American-Mongolian Deer Stone Project: Field Report 2006

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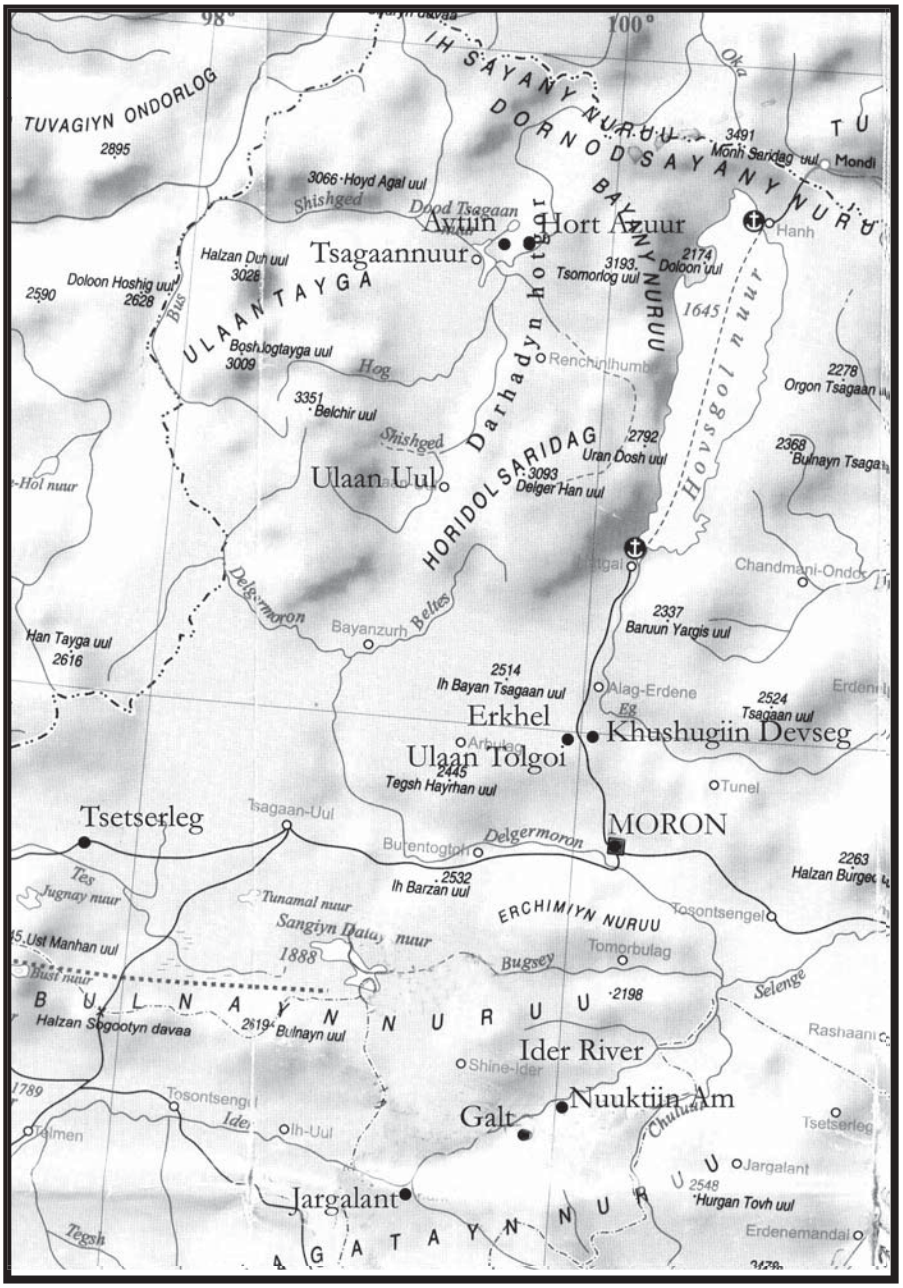
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PART 1

MONGOLIA DEER STONE 2006 PROJECT OVERVIEW
William W. Fitzhugh

The joint American-Mongolian Deer Stone Project completed its fifth field season this summer between 31 May and 10 July, returning to Hovsgol Aimag to conduct a broader series of investigations than it has mounted in previous years. The roster of project included (1) an expanded deer stone survey, with test excavations at several new sites in the northern Darkhad Valley, directed by William Fitzhugh and Jamsranjav Bayarsaikhan; (2) botanical surveys and Tsaatan studies north of the Shishged River conducted by Paula DePriest; and (3) ethnographic studies of Tsaatan and Mongolian shamanism, directed by Marilyn Walker. (4) Bruno Frohlich conducted an independent project, surveying and excavating a number of Bronze Age mounds in the region west of Muren, and (5) the Smithsonian Museum Conservation Institute fielded a second year of deer stone laser scanning and conservation. (6) In addition, we were fortunate to collaborate with Francis Allard of Indiana University of Pennsylvania who expanded his ethnographic study of modern horse husbandry and ritual practices into the Darkhad Valley. Allard and D. Erdenebaatar also gave us an orientation to the archaeology of the Khanuy River region where they have been working for several years. This season's work was highly successful and resulted in a number of important breakthroughs (see appended summary of scientific results).

In 2006 our core programs were supported financially by the Trust for Mutual Understanding and, for the first time, by the National Geographic Society, which published a one-page report on our deer stone work in the February 2007 issue, illustrated with a photograph of a deer stone from Ushkiin Uver by Gordon Wiltsie. Other components were supported by the Smithsonian's Department of Anthropology, the Arctic Studies Center, the National Museum of Natural History, the Museum Conservation Insitute, and the National Museum of Mongolian History.

I am especially grateful for our outstanding field crews: Christie Leece, Marilyn Walker, Ts. Ayush, J. Bayarsaikhan, T. Sanjmiatav, Khadbaatar, Mendbayar, Tsolmon, Onolbaatar, and Songuulkhuu, Paula DePriest, J. Oyumaa, and Oyumbileg; the MCI scanning team of Rae Beaubien, Basiliki Vicky Karas, and Leslie Weber; Bruno Frohlich and his team of students from the Smithsonian and the Institute of Archaeology; drivers Tsog, Khatbaatar, Narangel, Batbaatar, and Tserenam; our cook Amra; and our project coordinator and translator, Adiya Namkhai. Francis Allard and his team from Indiana University, Pennsylvania, Laura Short and Erika Maggiore, Marion Sikora from the University of Pittsburg, and Alyssa Caralla and Nasaa from Ulaanbaatar.

Components of this report include

-- Introduction and overview by W. Fitzhugh
-- Project narrative of W. Fitzhugh's diary;
--The Museum Conservation Institute's reports of the 3D scanning work done on the deer stones and conservation work in Ulaanbaatar in 2006;
-- Marilyn Walker's report on ethnographic studies conducted among the Darkhad Mongols and the West Darkhad Tsaatan;

-- Bruno Frohlich account of mound excavations
-- Paula DePriest's report on explorations north of the Shishged River.

The Ulaanbaatar Symposium and Workshops (2-9 June 2006)


Nora Lockshin demonstrates paper conservation techniques in Ulaanbaatar.

As in previous years we co-sponsored a conference and workshop with the National Museum of Mongolian History at the National University lecture hall on 2 June, mounted with the assistance of the American Center for Mongolian Studies through the good offices of ACMS Office Director Peter Marsh and assistant Enkbaatar. Symposium papers [insert a scan of the conference program] were presented by Cliff Montaigne, Rae Beaubien and Vicky Karas, Leslie Weber, William Fitzhugh, Bruno Frohlich, and Paula DePriest, J. Bayarsaikhan, Ts. Ayush, D. Erdenebaatar, O. Sukhbaatar, Paula DePriest and J. Oyuma, Francis Allard, Alyssa Caralla, and Erika Maggiore to an audience that at times reached nearly 100 scholars and students. On June 3nd, at the conclusion of the conference, Director A. Ochir of the NMMH hosted an evening reception at which Bill Fitzhugh gave a popular presentation on the Deer Stone Project and Director D. Tseveendorj of the Institute of Archaeology spoke about recent developments in Mongolian archaeological research. The Institute's work is a 'booming' field now, with scores of projects including several large international efforts. The consensus at the close of the meeting was that the growing success of the conference called for broadened participation by the University and Archaeological Institute in future years.

During the conference and for the following week Smithsonian exhibit specialist Paul Rhymer held workshop sessions on exhibit techniques and specimen preparation and mounting. The National Museum of Mongolian Natural History was especially hospitable in providing space, materials, and support for Paul's presentations. Last year Natalie Firnhaber had discovered the urgent need for paper conservation at several museums, libraries, and archives in UB, and this year we were delighted that Nora Lockshin, paper conservator at the SI Archives, was able to join our group for a week or presentations and consultations. As has occurred in past years, there was a phenomenal response to these museum training workshops, and the contacts that the team has made have been followed up with private communications between Smithsonian exhibit and conservation specialists and their counterparts in Mongolia throughout the year between our visits.

The Khanuy Valley Excursion


Satellite burial excavated at Urt Bulagyn.

Following the UB conferences and while enroute to Muren and our Darhad field area, the field team made a short visit to the Khanuy Valley region to view sites that Francis Allard and D. Erdenebaatar of the Institute of History have been working at for the past several years. We spent a few hours at the large Xiongnu site of Gol Mod I being excavated by a French team directed by Jean-Paul DesRoches. This site is truly phenomenal, and the deep excavation seeking the burial chamber beneath its largest

mound illustrates the logistical complexities of archaeological research on this culture period, ca. 200 B.C. to A.D. 200.

One of the elaborately carved deer stones in the Khanuy Valley, KYR 119.

We spent two days working at Urt Bulagyn (KYR-1), where we excavated two small satellite horse mounds outside the east fence wall. Allard's and Erdenebaatar's (2004) report describes this large stone mound and its square fence and associated horse mounds and ovals. Our work was designed to determine the period of time over which the horse mounds were constructed as a way to better understand the khirigsuur's construction history. The Urt Bulagyn kherigsuur has ca. 1700 horse mounds, and there has been considerable speculation about whether the central mound and its associated features were constructed during a short ceremonial period or event, or accumulated gradually in a slower fashion over decades or even hundreds of years.

We selected two small satellite horse mounds for excavation, Mound 1-21 in the first tier of mounds outside the east fence wall (presumably among the first horse mounds to be constructed after the fence was completed), and Mound 1-22 part of the outermost tier of satellite mounds farthest from the fence (presumably one of the last horse feature to be constructed in this area of the site). We were rewarded by recovering horse head remains from both mounds, and their dates were virtually identical, each averaging cal. 2875 B.P., suggesting that these horse sacrifices and burials occurred at the same time, radiometrically-speaking at least. One may therefore surmise that these horse burials took place within a short period of time, perhaps even as part of a single massive regional ceremonial event associated with the construction of the large central mound and its likely central human burial.

While in Khanuy we also spend several hours photographing and documenting the large deer stone site north of Urt Bulagyn known as KYR-119. This was once a huge deer stone site with 20-30 stones, of which only two or three are still standing today. Sadly, it is not possible to determine the locations of the many fine stones that were pulled down in antiquity for use in constructing square burials, a cultural phase that closely succeeds the Kherigsuur period, perhaps by as little as 100 year or less. Our Mongolian partner Sanjmiatav had excavated several of these square burials with V. V. Volkov when the latter worked at this site. Unfortunately, no detailed archaeological reports or maps were ever published, despite the many important artifacts and faunal remains. Our conservation team made detailed photographic records of the deer stones, some of which have been recently damaged by vandalism, but they did not have time to make laser scan recordings.

The quality of the deer stone carvings at KYR-119 is among the finest in north central Mongolia,

and the hands of several master-artists is easily detected. Today most of the deer stones are found in the unfilled excavation pits of the square burials and their associated archaeological spoil piles. This is a tragic scene indeed for some of the finest examples of deer stone art in Mongolia.

KYR-119 cries out for a major salvage excavation and restoration effort. This is an urgent matter, given the tourism attraction of the nearby Gol Mod I site, once work is finished there and restoration is complete. If Gol Mod II is excavated, as appears likely in the near future, it will only add to the tourist attraction of the area and the need for turning KYR-119 into a respectable national historic site.

Darkhad Valley Surveys and Excavations

We arrived a few days later in the Darkhad and set up a base camp on the south side of the Shishged River just outside the gorge that takes the river on its course into Russia, becoming the Little Yenesei. The spectacular scenery here was enhanced by some equally spectacular weather which brought sheets of rain at the river but dumped thick snow on the mountains all around, nearly down to our elevation. While Francis' team interviewed herders about horse-rearing, maintenance, and death ritual – which has some strong parallels with ritual treatment of horse remains in Bronze Age sites – we launched surveys into the surrounding terrain, making important discoveries. The biggest surprise was finding that the rock art we had discovered in 2005 on basalt exposures on the north bank of the Shishged was just the 'tip of the iceberg.' This year we found some wonderful rock art locations, and most surprising were two that bore exact images of the sacred deer found on the deer stones. Only a few other rock art examples of this motif have been found elsewhere in Mongolia (see Jacobson 2002). Given the considerable rock art surveys that have been done elsewhere in Mongolia, these finds suggest that the deer stone icon may be more common here than anywhere else.

Rock art at the East Ridge Site included this deer motif.

The first of the new rock art sites, the West Ridge site, was found up in the hills to the south of the Avtiin site east of the pass leading down to the Shishged. Ten or fifteen small basalt rock faces had been used for carvings of individual animals or small groups of animals, including mountain goats, elk, and others. A second site, the East Ridge site, was found on a single large block of basalt-like stone perched on the west side of a hill, near its summit. The flat west face of this huge rock, perhaps 1.5 by 5m, was filled with carvings of different wild animals, and on upper right (south) end, there is a large carving of the deer stone motif many times larger than the other animal carvings. This stone was traced and photographed carefully. Inspection of the ground beneath the rock discouraged any potential for archaeological excavation.

While surveying looted mounds a few hundred meters east of Elst Khooshan we found a third

rock art site in the rocky hillside above the khirigsuurs containing the image of a deer stone deer, a regular deer, and a swastika symbol.

Christie and Bayaraa with "the smallest deer stone in the world" at Avtiin.

