with yellow-grey soil from the immediate surroundings. Atop that filling a brick pavement was constructed of vertically standing adobes. Traces of this pavement, which were found in both trenches, represent a third occupation layer here.

Melting Pits and Workshop Areas

On our return to the site in summer 2012 we realized that the area of geomagnetic anomalies was not occupied by cattle-breeders this year. So we were able to excavate parts of the area which was characterized by the strong geomagnetic anomalies described above (Fig. 17). We opened three trenches measuring 5 m x 5 m covering an area of altogether 15 m x 5 m. During the excavation different features such as a flat ditch, two pits and several post holes could be observed [Fig. 24]. Noteworthy is feature no. 9 at the northern border of trench HC 38/51-95. Here a slightly rectangular pit with a burned edge came to light in the final days of the 2012 campaign. At its bottom, the pit was filled with a big lump of metal slag which definitely was the cause of the strong anomalies in the geomagnetic map (Fig. 25). Here was our first proof of smelting in the

Fig. 24. *Baga Nariin am*, trench HC 38/51-95, HC 48/1-45 and HC 48/51-95.

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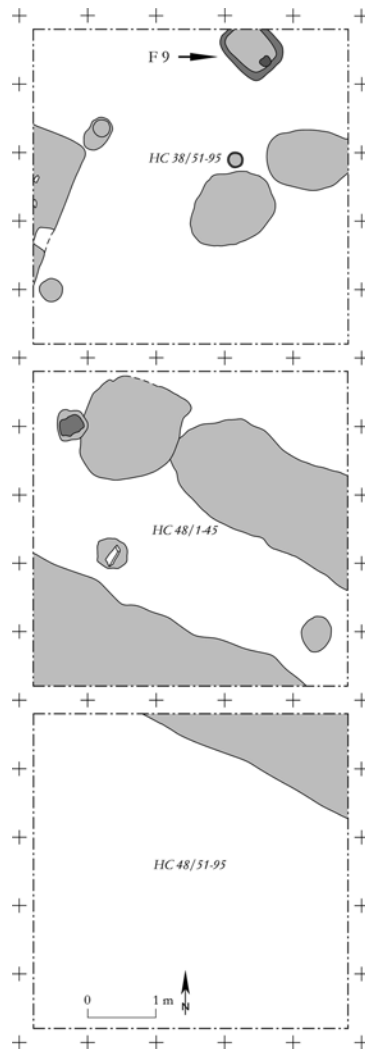


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Fig. 25. *Baga Nariin am*, trench HC 38/51-95, F. 9 with metal slag.

Orkhon valley. According to the geomagnetic results we have to assume that the entire area with strong anomalies was used for iron smelting.

Another stage of metal production obviously occurred on the border of the terrace east of the smelting area. Based on surface findings of small pieces of iron slag we opened two trenches here as well. Even if these trenches were mostly free of archaeological features, directly under the slag concentrations were two small open fire pits. Both pits, situated on the slope of the terrace, measure ca. 60 cm x 40 cm and contain small ventilation channels leading downhill (Fig. 26).

Fig. 26. *Baga Nariin am*, trench HD 84/56-100. Melting pit.

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Fig. 27. *Baga Nariin am*. Early medieval pottery from the survey.

Artifacts and Dating

Even if precise natural scientific data are absent yet due to the short time span after the end of our excavation, the dating of the settlement seem to be quite clear, judging from the artifacts collected and excavated. Apart from 42 stone artifacts from the Palaeolithic era the oldest materials in *Baga Nariin am* belong to the Early Medieval period of Mongolia. In the northern part of the surveyed area we found several fragments of rims from bottles (Fig. 27a), which have analogies in Turkic as well as in Uighur sites (ca. 7th-9th centuries). A reddish potsherd with stamped ornament found together with several undecorated sherds of the same fabric (Fig. 27b) belongs to the same period.