We also found several important new deer stone sites: **Zeerdegchingiin Khoshuu**, Avtiin, and Hort Azuur. Zeeredegchingiin Khoshuu overlooked an eastern tributary of the Shishged River and its two large khirigsuurs located on a promontory bluff had been 'excavated' long ago, probably by Buddhist monks in the early 20th century, when a monastery was located in the vicinity. We excavated a small satellite horse mound on the south side of the western khirigsuur and a stone ring on the west side of the mound fence, and obtained several dating samples (see sample list below).

Several km to the north we found **Avtiin,** a small but exciting site that contained several of the smallest deer stones we had ever seen, some only 60cm total length. Unfortunately, like other sites in this area, they were not in primary position. Our work here included excavations of a stone ring west of the deer stone setting, a circular rock pavement northeast of the setting that resembled a small horse mound, and a ring feature to the south of it. None of these features produced horse remains, although the western ring feature contained small amounts of calcined bone. Charcoal samples were obtained from all three features and from the still-open looters pit where we found a large deer stone lying partially exposed. We recovered charcoal from a recent fire here and found several other smaller deer stone fragments nearby. Others probably remain buried in the vicinity.
At least four deer stones appear to have stood here, one medium-sized stone and three smaller ones. All have distinctive deer stone markings, but they were rudimentary and none seemed to have carvings of deer or the full deer stone composition layout.

Sanjmyatav traces outline of deer and tiger images on Hort Azuur deer stone in Northern Darkhad Valley.

Hort Azur, located in the northeast corner of the Darkhad, appeared at first to be a small site with only a single standing deer stone, but when we began mapping we found several other fallen stones standing in north-south alignment, and one of the fallen and partially-buried stones had a tiger and horse image on one face, with charcoal beneath the stone. We eventually identified four deer stone loci: Locus 1, a single standing DS (DS 1) with a circle mark; Locus 2, one large fallen stone with the tiger and horse (DS 2) and two small stones (DS

3, 4); Locus 3, one large fallen stone (DS 5), which we excavated; and Locus 4, one large stone (DS 6) and possibly two mini deer stones, one meter to south, buried enough that we could not identify them positively without excavation. Like Avtiin, the Hort Azur deer stones differed from the 'classic' stones of the Erkhel-Muron region, having minimal carving, fewer deer images, and smaller size. In general their features suggest they either date (1) earlier or (2) later than the classic stones, or (3) are an attenuated regional, northern style. The date of the charcoal sample beneath DS 2 "tiger stone" was cal BC 390 to 190, 600 years later than the other deer stone dates we have obtained. Our attempt to find horse sacrifice remains beneath a circular pavement associated with L3 produced nothing, so it appears we will have to make a more concerted effort to excavate for better samples here in 2007. These deer stones are more similar to those reported from south Siberia and the Altai region of western Mongolia than they are to the deer stones in the Muren-Khanuy region. So far we have one solid horse head dating series from a northern Darkhad deer stone, Tsatstain Khoshuu, and this stone, like those described above and found in 2005 in the Evd 2 and 3, are minimally carved and have few deer images. The horse remains from Tsatstain Khoshuu are the oldest of any we have recovered from Hovsgol aimag. While the ca. 400 BC Hort Azuur DS 2 date is interesting in view of the typological differences from other stones, this charcoal date needs considerable reinforcement from other better provenanced samples.

Tsaatan Studies

A happy, heavy load for one of the canvas recipients.

While we were working on deer stones, Paula DePriest left on a horse trek with a group of Tsaatan guided by Sanjim, into the mountain country north of the Shishged, ascending the Tengis and nearly reaching the Russian border. Their route then turned south, emerging in the East Tsaatan pasture where they found people sewing the canvas we had helped deliver into new tent covers. Paula's trip brought her into a portion of the Tsaatan territory where we had not ventured previously.

We visited with the Tsaatan for a few days right after our arrival in the valley. Working with the US Embassy and the International Red Cross and assisted by the U.S. Embassy, we had arranged to present every East and West Tundra Tsaatan with enough canvas to make new covers for their urts (tents), and as a additional contribution from the Smithsonian, we provided every family with a 50-pound bag of flour. There were a lot of smiles as these materials disappeared into the mountains on the back of pack horses! We following behind, and by the time we reached the Tsaatan spring camp the canvas was on the ground being sewed into tent coverings by a host of seamstresses, most under the age of eight!

This summer we were accompanied by Marilyn Walker, a Canadian scholar who has been studying shamanism, plant-curing, and other ritual practices in northern North America and Russia. Marilyn had teamed up with Ts. Ayush from the NMMH and arranged to spend two weeks in the Darkhad working with Tsaatan shamans. Unfortunately she was too late to meet Suyan, the legendary Tsaatan shaman of the West Tundra group whom we had been fortunately enough to get to know during the past several years. Suyan had died in March 2006. Marilyn and Ayush had a very productive project and made plans for beginning a full-scale project in the

coming years. En route to and from the Tsaatan they were able to meet several Darkhad shamans. Her field report is found elsewhere in this newsletter.

Ulaan Tolgoi Excavations

Following our Darkhad excursion we returned to the Lake Erkhel area to continue our long-term study of Ulaan Tolgoi and other deer stone sites in the vicinity. This year's work involved excavating two horse mounds associated with Deer Stone 5, an oval feature northwest of DS 5, and several horse mounds at the nearby kherigsuurs to see if these features and their associated mounds date to the same time as the deer stones, as preliminary results from 2005 excavations had suggested. While excavating the stone ring associated with DS 5, Bayaraa encountered a large deposit of ceramic fragments, and when the area was opened up we discovered our first evidence of domestic activities associated with the oval rings and their burned food bone deposits.

Horse head burial at Ulaan Tolgoi, DS5.

Two horse mound features were excavated at DS 5. Feature 2 was a large rockpile about 6 meters south of the deer stone with a large subsurface chamber containing a well-preserved horse head. Feature 3 was northeast of the deer stone, also part of the circular arrangement of horse mounds encircling DS 5, and this mound contained poorly preserved remains of a horse head burial. As third horse head feature southwest of DS 5 had been excavated in 2005. Features 1 and 2 produced c14 dates of cal. 2900 B.P., similar to the dates from DS4. We also completed the excavation of the small oval feature southeast of DS 5 which we tested in 2003, and recovered a single piece of ceramic and a stone scraper, but no datable bone.

Following work at the Ulaan Tolgoi deer stones we excavated a single horse mound feature east of Mound 2 (adjacent to and east of DS 2) and a satellite mound (Feature 1) on the east side of Mound 3, a medium-size khirigsuur about 50 m south of DS 1, which produced a chert microblade core, a caprid scapula, and a single horse hoof. This site may have been disturbed; at any rate no horse skull was found.

On evening I surveyed the khirigsuurs around the south side of Ulaan Tolgoi and made the following notes on their general characteristics:

GPS #234. 5448 ft; N 49°55.690', E 99°47.386 A khirigsuur on the hillside, a lower intermediate Tolgoi slope, across valley from largest lower slope rock outcrop and west of a small drainage ravine. Square corner posts with boulder pavement structures; no external mounds or rings; exposed cobble pavement inside fence. (see drawing, pg. 142, Journal #2). The mound is ~1 m high, 6 x 6 diam; fence walls 1m wide, mounded up on downslope east and south sides to make more of a level platform interior.

GPS #235. 5538 ft; N 49°55.807', E 99°47.423' A looted square khirigsuur above the former one, with mounded cobble fence walls, large slab burial cover rocks all removed except

westernmost one. Has a very distinct cobble plaza pavement. 1m-high mounded corners, but no pillars. The fence is built up with 2-4 courses of rocks. No external mound features.

Working at Khushugiin Devseg.

GPS #236. 5557 ft; N 49°55.845', E 99° 47.380' A small 10 x 10m square khirigsuur above #235, with large corner pillars, but no corner mounds. Probably not looted, at least not recently, as #235 was. 25cm high central mound made of small cobbles, except for the flat cap stones, which are exposed. No external satellite features.

GPS #237. 5578 ft; N 49°55.853', E 99°47.532' Orientations: 060° N wall, 068° S wall. Cobble plaza surrounded by large single boulder fence walls. This is a10m square khirigsuur with corner pillars, located at the base of bare hill rocks on a 30° slope. No corner mounds or external features. Small 3 x 3 m cobble center mound, 20 cm high. Up- and down-slope sides are aligned with hillslope. Is this to orient toward the sunrise or for a geographic target relating to the hill?

GPS #238. 5576 ft; N 49°55.836', 99°47.279' Orientations: S = 092°, N = 080°. To the west along ledge base is another square, corner-pillared khirigsuur with its north and south fence walls parallel to the slope contour. Has a small, low center mound with only capstone slabs and no mound rocks. The plaza is covered with thick layer of slope wash gravel. Marmot burrow active in burial area. No external features. Single line of small fence wall stones.

GPS #239. 5585 ft; N 49°55.841', E 99°47.257' Next to the northwest is a recently- looted circular mound with a 3m diameter looter's pit open and about 0.75m deep. No bones evident.

GPS #240. 5556 ft; N 49°55.814', E 99°47.197' 15m north of #239, with wall fences of 17m on the east, 16m on the west sides. Small boulder fence wall; no external features. The looted burial had large capstone slabs and had been recent looted. No human bones, but recent animal bones were lying inside the looter's pit. No obvious exposed pavement, but there is lots of slope wash gravel on the surface, so it may be buried. The north/south fence walls parallel slope grade. Low corner mounds on the south wall are shored up 2m high.

Several circular khirigsuurs were also present, but they had no external features. All of the above-described khirigsuurs are slope types and belong to Bruno Frohlich's Class 2 mound type. Site placement and hillslope direction may determine orientation of square khirigsuurs at least for those on slopes/hills. There seem to be more square khirigsuurs than round ones on steeper hillslope sites.

Khushugiin Devseg

This summer we tested a deer stone site in the middle of a ger camp in the hills east of Lake Erkhel known as Khushugiin Devseg. In the area around the two standing deer stones we discovered a deep occupation deposit containing bone and charcoal that produced a horse tooth date of ca. 2300 BP, several centuries after the deer stones. This tooth came from a cultural deposit containing large amounts of charcoal and plain ceramics, most certainly the remains of a camp midden that post-dates the deer stone complex. More work is needed at this important site to clarify the dates of its classic type deer stones and the associated camp remains and determine the settlement site size and characteristics. Although complicated by multiple components this site is one of our most important discoveries of the past several years, as svery few true settlement sites have been found in Hovsgol aimag. This site will probably give us a stratigraphic series and a long chronology for the Erkhel region, of which the deer stone occupation appears as only one component.

Scanning Program

During our work further north Rae Beaubien, Vicky Karas, and Leslie Weber spent two weeks scanning the 14 Ushkiin Uver deer stone series standing at the site as well as the 15th stone, currently stored at the Muren museum. The also scanned the large DS 2 at Ulaan Tolgoi, one of the most elegant of all Mongolian deer stones but that was never recorded by Volkov and is as far as I know, still unpublished.

While we were engaged in studies to the north, Bruno Frohlich had been working with a large team excavating several mounds in the valley west of Ushkiin Uver. In all, five mounds were completely or partially excavated, and all contained human remains. His brief report is included in this volume.

Stone grinding wheel found deeply buried at Nuuktiin Am.

Nuuktiin Am

After our initial inspection of a group of two identical paired deer stones at Nuuktiin Am, on the Ider River west of Galt, while traveling north, we returned to record and excavate here during our return to Ulaanbaatar. We spent two days excavating a large khirigsuur, Mound 1, whose Feature 1 satellite mound produced a horse head. Excavations at a mound feature a few meters south of the DS group, one of a series of such features encircling the deer stones, produced horse remains beneath a large buried complex of slabs more than a meter deep. This feature was quite different from others we have investigated and in addition to the fragmentary, dispersed location of the horse remains, we recovered parts of a perforated circular stone quern used for grinding grain.

Recently Received Deer Stone Radiocarbon Dates from the 2006 Season:

Urt Bulagyn KYR-1-21 horse satellite mound: cal BC 1030 to 820
Urt Bulagyn KYR-1-22 horse satellite mound: cal BC 1020 to 830
Nukhtiin Am Deer Stone 1, F1 horse tooth: cal BC 1100 to 900
Ulaan Tolgoi, Deer Stone 5, F2 horse tooth: cal BC 1100 to 900
Khushugiin Devseg Deer Stone 2, F1 horse tooth: cal BC 360 to 40
(this turned out not to be a horse sacrifice and
is probably not associated with the nearby deer stone)
Hort Azuur Deer Stone 3 charcoal: cal BC 390 to 190
(not a horse sacrifice feature, charcoal was found
Under a fallen deer stone and association is not secure)

Key Scientific Results from 2005 Analysis and the 2006 Field Season:

1. Three new deer stone sites found, including more than 20 new deer stones;
2. With the spectacular increase in the number of fallen or partially-buried deer stones discovered, we now estimate the number of deer stones previous recorded by Volkov and others, ca. 300 in Mongolia, is more likely to be between 1000-1500 based on extrapolation from still-incomplete surveys in Hovsgol Aimag;
3. 29 new radiocarbon samples recovered from deer stone and kherigsuur contexts;
4. Discovery of a large previously unknown rock art locale on along the north bank of the Shishged River;
5. Discovery of two rock art panels depicting the image of the iconic deer stone 'spirit' or 'master deer';
6. Complete laser scans of the 14 extant deer stones at Ushkiin Uver, and a complete scan of the 4.3 meter Ulaan Tolgoi deer stone;
7. Botanical survey of the Tengis-North Darkhad Mountain region;
8. Preliminary interviews with Tsaatan and Darkhad shamans, in preparation for a formal ethnographic study of shaman ritual equipment and ethnobotanical practices by Marilyn Walker and Ts. Ayush;
9. Frohlich excavations of three small mounds in the East Muren region, all of which contained human remains and revealed mound construction details;
10. Third annual Deer Stone Project conference held in Ulaanbaatar;
11. Third annual museum workshop series conducted with museum and research center staffs in UB;
12. Publication and distribution of: *The Deer Stone Project: Anthropological Studies in Mongolia 2002-2004*, edited by William Fitzhugh, J. Bayarsaikhan, and Peter Marsh. 2005. 254 pp. Washington and Ulaanbaatar: Arctic Studies Center and National Museum of Mongolian History.
13. In collaboration with Francis Allard, assisted with logistics for ethnographic survey of horse ritual practices in the Darkhad Valley and with surveys, preservation, and dating of the Urt Bulagiin khirigsuur and KYR-119 deer stone sites in the Khanuy Valley.