The main part of the finds made during the survey and the excavations belongs to the time of the Mongol Empire of the 13th/14th century CE. A few Chinese copper coins date to the Song Dynasty, which is not unusual even for find spots of the Mongol period. An excellent artifact for dating is an Islamic silver coin with the *tamgha* of Möngke Khan (r. 1251-59), collected from the surface in 2009 (Fig. 28). Within the wide range of artifacts of different materials, including processed bone pieces and fragments of plate glass, both suggesting workshops here, several iron ingots of the same type which were collected in the survey are especially noteworthy (Fig. 11 d-e). Fragments of clay supports collected during the survey in 2009 and excavated during the last two years (Fig. 29) compare with finds in the kiln site of the Orkhon valley mentioned above (Fig. 30). All

(below) Fig. 28. *Baga Nariin am*. Silver coin from the reign of Möngke Khan.

(middle right) Fig. 29. *Baga Nariin am*. Earthen clay supports from the survey (a-c) and from excavation (d-e).

(lower right) Fig. 30. Kiln with clay supports from the kiln site in the floodplain of the Orkhon.



Photo (lower right) after: Hüffel and Erdenebat 2011, p. 40; Fig. 43; remaining photos © University of Bonn.



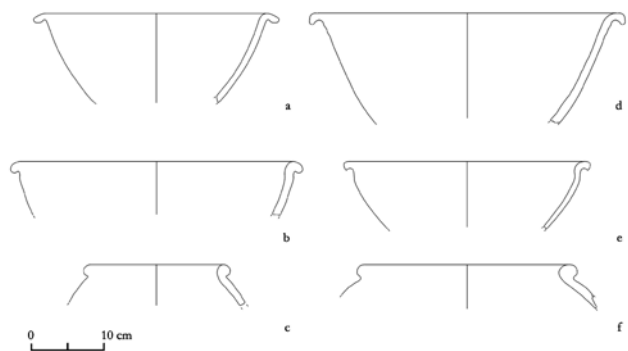


Fig. 31. Selected grey pottery from the survey east of Karakorum (a-c) and from Baga Nariin am (d-f).

these groups of artifacts confirm that the medieval settlement of Baga Nariin am was a production center.

The medieval pottery in Baga Nariin am covers the the same spectrum as that collected in the survey and is entirely comparable to the materials excavated in the city's center between 2000 and 2005. The pottery of Chinese origin consists of typical wares from the Song and Yüan dynasties (see the contribution by Anne Heussner in this volume). The second category is the indigenous grey pottery which obviously derives from older steppe traditions. The clay is generally well prepared and tempered with fine limestone gravel and sand or silica. The ware is entirely smoke fired, whereupon the surface is mostly dark grey. The variety of the forms is quite small. The biggest groups are large bowls with a globular or conical contour and pots with a round shoulder and sometimes with handles. Both groups are represented in the material from Baga Nariin am and from the survey outside the city (Fig. 31). Still unclear is the question of whether the few potsherds with stamped ornament and generally from older periods represent a survival into medieval times or whether they indicate prior settlement activities in Baga Nariin am (Fig. 27) or in Karakorum as well.

Archaeological Research in the Bayan gol Valley: a Manchurian Occupation?

The Bayan gol is a small tributary of the Orkhon running north-northeast with its estuary some 12 km northwest of Karakorum. Our interest to that area was initiated by prior research which began in the middle of the 20th century. The first person to draw attention to archaeological relics here was the Mongolian archaeologist Kh. Perlee. Without any detailed description of archaeological monuments he mentioned a place named "Bayan goliin balgas" at a distance of 12 km from Erdenee zuu monastery (Perlee 1961, p. 149, No. 153). Most likely on the basis of written records, he wrote that this place was occupied by Manchurian soldiers in charge of agriculture.² The same statement about the chronology at Bayan gol (obviously a copy of Perlee's report) is in the publication by D. Maidar (1970, p. 43, No. 104).

More information about archaeological sites in the valley became known from the work of Japanese researchers in the Orkhon valley during the last decade of the 20th century. First of all they drew attention to two rectangular ramparts located in the lower part of the valley on the right bank about 1 km south-southwest of the estuary (Fig. 32, no. 1). On the basis of historical sources Shimpei Kato has connected this place with the "Shira-Ordo" palace which is mentioned in historical sources of the Mongol period (Kato 1997, p. 23 with Fig. 7).

During the last decade two field projects have published short remarks regarding archaeological sites in the Bayan gol valley. In 2002 the Japanese archaeologist Noriyuki Shiraishi published a map with five concentrations of sites (Shiraishi 2002, p. 244, Fig. 3-43). In addition to the well-known ramparts he mentions



Fig. 32. Bayan gol valley. Satellite picture with ramparts, pit depressions and kilns.

Source: GOOGLE Earth.

Fig. 33. Bayan gol valley. Kiln site on the eastern terrace.

Fig. 34. Bayan gol valley. Kiln site on the western terrace.

two concentrations of tombs in the estuary of the Bayan gol and marks two settlement areas south of the ramparts on both sides of the stream. In 2007 a joint Mongolian-Chinese excavation project took place on the southwestern terrace indicated by Shiraishi's map. Here several ritual sites of the Early Medieval period were excavated, and materials collected as well from the Xiongnu, the Khitan and the Qing Dynasty (Ankbayar and Odbaatar 2011).

The most recent research in the Bayan gol valley was done by the Mongolian-German geoarchaeological project in 2008. In a first report it provides a short description of archaeological relics and indicates that the double ramparts are supposed to be tombs of the Early Medieval period and that in all likelihood the major part of the sites probably dates to that time (Ahrens et al. 2008, pp. 319-20 [MOR 18-32]).

Our interest was drawn to two kiln sites in the upper part of the valley which were discovered by Jan Bemann and his team during a survey campaign 2009 and the author in 2010. The first kiln complex is situated some 700 m southwest of the above-mentioned ramparts, south of a small eastern tributary on the eastern terrace of the Bayan gol (Fig. 32, no. 2). Here, the terrace was obviously divided intentionally by a north-south oriented sunken road which runs parallel to a large building (?) complex of walls on the upper terrace (cf. Shiraishi 2002, p. 244, fig. 3-43). On the eastern slope of that sunken road are 9 kilns (Fig. 33); three kilns are situated on the northern slope of the tributary, one on the southern slope. A second kiln complex is situated another 700 m southwest on the western terrace of the valley. Here two groups of kilns of the same outline could be observed within a large open settlement area (Fig. 34).

But another group of archaeological features piqued our interest as



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well. Between the two ramparts and the first group of kilns two concentrations of dark spots could be identified in the satellite picture of Google Earth (Fig. 32, nos. 3-4). Surveying these features in the valley we could recognize these structures as flat pits covered by bushes of nettles (Fig. 35). We chose for excavation two of the pits of the southern group. Directly under the turf we could recognize that the flat pits form the remains of pit houses which were dug into the natural soil (Fig. 36). Both pit houses were up to 1.3 m deep and mostly filled with dark brown soil. Special structural

(below) Fig. 35. Bayan gol valley. Pit depressions.

(right) Fig. 36. Bayan gol valley, site No. 4 (cf. Fig. 32). Excavated area with pit houses.





Fig. 37. Bayan gol valley, site No. 2. Kiln with lime remains.



(top right) Fig. 38. Bayan gol valley, site No. 2. Firing chamber.



(middle right) Fig. 39. Bayan gol valley, site No. 2. Firing chamber.

details could not be observed; only a posthole and the fragment of a millstone in the northern pit house were noteworthy. Finds were few; only some potsherds of a dark grey pottery could be retrieved.

For excavation of a kiln we selected one example from the northern kiln complex. The complete area of the kiln was divided into four sections whereupon two sections were opened by excavation. In the northeastern section a circular structure of lime was uncovered directly under the turf (Fig. 37) representing the outer line of the kiln. Upon opening a small deep section on the southern profile of sector B a central furnace chamber came to light (Figs. 38-39). This chamber was completely filled with loose-fitting stones, the complete skeleton of a small animal and an iron vessel with a blue enamel facing (Fig. 40). A second furnace chamber was uncovered in a second deep section downhill (Fig. 41) showing that this kiln was in use for a longer period of time.

Fig. 40. Bayan gol valley, site No. 2. Iron vessel with blue enamel facing.



Fig. 41. Bayan gol valley, site No. 2. Firing chamber.