Table 1. Radiocarbon Dates from Deer Stone and Khirigsuur Sites in Hovsgol and Arkhangai Aimags

site / feature	location/year	sample no.	material	uncorrected	calib (2-sig)
Ulaan Tolgoi DS4 S-17	Erkhel / 2003	B-182958 AMS	charcoal	2170 ± 40 BP	BP 2320-2050
Ulaan Tolgoi DS4 S-7	Erkhel / 2003	B-182959 AMS	charcoal	2930 ± 40 BP	BP 3220-2950
Ulaan Tolgoi DS4 F1	Erkhel / 2004	B-193738 AMS	bone coll.	2530 ± 40 BP	BP 2750-2470
Ulaan Tolgoi DS4 F2	Erkhel / 2004	B-193739 AMS	bone coll.	2950 ± 40 BP	BP 3240-2970
Ulaan Tolgoi DS4 F3	Erkhel / 2004	B-193740 AMS	bone coll.	2810 ± 40 BP	BP 2990-2800
Ulaan Tolgoi DS4, F5	Erkhel / 2005	B-207205 RAD	bone coll.	2790 ± 70 BP	BP 3220-2800
Ulaan Tolgoi DS4, F6	Erkhel / 2005	B-207206 RAD	bone coll.	2740 ± 70 BP	BP 3150-2780
Ulaan Tolgoi DS5, T1	Erkhel / 2002	B-169296 AMS	charcoal	2090 ± 40 BP	BP 2150-1960
Ulaan Tolgoi DS5, F1	Erkhel / 2005	B-215694 AMS	tooth coll.	2800 ± 40 BP	BP 2980-2790
Ulaan Tolgoi DS5, F2	Erkhel / 2006	B-222535 AMS	tooth coll.	2830 ± 40 BP	BP 3050-2850
Ulaan Tolgoi M1, F1	Erkhel / 2005	B-207209 AMS	bone coll.	1880 ± 40 BP	BP 1900-1720
Ulaan Tolgoi M1, F2	Erkhel / 2005	B-215692 AMS	tooth coll.	2860 ± 40 BP	BP 3080-2870
Ulaan Tolgoi M1, F2	Erkhel / 2005	B-215644 AMS	charcoal	2980 ± 40 BP	BP 3310-3000
Ulaan Tolgoi M1, F3	Erkhel / 2005	B-215693 AMS	tooth coll.	2950 ± 60 BP	BP 3320-2940
Nukhtiin Am DS1/2, F1	Galt / 2006	B-222534 AMS	tooth coll.	2830 ± 40 BP	BP 3050-2850
Evdt 2 DS 2 circ. feat.	Evdt Valley	B-215643 AMS	charcoal	3030 ± 40 BP	BP 3350-3090
Tsatstain Kh DS1,F1	Tsaagan / 2005	B-207208 AMS	tooth coll.	2920 ± 40 BP	BP 3160-2920
Tsatstain Kh DS1,F2	Tsaagan / 2005	B-207207 AMS	tooth coll.	3000 ± 40 BP	BP 3330-3060
Urt Bulagyn KYR1-21	Khanuy / 2006	B-222532 AMS	tooth coll.	2780 ± 50 BP	BP 2980-2770
Urt Bulagyn KYR1-22	Khanuy / 2006	B-222533 AMS	tooth coll.	2790 ± 40 BP	BP 2970-2780

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PART II

MONGOLIA FIELD JOURNALS 2006

William W. Fitzhugh

2-3 June, 2006 (Ulaanbaatar)

We arrived in Ulaanbaatar on the evening of 1 June. Our conference and workshop series began on the 2nd at the National University of Mongolia, co-hosted with the National Museum of Mongolian History with assistance from the American Center of Mongolian Studies.

Present for the conference were Wayne Paulson and Cliff Montagne who have been working with the Darkhad Mongolians on various social assistance projects, with Wayne keenly interested in deer stone art. Earlier in the spring I had met Hamid Sardar at The Mountian Film Conference in Teluride, Colorado. Hamid has made films of the Tsaatan reindeer-herders and recently one of eagle hunting in the Mongolian Altai. He is also working on a library preservation project for the British Museum, microfilming archival documents and books at libraries and archives in Ulaanbaatar.

This year's field program was supported financially by the Trust for Mutual Understanding and, for the first time, by the National Geographic Society, which will include a small story on our results in the February 2007 issue. Other components were supported by the Smithsonian Institution, NMNH, and MCI.

This year's team members included: William Fitzhugh and Christie Leece from Smithsonian Natural History Museum; Marilyn Walker, ethnologist, from Canada; Gordon Wiltsie, a photographer associated with National Geographic Society; Paula DePriest, Harriet (Rae) Beaubien, Basiliki Vicky Karas, and Leslie Weber from the Smithsonian's Museum Conservation Institute; Jamsranjav Baiarsaikhan, archaeologist, and Ts. Ayush, ethnologist, from the Mongolian Museum of Natural History; T. Sanjmyatav, archaeologist from the Mongolian Academy of Sciences; botanical assistants J. Oyumaa, and Oyumbileg; student assistants Khadbaatar (Khadaa), Tsolmon (Tsoomoo), Oogii Onolbaatar (Onoloo), Mendbayar (Mendee), Songuulhuu (Songoo), and Amarai-hu; drivers Khatbaatar, Narangel, Tsog, Tserenam; our cook Amara; Adiya Namkhai, our translator and expediter; and Francis Allard and his team from Indiana University, Pennsylvania, Laura Short, Erika Maggiore from Indiana University of Indiana, Pennsylvania, Marion Sikora from University of Pittsburgh and Alyssa Caralla and Nasaa from Ulaanbaatar.

We spent two days in UB on 3-5 June acquiring supplies and getting logistics set up.

6 June (Ulaanbaatar to Camp 1)

Departed UB for the field in three vehicles: WF team in two vans; MCI scanners in one van; Paula DePriest and Bayaraa remained in UB one more day to work on archaeological permit and police report concerning Paula's stolen camera. They met up with us the next morning.

After getting organized, Paula found some time for some riding practice outside Ulaanbaatar.

7-8 June 2006 (Enroute to Khanuy Valley)

GPS # 186. Camp 1, 4148 ft asl; N 48°07.067', E 102°34.652'

GPS #187. North of Gol Mod I, 4847ft asl; N 48°22.833', E 101°49.656'

GPS #188. Gol Mod I, 4928 ft. asl; N 48°19.945', E 101°54.690'

GPS #189. Possible granite quarry on east side of mountain valley, with lots of outcropping granite blocks. 5420 ft. asl; N48° 24.742', E101° 40.690'.

GPS #190. "Turkish Burial" 4 x 4m square, 2 slabs at North end.

This is the second day after leaving Ulaanbaatar. According to Sasha (Sanjmyatav), the Ulaan Tolgoi site west of Lake Erkhel was not found by him until 1988, and no professional archaeological excavations had been done here until we began our work in 2002. The Russian archaeologist, Nazabaev, erected some deer stones, but did not excavate. Sasha has some diaries and reports of this work, but most of his reports were turned over to the Archaeological Institute. Volkov did not know of the Ulaan Tolgoi site when he wrote his book.

This morning we visited the Burdnii Ekh deer stone site and wandered around the deer stones, square burials and the large kherigsuur to the west of the deer stone site which has an added SE rectangular or square enclosure on the east side, outside the horse mounds, and it may be a later construction feature. Later in the day we visited the French excavation site, Gol Mod I, finding a huge hole where the burial mound has been excavated to the top of the burial chamber (unfinished) and to the west, a reconstructed mound ramp and wall. There are six or eight log cabins upslope from the site where site-watch people are now living. The site is a big mess of excavated sand and boulders. Gol Mod I is a smaller mound site than GM 2. Herders pointed the site out to us when we were lost, trying to find way to Khanuy, GM1 is in Khunuy Valley, east of Khanuy. There is a Turkish grave where we entered Khanuy Valley. Erdenebaatar and Jean-Luc Houle had just visited GM1 yesterday, with students. Bryan Miller of the University of Pittsburgh is traveling with Jean-Luc, getting an orientation to the area.

Camp 2, Gol Mod 2. Arrived at 10:00pm, breaking the speed record from Erdenemandel to GM2, according to Francis Allard. Purchased a sheep for 61,000 tugriks, much more expensive here than in Darkhat.

GPS #191. Urt Bulagyn inner fence satellite mound selected for excavation, 5462 ft asl; N48°05.546', E101°03. At Urt Bulagiin there are north-south paths between satellite mounds, but radial pathways extending out from the corners of the mound fence.

9 June 2006 (Khanuy Valley)

GPS # 192? Urt Bulagyn 1:21 east side inner satellite mound (1st row of satellite mounds); 5491', N48°05.547', E101°03.465'

GPS # 193? Urt Bulagyn 1:22, mound in east side outer satellite mound row ; 5489' N48°05.546', E101°03.504'

Excavated two horsehead mounds at UB-1 in 1.5 days—found horse heads in both, and a charcoal sample in 1:21. Paved path/pavement along North side of UB-1 Francis calls the "killing area." (Later in the summer we found the large kherigsuur west of the two deer stones at Nukht Am on the Ider River had a similar rectangular paved area outside the fence along the north side of the mound.) Francis showed us many examples of paired mounds along the south side of the fence that he thinks are mother and young horse burials.

Laura Short mapping the reappropriated deer stones at Burdnii Ekh.

Khanuy River Deer Stone site (KYR-119) has three sectors, each separated big open pathways. Originally the site had ca. 28 deer stones. Our MCI scanners photographed and measured all that were accessible to them. Only three deer stones remain standing in their original settings (Who can tell without excavating, since there has been so much unrecorded alterations or work at these sites?). There is UB high school "History Fourth Class" graffiti on a small basalt stone that was uprighted since our visit last year, presumably by this class. Several of the site's square burials were excavated by Volkov and Sanjmyatav in 1968 (East burial) and 1988-89, center and west burial. They also excavated several smaller square burials between large ones and the deer stone site and found sheep heads and other materials (continued below) including bronze arrowheads. In the large square burials there were many sheep and cattle heads around the sides and horse heads in the middle. No deer stones seem to have been erected in the corners as at Burdnii Ekh. However, deer stones were used as retaining walls on all four sides of the large square burials. At least 25 deer stones may have been pulled from their settings for use in the square burials. Were the deer stones just seen as handy raw material for building? or for ritual power? or both?

Where are Volkov's reports on the square burials? Sasha says the artifacts are not all in Archaeological Institute, and perhaps no publications were ever written. We finished work on the horse mounds at 10:30 pm. Had a dinner and party around the fire with Bryan Miller, Jean-Luc Houle and Erdenbaatar, who is supervising nearly 100 first year students of archaeology and history, cleaning brush off the big Gol Mod 2 burial platform. Erdene may visit Darkhad Valley for the first time this summer. Bryan Miller was surprised by our early deer stone and kherigsuur dates: "There's nothing like this kind of archaeology until the Iron Age in Southern Russia." He wants to come to Mongolia and do some geophysical prospecting for burial features. He and Jean-Luc saw many traces of sites on hills and side valleys.

10 June 2006 (Khanuy to Muren)

We had to get a permit sign-off by "ranger" official at a small sum center. All sciences, including botany, also must have a local research permit signed. In return I gave the sum chief a project monograph. Lunch was at a roadside "truck stop" with 6-7 tables and big platform bed on one side, typical for travelers on "main roads;" eat and sleep/nap at your table.

GPS #197. Khushuutiin Am Deer Stone Site, 5152' N 48°42.288', E 99°53.669'

GPS #195. Chuluut River Gorge, 5711' N 48° 14.090', E 100°25.671'

GPS #196. pass over Hanghai Mtns. 8140' N 48°24.128', E 99°59.950'

While we were driving, Sasha told a story of meeting Owen Lattimore at their summer camp where many professors from UB went for holidays and weekends: "It was the first time any of us ever shook an American hand." They had never seen Americans before due to the Soviet restrictions on Westerners traveling in Mongolia.

On the road over the Hangai Mountains, the highest elevations had tundra vegetation with scattered larch and dwarf birch. The road was a tough and little-traveled one. We encountered several families migrating to summer camp. Tsog recognized the yak carts moving a ger. Pretty impoverished families in the high valley on this route. The 'short-cut' over the mountains is only 2 years old and was originally a horse trail—we got stuck in the mud at one spot, and Tsog almost got crushed when Hatbataar backed up too fast to attach the tow wire—strong words from Tsog!

Paula lost a tooth on the mountain (Hanghai Mtns.)—word came to us from Francis via the walkie-talkie he had loaned us. A Mongolian family in a truck had passed them hunting for the tooth (a cap) on the road and passed the word to Francis. She'd been trying to give me caramels earlier, and one she pulled her cap off without her knowing what it was, and she broke it in two, then spat it out and couldn't find it (The next day a dentist in Muren put in a temporary filling in for $1.50.)

Before leaving the mountains we gathered firewood for supper, dodging rain showers which produced a fine rainbow. We found the deer stone site (Khushuutiin Am) Volkov worked at with Sasha, located about 5km southeast of Galt. Unfortunately the carvings are poorly preserved. Six stones stand in north-south alignment, with lots of satellite features for dating. At dusk Bayaraa collected a skull from the looted kherigsuur he had heard about earlier, but there was no bronze bowl, as had been reported. They also found another deer stone, fallen down (GPS #198. 4965 ft; N 48°42.694', E 99°53.920'). We camped by the river below the deer stone site.

11 June 2006 (Galt to Muren)

Overcast but warm. Up at 6:30. Kasha breakfast with sausage and bread. We had another look at the fallen deer stone Bayaraa had found; it had 3 circles, one with possible rays, but no animal carvings; and it had an irregular shape. Tserenam's home in Galt Sum Center. Bayaraa born and grew up in Jargalaat, not far to the southwest of Galt. Sanjmyatav worked at Khushuutiin Am with Volkov. When they arrived all the deer stones were lying down or half-fallen and partly buried. They dug them out to draw them and erected some, and later local people erected others. They did not do excavations except to see the carvings. It looks like they were originally placed in north-south alignment between a lateral arrangement of rock features.

GPS #200. Nukhtiin Am-1 (Ider River Deer Stone site #1) 4660' **N48°48.959'**, E 99°47.471'

GPS #201. Nukhtiin Am-2 (Ider River Bridge site #2) 4663' N48°49.057, E 99°47.626'
Stone without markings, laying flat with some stone features.

GPS #202. Nukhtin Am Site 3 (Ider Bridge site 3) 4683' N 48°49.155', E 99017647.554'
2 standing irregular-shaped deer stones made of dark granite with unusual style carving and a ring of stone features around the 2 stones, which are in N/S alignment. There is a horse on north deer stone. 50 m to the south is a square kherigsuur with a cobble pavement outside and parallel to the north fence with a slab burial at its east end. We returned to excavate this site at the end of our season.

Arrived in Muren in late afternoon and stayed in the ger camp next to the Gobi Hotel. The ger camp was only partially operational.

12 June 2006 (Muren to Soya)

Left Muren. Ground is very dry this year and small streams and bogs are nearly dry. People are just now starting to move to summer camp, two weeks later than usual. We lunched at the small restaurant at Tom's Brigade, with two small tables and a wide sleeping bench for weary travelers waiting for dinner

or overnight. Bright purple tiny gentiums in the woods at Uliin Davaa with the long row of ovos—a beautiful cool and clear day.

Arrived at Soya at 8 pm in sunset light illuminating a hillside of purple laurels on the south side of Soya hill. The tractor tracks we followed all the way from Muren came right to Soya. We think this was the gold mine venture that had been launched at Soya but that had its permit denied by local government. Also, we hear no action likely on the ger camp proposed for Soya. White and black dogs spend the evening lounging and watching us from the other side of the river.

13 June 2006 (Soya to Herma to Soya)

This was the day we made the canvas presentation to the Tsaatan at Herma west of Tsaaganuur. Two years ago 40 m of lighter grade canvas, one sack of flour, and rice, sugar, and a container of oil was given to each East and West Tsaatan family, but it was not enough to cover a tent, and some non-herder families got canvas who did not deserve it. Some complaints came from those who needed it and did not have enough to completely cover their tents.

So American Ambassador Pam Slutz had arranged with the Red Cross to and another distribution of canvas to Tsaatan, and we went to Tsaaganuur to oversee presentation and represent US/SI interests. 50m of heavy canvas to 45 families of the East and West Taiga Tsaatan: 23 rolls of canvas to West, 22 to East. The "bog" governor, deputy to Tsaaganuur mayor/governor, had visited Tsaatan families recently to confirmed Paula's account of whom should receive the aid. When we arrived in Tsaaganuur, the governor was away in UB. Red Cross reps had come from Muren in two vans full of heavy canvas: 50 m for each of the 45 East and West Tsaatan families.

The bog governor is a Darkhad, a very small but interesting man whom we had met in 2002 at Menge Bulag camp in the mountains when we asked the Tsaatan for permission to dig the Neolithic site I had found there. Many Tsaatan had already come into town for supplies and we carried some of the women and children our to the distribution site at Herma, together with the Mongolian Red Cross representatives. We had lunch at someone's ger en route. About 30 Tsaatan showed up for the distribution. Immediately there erupted a controversy over giving canvas and flour to two families that are no longer reindeer herding. The rest of the Tsaatan group objected violently to their receiving aid. Batsaya, Sanjin's wife and the "Bog" governor nearly came to blows! Their canvas had already been withdrawn from the pool. After this, the give-away was uneventful, and the Red Cross put up their banner on the side of the van to shoot a picture of each recipient receiving material.

Later in the day I made a video of Marilyn Walker interviewing Odkhuu Darjhat, Shaman, living in Tsaaganuur, and the shaman's assistant. At the canvas-flour give-away, I gave Bog Governor Davaanyam of Tsaaganuur a field report book, and Batsaya also, on behalf of the group, and they dove into them immediately, surrounded by a group looking at the pictures.

There is a deer stone site15 km southeast of Soya. We visited this site later (20 June). Police fee for 9 foreigners: 25,000. Next time we must get permission from police in UB or Muren. "You don't have permission to be here. I could throw you out, but it's OK, you're doing good things here," the Police Chief said to us.

14 June 2006 (Soya to Shishged River)

Moved camp to the Shishged River, on the south side near a ger camp to access survey areas near the mouth of the river we had visited briefly last year. En route we witnessed a cattle drive across the bridge south of Tsaaganuur and had to wait for many "reluctant" cows. We spent several hours in Tsaaganuur to hand out 22 bundles of canvas to the East Tsaatan, who I noticed had many family resemblances to

the West Tundra people. Buyantokhtokh, the "Bog Governor" who has represented East Tundra Tsaatan in government for 20 years, presided. Several of the group spoke excellent English. One, named Tsebat, gave me a home-made knife of reindeer antler in thanks from his group. In my presentation remarks I mentioned **Kisholson(?)** and the filmmaker Hamid Sardar who has worked with them in the past.

Bog governor and Red Cross representative at the canvas distribution.

Paula and Adiya when off to visit Batsaya's spring camp today. Last night, on the 13th, Francis, Marion, Alyssa, Erika, and Laura, and Alyssa's Mongolian boyfriend Nasaa arrived at Soya in late afternoon. Big crowd for dinner and volleyball in the evening.

In the afternoon I surveyed the north bank of the Shish with Francis, Marion, Laura and Christie, looking for some kherigsuurs with satellite mounds and found two suitable to excavate. Noted a pit depression at GPS #203 1592m. N 51°24.8699', E 99°17.212'. We also found more rock art on the volcanic blocks in same area as last year. It took us awhile to locate the ferryman when we wanted to cross back to camp, and he had to use a small log rowboat to cross the Shish to bring his big ferry back across for us. Meanwhile a crowd had gathered on the south side wanting to cross, and was getting impatient, but the operator was waiting for someone to approach on the north side.

15 June 2006 (Shishged – taiga – Shishged)

GPS #204. 5460 ft;N 51°23.585', E 99°16.325' At the top of the hill behind camp I found a heavily weathered horse skull in a tree at the edge of the steppe.

GPS #205 5461 ft; N 51°23.585, E 99°16.324' Found a burial deposit in woods at hilltop, about 100 meters southwest of the horse skull noted above. Clothing, boots, and prayer sashes draped over a fallen tree, and hanging from a tree a meter to the south was a bag with turquoise-colored and clear plastic beads. "Is this a burial?" was my first impression. Then to the southwest, I found vodka bottles, an open, empty suitcase, and about 50 small white and blue sashes tied to nearby trees. 100m to the north, a female skull wearing a braided cap was resting on the surface of the ground, with yellow and blue prayer sashes tied to the nearby trees south and north, respectively. The skull faced east. A tube of lipstick was next to the hat, a porcelain bowl and a plastic bottle of cooking oil was also next to skull, and a juniper bundle was tied with white sash to a tree 5m south of the skull. At GPS # 206. 5461 ft; N 51°23.564', E 99°16.195, about 135°/ 30 m from #205 was more clothing, a sweater; and 20m to the southwest, a shawl. The burial area is in a grove of large larches 100m in from the pasture. Marion and I made a map of this site on the 17th.

Down in the narrow valley below the burial area we found several mounds and rock features:

6" diameter aligned boulders, beginning with a cairn at south end) down middle of valley floor oriented to 015°;

GPS #207. A looted rock mound in the middle of valley, 1m deep hole at (nothing seen), looted within the past year; 5231 ft; N 51°23.731, E 99°16.733;

2 – 1.2 m high cairns on north side of valley below rock eminence; reasonably old-looking; also a 3-rock high inukshuk-like small "mini-cairn" 15m NE of the northern cairn;

GPS #208. A looted 8m diameter stone mound west side no fence but there is a satellite mound and a 4th (triangular) cairn at the entrance to the valley on a slight rise. Not aligned with the rock line down center of valley. 5207 ft; N 51°23.828', E 99°16.919';

GPS #209. A 6m diameter stone pavement/mound. Not looted. No external fence or satellite mounds. 5192' N 51°23.896', E 99° 17.036';

GPS #210. A 6m diameter mound with external features and small (recent?) cairn on S, SW side. Badly burrowed by marmots or squirrels. 5188' N 51°23.957', E 99°17.113'.

The trip to visit the Tsaatan camp was enjoyable and quick. We met the horses at Herma and Bayandalai had a big, responsive, white horse for me, making the 50 minute ride easy and almost fun. They were camped in the same place as two years ago, on a spur of forest extending into the marshy meadow, in four camps. Batsaya and his family were all there.

A short visit to the Tsaatan camp.

There was no special news—a cold winter with bouts of snow and dry spells that made a crust and a difficult feeding so they had to move to softer snow areas. No major wolf problems because they moved to soft snow where wolves couldn't follow. Bilgun seems fine now and showed no hip problem—has a pretty smile. We had a few gifts for them—toys and hair ornaments for the girls. Bayandalai still has the knife I gave him last year, and when I showed my wallet picture of my granddaughter he thanked me and stashed it in his deel! I didn't have the heart to ask for it back. Some of the families were in desperate need for canvas and had tents made of a patchwork of plastic and tarps, and they were already sewing the strips of canvas together. Lots of newborn reindeer present so that side of life is fine. They will move to summer camp in 3-4 days. The larch were just needling and their camp was still brown.

We left after a couple of hours, just after seeing Marilyn, Amra, and Ayush off to Gost's camp for shaman interviews for a few days. Gost is now the senior shaman, with Suyan's passing on March 29. She has already been buried beneath her favorite tree, and her equipment also, in a different spot. The museum tried to acquire her stuff, but she had refused. At Herma we paid for the guides and horses, Christie had fun on her first ride and discovered the normal complaints. Allard's group also came on the trip and learned how people deal with reindeer after learning so much about treatment & practices dealing with horses in their ethnographic interviews in Khanuy, and now in Darkhad.

Bayaraa and the rest of the Mongolian crew stayed behind, but had no success with the digging a satellite mound, which had no horse head. But he had more luck with deer stones, found two sites north of the Shish—one with several stones (fallen) and one nearer the river with stones up but probably moved from somewhere else and erected for tourists. We'll see about excavating tomorrow. Some stones are very small, but are well-marked, having circles, necklaces and belts only shown.

16 June 2006 (Shishged)

GPS #211. Turkic stone slab rough "greenstone" but no aligned E-W stones.

5103 ft; N 51°25.203', E 99°21.370'

GPS #212. Four kherigsuurs, two with round fences, two looted; one large circular structure 10m diameter with an empty center—no mound, with 2 small rock features in center, and an external slab pavement to the east. The southern kherigsuur had 9/10 external satellite mounds (smaller mounds), round fence apron, pavement on the east side of the mound. 5088 ft; N 51°25.306', E 99°21.875

GPS # 213. Single deer stone (re-positioned) with belt, dagger, knife, sun, and mirror. No obvious horse mounds. Lots of horse heads were present because the stone had been re-used as an ovo. This location is called "Tsagaan Us," meaning 'white water pass.'
5461ft; N 51°27.402', E 99°22.107'

GPS #214. Avtiin hunting site, a 'baby deer stone' site with 2 miniature stones and one large deer stone and a granite fragment; small and large deer stones have diagonal slash marks on the sides, tools, and sun circle. Later we dug three features here which turned out to be satellite feasting hearths, with bone and charcoal in F3. 5412 ft; N 51°28.010', E 99°21.910'

GPS #215. West Ridge Rock Art site. This is a dramatic craggy ridge with many kherigsuurs on the SW side and near the top of the crags. Several art panels are seen on the southernmost outcrops. 5805 ft; N 51°27.225', E 99°28.865'

GPS #216. East Ridge art panel with deer stone deer and many other animals. This is an amazing rock art carving on a 4m x 1m southwest-facing rock slab with scores of animals and engravings, and on upper right (south) end, a large carving of the deer stone deer 8-10 times the size of the other carvings. (We need to get Gordon Wiltsie to see this!)
5865 ft; N 51°26.613', E 99°24.299'

Bayaraa found the site as we scurried over the southernmost peak overlooking the lake. We had heard about a stone with some inscriptions on it from a local herder (Ranger Daavaajav) who visited us while we were digging the Avtiin deer stone site, who was a local ranger for the area. Earlier he had stopped local people who were excavating the deer stone site at Avtiin in 2001 (or 1990's?). We excavated 3 features there and F2 produced no horse head but did give up a charcoal sample. F3, which I dug with Christie and Sasha provided a charcoal sample and some calcined bone fragments. We also found a small deer stone (GPS #213) that had been moved to a new position near its old one, according to the ranger and turned into an ovo festooned with many horse heads and silk sashes. We also found a Turkic slab (#211) and a set of kherigsuurs, 2 with round rings, both looted/opened, in 1919 perhaps by Buddhist monks, according to the warden, who had been told this by his mother. There was also an oval stone enclosure with 2 internal rock features and 2 rock mounds without fences.

Rain in the evening. Tents were wet and are being moved. Allard's crew was in camp when we arrived and had been trying to keep the tents up. The big tent had partly blown in. Much was soaked, but it had cleared a bit, and we had a great meal of mutton stew and a mess of baked whitefish caught by our neighbors living down by the river. Two flimsy tents were erected inside the cook tent for super security while others (Bayaraa and Christie) moved in under the lee of cook tent. Mine withstood the wind and rain pretty well.

17 June 2006 (Shishged)

Paula's horse trek got off to a slow start on the 15th because they needed to find one more horse for packing, and when they left our camp area it must have been early afternoon. Since then it has been cloudy, windy, and raining—not the best conditions for riding. But as Adiya said, "Paula is better prepared than ever with her purchase of heavy green cape rain gear she found in the market for everyone.

I asked her where she was going. "Wherever they take me," she said.

Suyan has been buried back in that country. Allard's ethnographic team of Elyssa and Laura have been doing interviews among the gers here about horse practices. They have found similar practices here as in Khanuy, but with some new twists, like burying horses toward the east on high hills (not new) if they are local horses, but if they have come from far away they orient them to their original birthplace. They also had people express displeasure at people digging kherigsuurs, which can release evil spirits and make trouble and bad luck. But we've found lots of kherigsuurs that have been opened recently by local people, and some dug as early as 1919!

We've had two lambs so far, and a mess of whitefish last night that Nasaa and Adiya spiced up and cooked in tin foil over coals in the stove—excellent! We had a scary time on the ferry last night with the rain-slicked wood ramps. Tserenam's van almost slid sideways getting off the ramp. The ferryman has a tough job—always on the go, rain, wind, or shine, and in our case we have a paper from the sum government giving us a free pass—so no salary there. The ferry is a pretty rickety affair—you're on a thin edge always.