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No remains of metallurgical production came to light during our excavation. Based on the abundance of lime we early came to the conclusion that this kiln site was used for lime burning. This assumption was confirmed during the last days of our stay in the Bayan gol by an old man who indicated that here lime kilns existed until the 1940s. When this industrial complex started to produce is still unknown; we hope to obtain some information by analyzing a few charcoal samples in the coming year.

Results

During the last two years our work has substantially enlarged the knowledge of workshops and trade around Karakorum. While directly outside the city wall no area can be clearly connected with metal trade, the excavation in Baga Nariin am yielded evidence of production sites. The most prominent features are the remains of a big kiln of obviously Chinese origin and the first evidence of metal smelting processes during the medieval era in Mongolia. Furthermore, workshops of bone carving and possible glass production can be located here (Fig. 42). The dating of the settlement, especially from a preliminary analysis on the basis of dendrochronological data from a board found in one of the pit houses, at least raises the possibility that the residents here might have been in charge of building the city and the royal palace of the Mongolian khans. But to confirm this requires further natural scientific data from charcoal samples.

The results in the Bayan gol valley did not meet our expectations concerning metallurgy of the medieval era in the broader vicinity of Karakorum. According to the results of the Mongolian-German

geoarchaeological project, that valley was more densely settled during the Early Medieval time than in the Mongol era. Now an additional settlement layer of Manchurian and/or modern times can be added to the history of settlement here. Even if we could not obtain any results concerning industrial sites of the medieval period in the Bayan gol valley, the results seem to be important, because the archaeology of the post-Yüan era in Mongolia has so far been limited. We hope our work will encourage an interest in that epoch.

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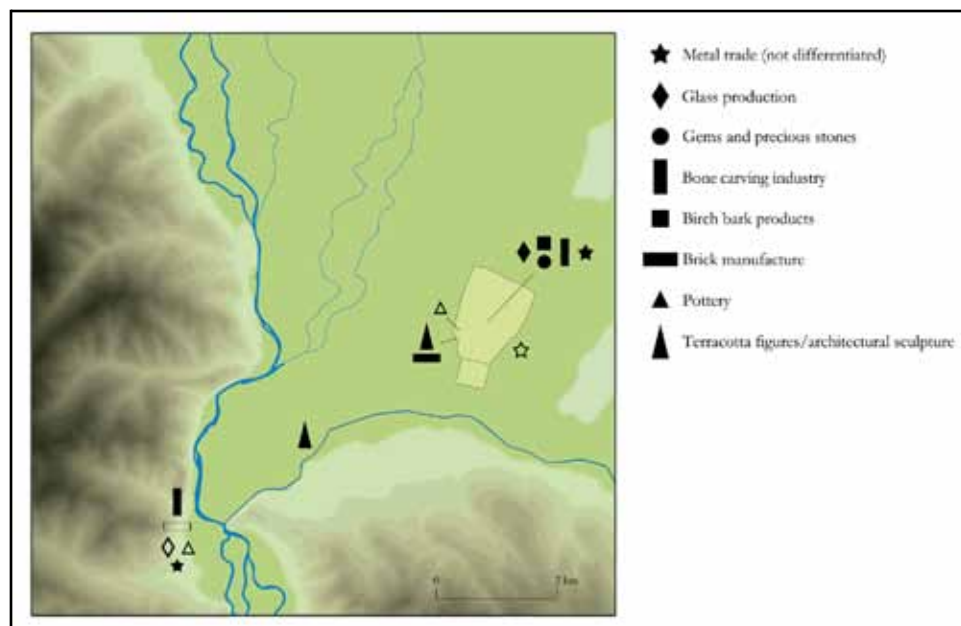


Fig. 42. Distribution of workshops in and outside of Karakorum. Open symbol: supposed. Filled symbol: proved.

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Notes

1. We are thankful to Jan Bemmam and his team for providing the necessary information regarding the two places selected for excavation. The materials from Baga Nariin am collected during the survey will be published in the final report of our project.

2. Originally Kh. Perlee was a historian. During a visit of our excavation at Baga Nariin am in summer 2012 Prof. Ayudai Ochir, a specialist of Manchurian history, confirmed that historical sources report a 60-year occupation in the Bayan gol valley under the Qing Dynasty in the 18th century CE.