One of the more treacherous ferry rides of the field season.

The weather was too awful for working so we drove off in a caravan to Rinchinlhumbe to get our permit signed by the local authorities. On the way back we surveyed.

GPS #217. A hill west of Rinchin with a 4-post 15' high scafford on the summit, with 3 horse skulls on the platform. Two more horse skulls were on the rocky summit at thye west end of the hilltop. 5320 ft; N 51°10.162', E 99°33.321'

There are many kherigsuurs around the base of the hill's south side, which rises from the lake bed/plain, and kherigsuur mounds extend up to summit on the south side of the hill. The east side is a ridge and is not an option. Pouring rain, some snow/rain windy and miserable!

At the east end of the hill Francis found a square kherigsuur with no obvious satellite mounds on the plain. 5 km to the south is a very large kherigsuur with a round fence and 20-30 satellite horse mounds around from the north to the south sides and 3-4 on the west side. A deer stone was lying on the ground 135° from the center of central mound and had been recently turned over in the past few weeks (maybe by Wayne Paulsen?). It has a thin belt line and a grooved arch at the top on one side—nothing on the other sides. There were no obvious ovals and it looked like the mound that once existed had been mined for rock, leaving the ground level with only the angular small rock of the original ground uncovered, none of which had yet been filled in with blowing silt/soil, although the old silted ring at the edge of the mound was mounded up with silted rock as occurs at the edge of kherigsuurs.

We got back to camp for dinner at 6:00. I installed a wire mesh stove pipe vent through the cook tent roof so we could use the iron stove to cook and dry clothes inside. After supper Marion and Francis and I went up and mapped the shaman's burial. Snow has fallen in the hills all around down as far as 500 m elevation above our camp. White mountains all around!

18 June 2006

GPS #219. Horse mound SE side of looted Kher. Same site as #212

5172 ft; N 51°25.278', E 99° 21.874'

GPS #220. "Hort Uzuur" Site, translates as "Poison Corner" in Tavh Hills. A single standing stone with a design at top—no other marks. 122 x 25 cm angled top deer stone lying on surface with circle groove at top and a belt groove on one side with a circle only; 2 other deer stones, granite and partially buried, are 1 m away. This site was known to our driver Tsog, who discovered it first while traveling here with some Japanese tourists. 5181 ft; N 51°25.850', E 99°35.550'. Mapping data: L1 to L2 is 17m ; L1 to L3 is 42m ; and L1 to L4 is 74m (these are all in 'paces', not measured out with a tape. We used a tape for the map done later on by Adiya.

GPS #223. Hort Azuur's northernmost deer stone, of rough granite, 1.17m long. A belt is present but no other features were seen—possibly too eroded as the stone is coarse granite. 5166 ft; N51°25.403', E 99°35.547'

GPS #220 is Hort Uzuur Locus 1, the southernmost. GPS #221 is Hort Uzuur L2, the 2nd deer stone. GPS #223 is Hort Uzuur L4, the northernmost deer stone. This locus has 2 or 3 possible deer stones 1.5 m south of the line, lying partly buried. The alignment of the deer stones is a cool 180°! The sacred hill Ongon Tolgoi (Shaman Hill) is 187°.

GPS #224. A single granite standing stone at the pass northwest of Hort Azuur, made of rough granite, with no visible marks except some orange paint remnant on its east side. This stone has been made into an ovo with a wood cross, on which hung horse and sheep skulls. 5434 ft; N 51°27.660', E 99° 35.789'

GPS #225 A large looted kherigsuur with horse bones embedded in rocks and probably buried within the mound. I sampled the horse teeth for dating, as they seemed old and not recent additions to the mound. 5192 ft; N 51°21.236', E 99°29.532'

GPS #226. I found a rock art site above a looted kherigsuur with a deer stone deer engraving, a regular deer, and a swastika. There were also other images on the south-facing ledges above the kherigsuur. The deer image is 33 cm long. 5237 ft; N 51°29.282', E 99°29.535'

GPS #227. Standing stones and deer stone-like slabs at Elst Khoshan ("sand corner"), but no markings were found on the stones. There are several kherigsuurs on the terrace below, near a small lake. 5136 ft; N 51°29.587', E 99°27.186'

GPS #228. Zeerdegchingiin Khoshuu (meaning 'mountain corner'). Francis called this site DK-1-2, North Tsaaganuur, a large looted kherigsuur site previously mapped by Laura Short. Christie and I excavated a kherigsuur ring feature west of the western kherigsuur mound. 5139 ft; N 51°25.227, E 99°21.839' Bayaraa excavated a horse mound to the southeast of the mound that contained a horse head that oriented 111° and had 6 cervical, 1 thorasic, and an atlas, and 2 hooves.

19 June 2006 (Shishged Surveys and Excavations)

Bayaraa took Sasha and a couple of the students to the rock art mountain site to draw the animals and spirit deer on a large sheet of plastic and see if any excavation could be done at its base. (It was too rocky.) Meanwhile, enroute to Hort Azuur, we surveyed the sand dunes and blowouts south of the big lake extension, crossing a small bridge whose foundations were made from boulders taken from one of the nearby kherigsuurs. The only thing found was some ceramic sherds from a single broken pot with smooth brown exterior bulb decoration. These materials were eroding from beneath dune face west of larch tree about 30m away. 230 sherds were collected GPS #229. 5088 ft; N 51°25.369', E 99°25.602. Tsomoo found a whetstone up near the hills to the south, but there was not much else to see.

Our van then went to Hort Azuur—the mini deer stone site—to excavate deer stones and features. Tsomoo and Adiya made a site map of the site, and we dug out Deer Stone 6, finding it to have a hatchet/axe, necklace, circle, and slash marks. We also got a charcoal sample from beneath the stone. The excavations of a rock pavement feature a few meters to the west produced nothing.

Bayaraa arrived with his rock art mural—impresssive! He dug out the big deer stone in Locus 2 and found it to have a spotted tiger—very unusual—and when we slanted the rock to highlight the art we discovered two spirit deer on the same face, below it. The chalking session with all hands participating was an interesting effort—sometimes verging on over—interpretation, spurred on by Sasha, but he has indeed seen and studied lots of deer stone engravings. We erected the stone before we left.

Trying to cross the river to get back to camp we found the ferry stuck on the south side with a mini-truck whose front wheels had fallen through the gap between the ramp and the ferry. It took an hour to get it up on the ferry with the assistance of the accumulating number of riders. Evening was calm and warm.

20 June 2006 (Shishged to Tom's Brigade)

Today marked the end of our Shisheg episode. A policeman appeared last night after supper to check on a complaint made by the herder who came to the kherigsuur (Zeerdigchingiin) where we were digging a horse burial on the 18th. The herder spent an hour screaming at Bayaraa after a very formal greeting, offering him snuff and "banos," and laying out his gorgeous tobacco pouch, pipe, with silver ornaments. I asked to take this picture and he resolutely refused. Pride matters while complaining. Then he rode off in a fit towards the ferry, to Tsaaganuur. We met him again returning home on the ferry that morning, and we discovered the object of his trip last night when the policeman appeared in camp asking for our papers, saying there had been a local complaint about people digging kherigsuurs "all over the place." Bayaraa quickly informed him of what we had and had not done, noting all the kherigsuurs that have been excavated by local folks over the years, even using their stones to build bridge foundations in recent years. When we checked out with the Tsaaganuur Police today, we gave them some camping equipment, which they need for making their rounds in the country.

GPS #230. We had lunch at the Zuun Shuregbei deer stone site. Only one stone is found here, and it had been excavated sometime shortly before Bruno and Bayaraa found it 3 years ago. The stone was lying beside a looter's pit that it had been removed from sometime in the past couple years. It is very ornate and has 4 deer on the front side, a top circle with triangular pendants, and a very high belt. (This sometimes occurs in steady row of dots making it seem like a necklace.) The other side has a circle and a moon without pendants. Charcoal that was all around and in the pit turned out to be recent. Some stone features present, but none looked like a good bet for horse heads. The stone looks more like the southeren fancy deer stones than the Darkhat ones we've seen. Next year we may try for a charcoal sample from one of the features. 5175 ft; N 50°59.614', E 99°22.439'

The ride to Toms Brigade—our evening camp – was uneventful, with a brief stop in Ulaan Uul. Thunderstorms missed us, and we set up across the river from the small restaurant, where we had supper cooked up to give Amra a break. The boys found a basketball net and had a game. Bayaraa had to sit it out with a banged-up knee from an earlier soccer game. I climbed up the hill to the northeast of our camp and found a horse head in a tree at the top of the hill (GPS #231. 6675 ft. N 50°23.378', E 99°19.994'). The next hill to the northeast, much higher, has a hole perforated through the summit.

21 June 2006 (Tom's Brigade to Ulaan Tolgoi)

Summer Solstice Day! We traveled from Tom's Brigade to Erkhel camp today. Left Tom's Brigade camp about 9:45 and had an uneventful trip to our old campsite at Erkhel/Ulaan Tolgoi. Great cool weather. Tractor tracks paralleled our trip all the way. The gold-mining company had a tractor, a truck and several

other vehicles drive from US to Soya, only to discover the local governor turned down their mining permit and they had to return. Capitalism learning some political lessons here, but with a surprising ending, as usually the capitalists win. We found Erkhel valley quite green and lush with grass.

We started working at Deer Stone #5, Features 2 and 3 in cool, threatening weather, but it never rained. F3 which I began on the outer fringe of DS 5 features quickly produced a leg joint fragment, and by day's end the top of a horse skull. F2 took longer to map, so no news there yet. Bruno is supposed to arrive in Muren today. No sign yet of Rae and the scanners; and Ayush, Marilyn, and Amaraa are out of the taiga now, roaming the Darkhat for shamans. Paula has another 3-4 days before finishing her botanical trek. Camp got set quickly at our old site and the big tent is set just right, but two of the crew who have a flimsy sleeping tent have set it up inside again, as in Shishged, to avoid having it blow down. Great for them, but we have little living space now. A storm came on from the northwest after dinner, with hail. The drivers dug their vans in to avoid lightning damage by digging holes up to their rims for their back tires. As it turned out we had a squall with rain and hailstones, but no lightning and it was over by 8 pm, leaving a long evening into the summer solstice night and not much excitement for a couple of Americans.

Christie was dozing when I stopped by to wish her well at 10, and I was in for the longest sleep I've had in months, if not a year. The boys, however, were telling stories until 12. We had a long talk with Sasha in the van yesterday while traveling about archaeology—relationship between deer stones and square burials, distribution of deer stone rock art; two types of deer stones, and of square burials recognized by Novgorodova (i.e. simple and complex deer stones, sq. burials, with or without horses). The absence of Altai deer stones in central Mongolia and relatively the same for square burials in the Altai suggests replacement/cultural change in central Mongolia just before deer stone complex was reaching Altai. This is even more reason to date and study deer stones in Altai, and to date square burials—maybe from bones in Institute of Archaeology. Sasha says there are a few horses in Central Mongolia deer stones, but this should be verified.

22 June 2006 (Erkhel)

Damp, cloudy, cool, morning. We've had to shift to dung fires now—no wood for easy collecting. Amra made some great onion fritters for lunch; sweet, crunchy pastries with onions, deep-fried; also mutton on the bone, and mutton and rice soup. We opened up the Feature 3 horse head and found it very poorly preserved with even a tiny baby mouse skull in a cavity of the horse skull. In Feature 2 Bayaraa had to expand his excavation area when they located the horse head. They also had a charcoal sample from the horse feature, and it's deep and directly associated.

Christie and I climbed Ulaan Tolgoi after dinner. We could clearly see the Ulaan Tolgoi site and found two huge fortress-like 1m-high walled square kherigsuurs with modern horse head donations and, southeast of the summit cairn, a human burial exposed with 2 horse skulls nearby.We left everything in situ. (GPS #232. 6031 ft; N 49°56.119', E 99°47.183')

Francis' team arrived while Christie and I were up on the hill and were eating Amra's spaghetti and telling tales of their visit to Rinchin, where they'd heard an 83 yr. old shaman had just died and been buried. Battogtokh-Jamba is the family name of the shaman who died as reported by Francis and Nasaa. I hope this is not the shaman Gordon Wiltsie was going to photograph when he arrives. I called him to let him know but he may have left already for UB. Francis could not get to the shaman hill as the water was too high, but he heard there are no archaeological monuments there—it's used only as a place of ritual. Nasaa's eye is still sore and could not be treated effectively in Rinchin, so they will go to Muren tomorrow for care. Tsog went to Muren in evening to doctor's care as he's had some angina pain; he had had a heart attack a few years ago. He'll get some groceries. The closest ger camp's generator is

inoperative, and we can't get showers or clothes washed until they fix it. They are just getting organized now and have had no visitors but us.

Our young friend at a nadaam festival.

23 June 2006 (Erkhel)

Raining in a.m. Francis and the ladies went to Muren for showers, Nasaa's eye-care and supplies. We opened three new features north of Deer Stone 5—one ring, one square-shaped feature, and one horse mound a few meters from F3 – to see what sort of horse it contained. A 15 yr. old blue-eyed herder boy from the herders camp near the well we've been using visited at the site today. How does a Mongol get blue eyes—a recessive trait in this sea of dark-eyed people? Adiya said many people in the Selinge area have blue eyes, probably due to Russian incursions in the past, maybe Cossacks?

We got washed out by rain by lunchtime, and the weather does not look much better for the afternoon. In the afternoon Bayaraa's ring feature (F6) started producing ceramic fragments and a hammer-stone, plus the usual calcined food remains. Feature 5, the large ring, had large amounts of calcined bone, and Christie and I in F4 located the horse head quite deeply buried for a horse burial. Just before we quit a van roared up and Bruno hopped out, followed by Tugsa, Thomas Frohlich, Evanand Erika—his student assistants from Washington. They have large camp with 13 people west of Ushkiin Uver and are using a ger he rented in Muren. They're preparing today three small kherigsuurs.

When he arrived in UB, Bruno had a good conversation with Tsevendorj, who insisted on giving Bruno a permit from the Institute as well as the one we arranged through the museum. Bruno had lots of stories about his trip to India and then on to Mongolia—ticket problems, barfing up polluted Chinese hotdogs on the Air China counter etc. We also heard from our driver, Tsog, and from Francis about Rae Beaubien and Vicky Karas' scanning work at Ushkiin Uver—they have a mini-ger to shield deer stones from the sun—working at night until 5 am, freezing. Tsog returned with beef and ice cream and other goodies. Francis' group also returned with small blue plastic stools, showers, and firewood—a big improvement over the scabs of sheep dung we scooped out of the nearby winter camp lamb-house.

Bruno has quite a crowd at his camp now, with Evan, Erika, Thomas, William (our museum's IT staff), Tugso, Erdene, driver, cook, and a couple of students. Sounds like he'll stay in his river camp west of Ushkiin Uver for the duration, as his rented ger is too heavy to move without a truck, and he has plenty of mounds to survey and dig close to camp.

The oval feature Bayaraa is digging may turn out to be one of the big surprises of the season if it starts producing domestic remains; perhaps people's concentration on the remains inside the ovals—generally nothing much but calcined bones—and resulting lack of interest in fuller excavation—has resulted in neglect of one of the most interesting evidence from deerstone and kherigsuur ceremonial sites—and therefore, of Bronze Age sites in general, since their living sites are basically invisible. The campfire last night brought everyone together with its crackling wood fire and a couple rounds of vodka Christie produced. Plus Amra's never-ending array of wok foods—in this case a beet noodle soup, followed by fresh yogurt from the nearby herder camp near where we buy our water. All this after a full meal a couple hours earlier. Some singing of the Mongolian "mother song," followed by the usually 'non-existent' American vocal contribution. Francis played host, as is his custom. He had lost Alyssa and Nasaa to the UB bus run, as Nasaa's infected eye could not be treated in Muren and he had to rush to a UB specialist. One treatment he received in Darkhat after removal of some foreign object was by a Rinchin man who

spit charcoal in his eye; in Muren this was upgraded to two injections into his eyeball. What next in UB? Erica had made up a eye-patch with a magic marker "eye" resemblance with long eyelashes—he's quite a sight! But this means a loss of Francis' "ethno-team" for gathering data on horse practices and Marion's study on horse origins needed for Mike Rosenmeier's trace element chemical study of those horse teeth. Nasaa and Erica were the principals for this work, which has to be conducted in Mongolian. So I suggested Adiya help out for the next couple of days.

24 June 2006 (Erkhel)

Sunny morning for a change. We've been trading our excess onions and bread with herders for water and yogurt! Pretty slow day due to the heat and general need of the crew for some showers and R+R. At least I felt pretty lazy, but fortunately Christie and I were busy getting our horse head extracted. This was quite difficult because it was very small and poorly preserved, except for the teeth.

25 June 2006 (Erkhel)

This morning we accompanied Francis and Adiya on this interviews with herders about horses and with a ger family at GPS #233, 6355 ft; N 49°58.842,' E 99°36.463,' in the hills north of the Erkhel ravine. Here there is permafrost down at 15 meters so wells can't be used in winter. Animals get water by eating snow. According to this family, horse heads are taken to the mountain and placed facing the rising sun. This herder has received prizes in the Soviet period for productivity and recently won a raffle for a new jeep! "What do you suppose your grandchildren will grow up to be? Herders?" I asked. "I have no idea," he said. "Perhaps if they get good marks in school they'll be professionals."

It's amazing that you can just drive up to a ger unannounced and ask for an interview and be received with such openness. We had brought along an old man from the family who controls the well where we buy our water, and he was a good interlocutor. He also showed Marion many of the plants that horses eat and avoid. On the way over we encountered a yak who had dropped her calf in the middle of the road and was licking it and blocking us with no intention of moving. Mother moved to defend it when we drove up close to urge it to move, but no luck. So we had to make a detour. We then raced (up to 100km/h) to the airport to meet Gordon Wiltsie's plane from UB, Tsog driving masterfully. We found him waiting in the rental van we'd arranged. The airport was otherwise empty. He had just met an acquaintance on the helicopter we'd seen flying toward Hovsgol—on a flight with Diane Feinstein's husband. We stopped in Muren and then found Bruno at his kherigsuur dig west of Ushkiin Uver. It is a massive construction with much underground foundation and a rubble-filled "plaza." He and his team were working like Howard Carter's boys (and girls) with control pits and pickaxes and moved huge amounts of earth and rocks in just three days. Then we went on to the Vicky-Rae-Leslie scanning operation at Ushkiin Uver, which with their mini-ger was doing very well. They had seen some strange atmospherics at 2 am the night before, swirling lights and an "eye" in the center with bright light and a searching beam. Turns out that Tserenam was working on his car and saw the same thing! Strange. The Mongolians who saw it described it as a figure "9" shape. Shades of Roswell.

Rae has made good work of the Ushiin Uver deer stones and only has the tops to do now. The area has been fenced off and it looks like a concrete block visitor's center is being constructed nearby, with the result that the site is losing its charm as it becomes a more established tourist location. While we were there an English couple asked where they could make a donation to the site. Oyumbileg wrote the descriptions of the deer stones "posted" with each stone lying on the ground next to their bases. I got a copy of the Japanese field reports from this site for the past 4 years in the mail just before I left DC; they had no C-14 dates reported but had excavated two kherigsuurs and found one with human remains and one without, and also excavated some horse mounds.

By the time we got back to camp there was a huge convocation, as Paula, Marilyn, and Ayush had arrived and there were scores of stories to tell. Paula got stuck in the snowstorm—mostly rain where they were, and went up the Tengis valley clear to the Russian border, visiting Sanjim's old camping/hunting areas and then returning toward the east, meeting the East Tundra Tsaatan, who were raving about our canvas donation and planning to use it in a tourist center they are building. Saw wolf tracks as well a bear and a roe deer. Passed the Boojam camp (Kent's) at the confluence of the Tengis and Shishged, but it was unoccupied. You can drive with a jeep there and almost to the border. The country there is "very geological" according to Paula, unlike the more open vegetated valleys of the West Taiga, but there is lots of available unused reindeer pasture. While she was tramping north, Ayush, Marilyn, and Amara-hu were in the spring West Taiga Tsaatan camp gathering shaman information. They got much cooperation from crusty old Ghost who seemed mostly was interested in the $150 fee and complaining about people's use of the term "Tsataan" as opposed to Dakha—"we're Tuvans," he kept saying.

They then toured around the northern Darkhat questioning about attitudes towards shamanism with good success. Marilyn wants to find money to have a replica shaman's costume made by the costume-makers who team up to do this for shamans—not being ritually blessed, this might be possible. There's no other ethical way to get a shaman's outfit now. Recent ones put out in the country generally disappear, although we had a hand in saving one of those—though not a modern case. Too bad Bruno's crew was not present to make the evening a total round-up! But the crowd of five vans broke all records for our work at Erkhel. The other highlight of the day was the 'bath quest,' which was going to be in the river where I could easily wash clothes as well. When we saw the filth in the river due to high water and all the rain recently, this was not an option, and we had to go into town to the public bath. This time there was no waiting line, but the tough lady manager made sure to tell me "no clothes washing" when I asked about a basin, carrying my large sack of dirty clothes—"only small items," she said. Well, I managed in spite of her with the aid of my rubber bag 'laundromat' and snuck out overheated and steamed up from the lack of ventilation in the tight, small stall.

26 June 2006 (Erkhel)

Khadaa (dressed for victory) and Bayaraa.

Gordon and his son Nick got settled into camp and came out to shoot at the site in the morning, after Paula and Marilyn's groups pulled out for Muren. After a day for organizing they went to UB with lots of goodbyes. Amara-hu, Marilyn's translator, may be going to the US to teach Mongolian to some military SWAT team in Ogden, Utah in August. Francis went off with Adiya to survey mounds around Lake Erkhel, and the rest of us went to the dig. Found some pottery in our old 2002 circle hearth. Gordon shot us and Bayaraa's horse head close-up. Had a couple old visitors stop while looking for their lost horses and camel.

Just before lunch Bayaraa mentioned that some of the boys wanted to wrestle in a local Naadam taking place near an ovo halfway between here and Muren, so we piled into the vans and picked up our herding friends who tend the well and scoured the hills looking for the festivities, at first without success. But evetually we found people converging on a high plain below the highest mountain in the area, and soon found the location. There were two separate horse races, gelding and mares, and stallions (all with uncut manes, in the

Khadaa's defeat of Onoloo took him to the final round at a local nadadam.

Mongolian tradition), and wrestling. The races were more of the typical wait, wait, wait and then "they're coming," and *whoosh!* there they are through the finish gate with whooping and fathers riding out there to rescue young riders so tired they are nearly falling off their horses. And then come the rider-less horses whose riders have already fallen off! I video-taped a bit of it; Gordon Wiltsie and Nick were having a still-shooting field day with all the interesting folks and horses, the formal 'snuff exchange' greeting between the men and the prideful inquiries about the young contestants. The wrestling began after the races were over and went in a series of rounds—sometimes with grossly mismatched pairs—heavy against light, fat against lean. Four of our boys competed. Mendee and Tsomoo in their digging clothes, and Onoloo and Khatbaatar, who had brought proper wrestling outfits with fine decorated boots. We were definitely interlopers in the local scene and you are supposed to have local ties to compete, so Bayaraa made up the story that Khadaa was his brother and they were from Darkhat. Mendee and Tsomoo went down in the first round, but Onoloo and Khadaa defeated their rivals with Onoloo going on to the third round and Khadaa defeating all the local champs, finally taking the crown in a long standoff match that ended with him nearly being thrown by a much heavier man, but twisting him under him as he went down. In the round before the guy he defeated tried to start a fist-fight with him. The prize for Khadaa was a young colt—worth $100—and two rivals got goats, live of course! Khadaa entrusted it to our ger family and named it "Deer Stone." He has yet to decide what to do with it. I suggested we start a traveling circus—with animals and wrestlers, and tour Mongolia raising funds for archaeological work.

During the evening, Francis made a game of challenging Khadaa to a wrestling match, with Marion as the prize. Two bouts quickly ended after Francis led with a bullish, aggressive style of wrestling, but when Khadaa saw he was serious, he took Francis down with a heavy thump, and Khadaa enjoyed a long embrace with Marion. I've got to admire Francis for even making the attempt to fight a sum champ! Gordon screened his day's pictures later—all very wonderful. He had a marvelous day of shooting and got hundreds of great shots. About 11pm Vicky, Rae, and Leslie showed up, moving their camp here to scan our deer stones—done last year but incompletely and not in color. Rain moved in soon and fell all night. During the Nadaam I ran out of videotape and had no spare, so I missed filming the races and wrestling and the interesting chanting that accompanies the presentation of the winner—both of the horse races and the wrestling. There is a tradition of pouring irag on the head and mane of the winning horses and giving a drink of it to the riders—some horses did not cooperate with the anointment, and the young kids had a few sour faces as well.

27 June 2006 (Erkhel/Hovsgol)

Rainy day again. We decided to make a trip to Hovsgol to make some use of the day, hoping to find the sites that the former Peace Corps volunteer Brian Long had told me about last year. We caravanned up in three vehicles. Brian Long turned out not to be in Hovsgol this summer—a surprise since he had told me he would be (later we learned he showed up later in the summer).

Clyde Goulden, the Philadelphia Academy of Natural Sciences biologist who has been promoting conservation biology studies of Lake Hovsgol for the past ten years, was also not in Hovsgol this summer, at least so far. We met Gordon's friend Chimbat, who is opening a lodge call Hovsgol Inn on the river bank in Hovsgol. He spends half the year there and the rest in Minnesota. Khadaa, Tsomoo, and Erica stayed in Hovsgol visiting Tsomoo's family (he was born there). The rest of us drove over the mountain pass and up the west coast of Lake Hovsgol to the area where Brian Long's site was supposed to be. This

year he gave me its coordinates; but even so, we were unable to find any trace. This is the area I visited in 2002, but found nothing except spurious 'Paleolithic' tools. A big thunderstorm was raging across the southeast end of the lake, and it missed us, but sent ominous peals of thunder rolling across the lake.

Meanwhile, we were able to locate the Tsaatan shaman who lives with her family and reindeer here on the shore. Gordon needed a shaman shot for a book and paid for an interview and photo of her in costume, which she agreed to willingly for $100. A pretty-much staged shot against the thunderclouds over Hovsgol, but interesting nevertheless. Much more interesting was his interview with her in her tent with all of us crowded around, and her family and kids. I got some video of the scene. She was an interesting character whom I first heard about when I was here four years ago. She is a West Tundra Tsaatan; makes her living giving treatments to about 250 people (20-30 families) each year. She is criticized by Tsaatan for being a commercial shaman catering to tourists and the likes of us, but is definitely a part of the diverse group of shamans finding various ways to make a living today, some out of their traditional communities. At her place several others were selling crafts, and our group made many purchases. We had some ttrouble finding her as she was down the road seeing an American doctor who was staying at a tourist camp nearby—a bit ironic to say the least, but quite understandable!

Vicky Karas precariously perched on the van with the scanner.

We returned to camp at 10 pm, and I discovered only then that Vicky's team was planning to leave for UB/Muren at 5 am, without having scanned any of the Ulaan Tolgoi deer stones. Last year's scan with an older scanning device had left many gaps in the scan of our biggest and most impressive stone (DS-2). I prevailed on them to spend one more day, and at 12 we went to the site and scanned very successfully until 6:30am, when the dawn light washed us out. We woke Gordon at 2 am and got him to make some great night shots of the scanning process, with the deer stone lit up and Vicky, Rae, and Leslie working on the van roof with the red-eyed scanner, and at the computer. Beautiful dawn with strange blue, sky and flying geese leaving Erkhel for daily haunts. We had great help from Adiya and the drivers, who had to position the van among the rocks next to the deer stone when we scanned each of the four sides. In all, we made over two hundred scans just to cover the upper half of the stone. The scan team did a great job manning the laser apparatus from the top of the luggage rack, covered with layers of canvas for padding. Every once in awhile Gordon would cry out with excitement as he got another shot he liked. By the time we got back to camp, Amara was up making breakfast. An eventful and productive night! Gordon got some great shots.

28 June 2006 (Erkhel)

I slept until 10am and when I got up I found the camp still full of people, with only the Mongolian archaeologists out in the field. I got my still shots downloaded onto my computer with Gordon's device and showed him the deer rock art on the Shishged. He may decide to go there for a good shot. While having breakfast, Bruno's driver arrived with a message that he had found a well-preserved skeleton beneath his mound and was asking Gordon to come to take a picture. We stopped by the site en route and found some new squares opened in Bayaraa's pottery area. Later in the day, Christie found pottery and a stone scraper in our rock circle. Everyone wanted to visit Bruno's mound, so we left in 3 vans and arrived to find them entertaining a bunch of Sum police complaining that Bruno had not checked with them before starting to dig. Then we visited the site and his two other smaller mounds up in the hills, and Gordon got some shots. The "buried" guy was missing most of his teeth and seems to be in his 20's. We'll see later after complete excavation what his complete story is. Took a swim in the swollen brown and very swift river, which had risen to swamp several of their tents overnight! Lots of rain in the past couple days, leaving the steppe as lush and green as I've ever seen it. We returned to photograph Deer Stone 5

against a dramatic sky and see the scanners finish number 2. I turned in before the bonfire event that marked tomorrow's departure of both Rae's and Francis' groups. Earlier in the day Narangel noted a white spot in the grass driving home to camp, and it turned out to be a new-born baby sheep abandoned by its mother when it was born a few hours earlier, its flock untended. We now have a small wobbly mascot nuzzling about for things to suck. It revived from near death very rapidly, and still has its umbilical cord remnant dangling from its belly. It had been abandoned by its mother without even being licked clean.

Amara with our new addition.

29 June 2006 (The Erkhel Flood)

To paraphrase Robert Kennicott when his team pulled out of the Smithsonian Castle en route for the Western Telegraph Survey in Alaska in 1866(?), 'there was a big clearing out' at the camp this morning as Francis, his girls, and Rae and her team departed for UB. Rae left about 8:30am and Francis about 11am, after what seemed like an hour of goodbyes between the girls and the Mongolian guys. Many photos of different group compositions etc… while Francis sat in the van and wondered if he'd ever leave. I'm sitting on a rock near camp now and have a family of big-eared lemming-like mice squabbling in the outcrop next to me. I'm also being eaten by sandflies/gnats, and the air is completely still and the sunset in full bloom, with all sorts of weather clouds hanging around the sky; thunderheads, grey stratus, etc…left over from the storm this afternoon.

We had just gone back to work after lunch, with ominous storm clouds approaching and got our excavation back-filled when it started to pour. After sitting in the rain for a few minutes in the van Tsog thought we should check the camp and big tent because of the wind. On the way back hail stones started to fall in sheets, pinging on the car roof, and you could barely see out the windshield. As we started down the draw into camp we could see the tents standing, but a current of water was running down the ravine through the middle of camp, just missing the cook tent, but was rapidly rising around Gordon's and Nick's tents, which were full of photos and electronic gear. We bolted out of the vans and ripped their tents off the ground and carried them and their contents to higher ground (thank goodness for sewn-in ground cloths!), sloshing around in the stream of water, hailstones, and animal turds picked up by the sheets of water coming off the side of Ulaan Tolgoi. We were already soaking wet when we realized Christie's and my tents were inundated by another sheet of water coming off the other slope behind camp, so we moved them to a better spot. The guys then retreated to the big tent and wrung out their clothes, while some used the water running off the roof to take mini baths and shampoos. Gradually the rain fell back and sun began to poke through. We discovered several inches of new sand packed around the stove, making a completely new kitchen surface, and great furrows in the hillslope where water had carved or deposited new soil. This is why there is so much loose sand around the camp area.

Meanwhile out in the valley south of camp a river had formed up and was running into a new lake on the valley floor out beyond the site. Rafts of hailstones were left in the nooks and crannies around camp, one of which contained my shaving mirror which had blown off the ledge I've been using as a bathroom shelf and got buried in three inches of new sand. So my great tent site retreat from the windstorm we had here two years ago was not so good in flash floods. Now I'm sleeping on a 20° slope wedging myself between packs and air-mattresses across the slope. After regrouping we got back to the site and worked til 9 pm, watching an illegal marmot hunt being conducted across the valley by a guy in a white pickup shooting marmots flushed from their burrows by the flooding. Later in the evening Gordon and Nick returned from shooting Bruno's fully-excavated skeleton and deer stones at Ushkiin Uver in a vibrant sunset and new moon. They got great shots in both locations but returned to camp to wonder where their tents had gone. The storm did not get to Bruno's camp fortunately, as their location cannot stand more river-rise or they will be flooded out. About 2am violent wind, lightning and rain threatened a repeat of the afternoon's

crisis, but it was a false alarm. Fortunately, because we could not have taken more of that kind of abuse.

30 June 2006 (Erkhel)

Everyone was a bit zoned out this morning and did not get breakfast going until about 8:30, as they recovered from wind and threatening storms most of the night. However I was pleased to see Gordon's van here and his and Nick's tents standing. Amara made some good "kasha" (cream of wheat, using the Russian equivalent) and we got to work about 10. After two hours of waning hopes due to the bottoming out of a cultural level, I hit some bone at the very last moment and found a single cervical vertebra and two horse incisors, very worn and from an old horse. Too bad Erica has gone or we'd know how old it is, but she'll see the material in UB and can give us a report. There were no other horse remains, and the teeth were separated, one beneath the vertebra and the other about 30 centimeters to the east. A small rock slab had been placed over the remains. The bone and teeth were in good condition, so preservation was not the cause of the missing head and teeth. And other than the absence of large rocks over the central area of the mound above the remains, there was no sign of disturbance or looting; it therefore appears this was what was offered in the original place, making it similar to the partial offering we found in the fence mound from U. Tolgoi Mound 1(A) last year—parts of a weathered old mandible. But in the current case the remains looked like they had been fresh when interred. Whatever the reason, we are starting to accumulate some interesting variation in horse burial practices that may lead to some new understandings in the future. Bayaraa finished the ring feature excavation around at DS5 and profiled the west wall where the pottery fragments occurred in the same layer as the small rocks, 5-10 cm below the ground surface. Is there a heating/cooking association here? The rest of the boys took down the areas outside F2 horse feature south of DS 5, finding very little, but isolating the big horse head feature prominently. We backfilled Bayaraa's large "potato patch" and my horse feature at mound 2, and we started clearing the northern of two satellite mounds east of Mound 3 (next south of M2, and south of the Deer Stones #1 and 2).

The weather cleared in the afternoon and the light breeze kept most of the gnats away. Tsog returned from his IV treatment for his heart condition with a batch of horshur made by his family. Gordon took a bunch of site shots with people working and showed me his shots from Bruno's dig (the skeleton, and Bruno's "Hamlet" pose with the skull – "Ah, Jorik…") and Ushkiin Uver with its deer stones against the sunset and silver moon. Very nice. (This shot eventually was selected by National Geographic Magazine for their February 2007 issue.) I walked around the base of Ulaan Tolgoi looking at the mounds near camp and found none—circular or square—had external features. Need to check for alignments and GPS locations. I noticed that large amounts of gravel came down onto the lower slopes from the hill in the rain storm yesterday. In fact this storm was an eye-opener for me in understanding changes in the landscape here over short and long periods of time. Deer Stone 4 got 3-4 centimeters of new sand deposited at its base from the slope wash coming down from the hill above. Maybe this is why so many of the deer stones have their belts and lower sections buried now. On the other hand, our test pits usually show 10-15 cm of soil build-up since the Bronze Age occupation surface, so there must be erosion at work on the unconsolidated materials washed down in storms like this one or the stones would be buried much deeper, and we would not even see the low kherigsuur fences. Walking over the hillside in the evening I was amazed to see how much rock and sand came down off the hill, not just in the ravine, but general slope wash.

Documentation from my Ulaan Tolgoi survey:

GPS #234. 5448 ft; N 49°55.690', E 99°47.386 A kherigsuur on the hillside, a lower intermediate Tolgoi slope, across valley from largest lower slope rock outcrop and west of a small drainage ravine. Square corner posts with boulder pavement structures; no external mounds or rings; exposed cobble pavement inside fence. (see drawing, pg. 142, Journal #2). The mounds is ~1 m high, 6 x 6 diam; fence walls 1m wide, mounded up on downslope east and south sides to make more of a level platform interior.

GPS #235. 5538 ft; N 49°55.807', E 99°47.423' A looted square kherigsuur above the former one, with mounded cobble fence walls, large slab burial cover rocks all removed except westernmost one. Has a very distinct cobble plaza pavement. 1m-high mounded corners, but no pillars. The fence is built up with 2-4 courses of rocks. No external mound features.

GPS #236. 5557 ft; N 49°55.845', E 99° 47.380' A small 10 x 10m square kherigsuur above #235, with large corner pillars, but no corner mounds. Probably not looted, at least not recently, as # 2 was. 25cm high central mound made of small cobbles, except for the flat cap stones, which are exposed. No external satellite features.

GPS #237. 5578 ft; N 49°55.853', E 99°47.532' Orientations: 060° N wall, 068° S wall. Cobble plaza surrounded by large single boulder fence walls. This is a10m square kherigsuur with corner pillars, located at the base of bare hill rocks on a 30° slope. No corner mounds or external features. Small 3 x 3 m cobble center mound, 20 cm high. Up- and down-slope sides are aligned with hillslope. Is this to orient toward the sunrise or for a geographic target relating to the hill?

GPS #238. 5576 ft; N 49°55.836', 99°47.279' Orientations: S = 092°, N = 080°. To the west along ledge base is another square, corner-pillared kherigsuur with its north and south fence walls parallel to the slope contour. Has a small, low center mound with only capstone slabs and no mound rocks. The plaza is covered with thick layer of slope wash gravel. Marmot burrow active in burial area. No external features. Single line of small fence wall stones.

GPS #239. 5585 ft; N 49°55.841', E 99°47.257' Next to the northwest is a recently- looted circular mound with a 3m diameter looter's pit open and about 0.75m deep. No bones evident.

GPS #240. 5556 ft; N 49°55.814', E 99°47.197' 15m north of #239, with wall fences of 17m on the east, 16m on the west sides. Small boulder fence wall; no external features. The looted burial had large capstone slabs and had been recently looted. No human bones, but recent animal bones were lying inside the looter's pit. No obvious exposed pavement, but there is lots of slope wash gravel on the surface, so it may be buried. The north/south fence walls parallel slope grade. Low corner mounds on the south wall are shored up 2m high.

Several circular kherigsuurs were also present, but they had no external features. All of the above-described kherigsuurs are slope types, Bruno's Class 2 type. Site placement and hillslope direction may determine orientation of square kherigsuurs at least for those on slopes/hills. There seem to be more square kherigsuurs than round ones on steeper hillslope sites.

1 July 2006 (Erkhel)

This was the last day at Erkhel site, and it was a fairly hot one, but with a breeze and occasional cloud cover to give some shade. Bayaraa drew the profiles for the big horse head feature (F2) at DS 5 and later backfilled it. Christie, Mondee, Sasha, and I worked on the Mound 3 (F1) mound, finding tantalizing evidence as we expanded the central pit, but never finding the expected horse head. A flaked chert core turned up under a small slab at the base of the brown fill level in the top of the gravel, where the horse should have been, but no horse. Expanding the pit, we found a 2-year old sheep/goat scapula 10cm below the surface on the east side of the pit, and it had a cracked distal blade, making look like it had been used for divination—which until recently has been

Goat or sheep scapula found at Mound 3, Feature 1.

a common practice in rural Mongolia. It was found beneath some rocks and does not seem intrusive. A while later we found a horse hoof nearby, also about 10 cm deep. This at least is evidence of some kind of horse connection; but what happened to the rest of the critter is a mystery. Bayaraa went off with his team to test the Khushuugiin Devseg deer stone site east of the ger camp. We had found this site last year but had not excavated there. At Ulaan Tolgoi, we continued to expand our feature, hoping to find the horse, but it never appeared—only one more worked piece of flint—probably like the other, used as a fire-starter. There did not seem to have been any disturbance—like marmots—and the upper rocks were in place. About 6 pm we called it quits and backfilled and drove off for the ger camp for showers and a beer. By now they had the pump fixed and even had hot water, but without much pressure. I filled my laundry bag with soapy water and let the bouncy van ride to Bayaraa's site do the rest.

The site is in a gorgeous location on level ground in the hills over-looking the east shore of Erkhel Lake. We visited it last year and photographed its two deer stones—nicely carved with lots of deer but on roughly-shaped stones. Betsy Ellsworth drew some of their design elements last year, and we used them in our book. Tsomoo was making a site map, and the rest were excavating a 2 meter pit where they thought there might be a horse head. The soil was incredibly black, rich, and deep, and there were lots of rocks down to 60-70 cm; the big surprise was the quantity of pottery and the fact that unlike other ceramics we have found associated with deer stone sites, it was ornamented (minimally—having pressed ridges and some rim decoration), blackened with soot, and very fragmented, and low-fired. Seems like a settlement site deposit rather than a burial or a deer stone site. The site is in the middle of a herder's winter camp and large areas are covered with manure. This area may have been an important settlement site for a long time, and may have lots of different archaeology components; but it may also complicate dating the deer stones. The herder who lived here showed up, having seen the invasion of his winter place from his summer camp up higher on the hill, wondering what was going on in his front yard. He seems thrilled by the attention and information provided by the excavation. It must be strange to live with two great deer stones in the middle of your camp and not to know what to make of them. He invited us back next year, and I'm sure we'll take up the offer.

The midges were out strong, even up on the hill, but it was a beautiful evening. I called home and heard about all the flooding in the East from the massive rain. The mall in DC has been shut down for the 4th of July weekend! We finished excavating about 10:30pm as the light dimmed. The Mongolians headed for ger camp showers, and the rest of us to camp. The Mongolians did not show up back home until 1:00, having lost a soccer match to the ger crowd.

We've had a good relationship with the family west of our site where we got water and yogurt. They were our local sponsors at the nadaam and are caring for Khadaa's colt until he makes the arrangements for a good surrogate-trainer, or a buyer.

2 July 2006 (Erkhel to Bruno's camp)

We packed camp and gave Gordon the location of the rock art sites north of Shishged. He'll drive up there and visit Cliff Montagne and hopes to photograph a more traditional shaman, and shoot our new discoveries. I'm glad I'm not making that trip again now! He'll be back in UB on the 8th, when we also should arrive. We went into Muren to drop Amra off for the night and get some groceries she needs to get for our homeward trip. Here everyone was on their cell phones calling their mothers and wives, or girlfriends, since we were within a cell service area for the first time in weeks.

Adiya carried on a conversation with his little girl in UB, just home from church, mostly in English. Sasha found out that he had to return to UB to sign some budget papers for the Chinghis Khan Studies Center he is in charge of, an affiliate of the Mongolian Academy of Sciences, so we immediately dropped him off at the UB taxi stand, which almost had a quorum of passengers (10) for departure to UB. Then out

to Bruno's camp for some nice swimming in the river and washing clothes—Bruno's camp schedule is 5am to 2pm now, to avoid the heat of the day.

The river's gone down since we were here two days ago, and now is safe to swim in; but I played lifeguard just in case, since this river has a long history of drownings, including two already this summer—due to its rapid rises, fast current, and many tree and root snags in high water. The guys just returned from a soccer match with Bruno's team, which they won, even drivers playing, and have jumped in the river again. It's 10:45 pm and starting to get dusky. My clothes dried in the dry air here in little more than an hour. Tugsu went out and bought a goat to have enough meat for our joint dinner. It cost $40.50 here. They've been eating goat rather than mutton or sheep, which our drivers prefer. We supplied the beer.

The river is definitely the place to go at the end of a long and dry field season. Too bad Erkhel is so 'out of rivers' except in storms. We had an interesting discussion about divination with shoulder blades coming down in the van today. It seems to have been a very widespread practice in the countryside until recently. Even Adiya's father used to do it. Most reasons were to locate a lost sheep; determine the prospects of a forthcoming trip or enterprise; tell how a missing relative is doing. But there were many more, like determining who stole your horse. You had to use the shoulder blade of a two year old sheep and it had to be boiled in your own pot to have any validity. Younger or older sheep would not produce the right scorching effects as the end would fall off or cracks would not appear. Shamans were the best to do this, but others might also. Tsog knew lots about it, and Sasha did also. I tried to find out if the scorch patterns were seen as maps, as in North America, but didn't get a clear answer. Eating lots of sheep and spending lots of time around the fire must have made scapula divination a popular ritual, if not sport and amusement since so many things in herder's lives seem capricious and hard to know. Bruno's team is now 3 for 3 in the skeleton recovery game. Each of the two mounds they've dug this summer produced full skeletons, although not all are well-preserved. The smaller, higher mounds are producing younger individuals, and there is no clear sexual correlation with square or round kherigsuurs.

3 July 2006 (Muren to Ider River)

GPS #241. 7060 ft; N 49°07.065', E 99°33.058' The location of the ridge between Muren and Galt, and just southeast of this location is a highly populated summer camp valley, with hundreds of gers.

It looked to be shaping up for a hot day even by 7 am when we had a bit of breakfast with Bruno. They post-poned their new regime a couple of hours to fit our schedule and because Tugso and Bruno had to pay a visit to the officials at the Sum center this morning to finish their permit arrangements. On the way to Muren we found a big camp being set up at the Ushkiin Uver, with a bunch of vans unloading gear of all sorts packed in boxes labeled "National Institute of Korean National Heritage/Jikji Buddhist Museum." The fellow in charge—a Buddhist monk named Heung Sun –- was sitting off in the distance on a rock contemplating a deer stone, and his photographer was running about the site snapping pictures. It was already devilishly hot with only a bit of shade from a tarp set between two vans, and the smallest single person tents I've ever seen! The boss spoke English and he was as nice as could be. The project has funds to make photos and rubbings of the deer stones for a month and will return next year to do rock art. I gave him a copy of our book and we exchanged contacts so we can be in touch. Perhaps he might let us use some of his work, maybe for the October festival. His museum is from southernmost Korea. I might be able to fit a visit in there it I get the Korea Foundation grant. Why they don't camp at the river is beyond me, as the site is a blazing desert. Bayaraa had some conversations with some of the Mongolian team, whom he was familiar with.

In Muren we had a horshur lunch at Amara's home and after some delays with the boys getting some money from the bank, and ice cream treats, we got out of town and headed south over the mountains toward Galt and the Ider River sites we wanted to work at. Hot, bumpy, and tiring driving. Bayaraa split

off at one point to visit a deer stone site we had not seen, but we missed his signal and missed it. It's large, with 4 standing stones, which are very well made. I need to see it next year. About 6 pm we got into major kherigsuur country, coming down off one of the most heavily populated summer grazing areas I've ever seen. There is a lake at the west end of the East-West valley and I counted more than 50 ger tents in the eastern part. It's at about 5000 ft. and very green. Lower down the kherigsuurs began as we approached the Ider River and most of the ones I could see in passing were square and at the base of the hills. The set of two deer stones at Nukhtiin Am are very interesting and we'll dig a horse feature in the ring of features that surrounds the pair, and one from the kherigsuur to the south, which appears associated with it. This is the only time I've seen a pair of stones treated as a single unit like this. They are made of identical dark granite, have angled tops and striking carvings. Unfortunately the belts are buried. We camped by the river nearby and narrowly missed being hit by a big thunder-storm which passed to the west. Bayaraa's and Tserenyam's families are not far away, so we may visit them before we leave for UB.

4 July 2006 (Ider River)

My tent was broiling by 7:30am and most of us were likewise flushed out for breakfast by the heat, not relishing the prospects of a scorching day at a shadeless site. In fact, the morning was as expected with the only consolation being the easy digging in a sandy soil with almost no vegetation cover. This whole part of the valley had been agricultural land in the 1900s and you can still see the plow marks and fence lines—a cattle operation according to Tsog, but then why the furrowing? At any rate, there is no turf or original soil level to hack through; you just start troweling away. By noon the small horse mound Christie, Mendee, and I were working had produced a sign of horse bone, but not in the middle of the circular feature. Rather off in the SE corner of the square where we almost missed finding it. Shades of Erkhel! This is a mound on the east side of the big kherigsuur south of the deer stone pair. In the afternoon, after a threatening, but no-show thunderstorm, and some body surfing in the rapids after lunch, we returned to the site and uncovered the horse skull, which was close to the surface (10-15cm) and consequently poorly preserved. We found only 3 vertebra on the south side, and most of the skull will be lost when we excavate it. Even the teeth are soft and rooty. But I'm sure it will give us a date. We had to leave most of the removal until tomorrow.

Digging the deepest excavation of the summer to find a grinding stone and horse head.

While we were working on the kherigsuur feature, Bayaraa's group started a feature a few meters east of the deer stone pair. By evening they had some spectacular architecture to show, ending with two large capstones at nearly one meter depth, and huge bordering boulders. When they removed the slabs, a horse head was visible directly beneath the largest stone. Earlier they had made two great finds in the upper part of the pit—a rim fragment of a thick stone bowl, and slightly deeper and on the other side of the pit, a round doughnut-shaped stone object with one side worked roughly into shape by pecking, and the other broken off the rest of the object. The central hole was worn smooth from grinding. It seems to be part of a flour-grinding mortar used with a wood or stone pestle. The rim we had found earlier may be related to this set somehow. Both were 'killed' for the burial operation to go with these unusual paired deer stones. Other 'horse' features surround the pair, but this one inside the ring of features and to the east of the stones seems like the most prominent ritual location.

The river turned foul in late afternoon due to heavy rain upstream on the other side of the mountain to our south, really filthy, with floating grass and organic debris and muddy as the dickens. Good we got out swims in before, but it forced the guys to go off to find a clean stream for cooking and washing water. I wandered up the bank surveying and found only modern camps and garbage, even though the high sand/gravel banks must have been good camping places. Once again I'm impressed by the absence of hunting/fishing camps from early times, and by the presence of herding people for thousands of years. We had several groups of visitors to the dig during the day—a young family in the morning and three young horsemen (one with arm in sling from a fall practicing for the naadam race). Some of our guys tried their hand at riding, and Mendee fell during a mini-race, to everyone's amusement, as he as on a tiny but spirited horse.

5 July 2006 (Nukhtin Am to Jargalant)

A beautiful morning with clear light and few clouds. A local herder dropped by at breakfast who knew Tserenyam and stayed for a cup of tea. I'm writing now on the bank of the Ider River where we're waiting for Tserenyam to catch up with us; he had spent the night with his family in Galt nearby. After we got started our route up the Ider turned out to be very different from most open valley travel as it is a small track that runs along the river as it winds though the hills. We're heading upstream and are passing through sandy fields, running over craggy passes when the road can't make it around a steep bend in the river, or clinging to our seats when the road tries to make it around a bend. Families are scattered thinly along both banks, but are not so prosperous as those in the broader bottom lands. Here people seem to be living in one place and move only "next door" from ger in summer to cabin in winter, both located side by side. This area has amazing granite hills, finely textured by erosion so they look like great wrinkled old faces, with skirts spreading out at their bases. This is a very little-traveled road and sees minimal vehicle traffic. At one point we were caught behind a cart migration with all their flocks and belongings moving camp. Jargalant is a sum center for this region, which is the southernmost in Hovsgol Province, and it's a nice town of wood homes. They are mostly old and dilapidated, but new ones are being built and two of them belong to Bayaraa's relatives; his father and step-mother, who live with his grandmother (now in a ger camp in the countryside) and his brother-in-law, who is just building his 2-story home next door. The brother-in-law owns a café-bar and is trying to make a living that way. His father does small wood-working jobs—mostly making home furniture.

We all gathered at his place and talked, drank vodka and airag, and had a major meal of boiled mutton with all the organs and fixings. We have not had this so far this summer as the drivers ate all the first meals after slaughtering. Liver, kidneys, lung, and stomach and blood pudding. They also served a very good cream curd pudding made with flour and sugar and butter. It was a great evening and introduction to Bayaraa's family and their town, which has lots of ancient larch trees and streams. We spent the night in a tourist ger camp on the east side of town, where we met a young American named Charlie who is a wrestler and is entering the University of Oregon this fall. His dad until recently ran a bio-tech company in Vancouver, but it recently was bought out. Charlie wanted to wrestle with Khadaa, and despite being 30-40 pounds lighter did a good scrappy job; but of course lost several bouts. Khadaa it turns out, is going to stay here in Jargalant to wrestle in the Nadaam coming up in a couple of days, to try for a title here; if he wins he can then compete with that title in UB rather than wrestle as just an untitled competitor, which he'd have to do in UB otherwise. So there is lots of strategies to the wrestling business!

This morning's closure to the archeology chapter at Nukhtiin Am went off without any big surprises other than the huge rocks that kept appearing in Bayaraa's pit. They went through the capstone and found the horse maxilla with sound teeth, but never were able to locate the jaw bone, but it's likely under some of the rocks that could not be removed from the small pit or are just outside the 2 x 2 area. It certainly was a major construction for a horse head burial—the most elaborate one we've seen to date. We completed recovery of the rest of the horse head in my, Christie, and Mendee's pit without trouble, but it was very

broken up. The river cleared up enough so the guys could swim after lunch. On the way upriver to Jargalant we crossed the side stream that dumped all the dirt into the river, and what a muckhole that was—black with organic mass all over its flooded, receded bank. It was about a two-hour drive to Jargalant, where Bayaraa's parent's lived. They are now divorced and his father's family and grandmother are still there. He has not seen her for three years. When he was born his family had to give him to her to bring up because they already had a daughter (1 yr) and couldn't manage another child. This seems to have been common in those days.

We located the father, but the grandmother was off in summer camp 10 kilometers away. The bar his brother-in-law runs is a bit funky, with saggy floors, and stock picture decorations on the walls, a tiny kitchen, and a dance floor with a glitter ball hanging from the ceiling. No karaoke machine evident! We returned to the father's place for a welcoming meal and interesting talks with his family. I discovered some static sound in my video camera and hope that it is not found in everything I shot. Managed to change some settings for the microphone and eliminated it in new recording. Not much business in Jargalant except services—no mining etc. But recently people have been finding ways to make money and replace shacks with nicer homes like Bayaraa's father's. We retired to a ger camp for the night and had a big volleyball game until it got dark.

6 July 2006 (Jargalant)

Miraculously, no beetles crawled into my bed in the ger last night although they were plentiful around the floor where Adiya and I hunted many of them down before turning in. I had a duna-like quilt and a bottom sheet out the bed, which had a new and comfortable mattress. After a simple breakfast, we went to Bayaraa's place, where we had another breakfast, hot this time, and with a rice and beef jerky combination. His mother had to go to her kindergarten class to decorate it for Nadaam, so we had a brief tour of the place where Bayaraa went to school, next door to the museum. The latter is a one-man (old man) operation that was started in the 1970's and has survived due to the dedication of its much officially-decorated proprietor, who is truly a character. He's a wood-carver especially, and the museum is full of small and large carvings of animals and Buddhist figures, and some of his work has been exhibited in Japan, I was told. He's also a natural history buff and has small cases of oddities—like the biggest tayman caught in the Ider River, a tree root resembling a snake, the head of a fanged musk deer, etc. This is exactly how I imagine old European cabinets of curiosities must have looked and being tended by similar dedicated odd-fellow naturalists in the 18th Century—alive and well in a small sum center in Mongolia no less—but self-grown and not in the European tradition.

We then visited a wealthy herder family named Gombodoo that lived on the Ider just outside Jargalant and were close friends with Bayaraa's family. They have a finely-decorated cabin with several outbuildings and many carpets on the walls and lots of things in their "shrine" cabinet. We were served a succession of milk tea, airag and airag vodkha—in that order—and then gathered outside where the gentlemen patriarch had his entire wealth in family, relatives, and then his horses, goatherds, and other animals paraded through the camp. It was quite a scene, done in honor of Bayaraa's visit and his video camera—which Christie rejuvenated with her gift of her last roll of tape—I was on my last and couldn't help or film much myself. The headman decked himself out in his dell and put his freshly painted saddle and finest silver coin-studded bridle on his favorite horse and pranced about for us. A major event was the appearance of Jargak Baiarsaikhan, his older brother, who a few years ago fell from the top of a pine tree when a branch broke as he was gathering pine nuts, and his been paralyzed from the waist down ever since. He looked cheerful and glad to see Bayaraa, who hasn't been home for a visit in 3 years, although much of his family has since seen him in UB Gombodoo's furniture was very old and beautiful. Bayaraa's family is related through marriage to them. This was followed by many goodbyes when Khadaa and Tsomoo stayed behind at Bayaraa's house to take part in the Nadaam wrestling competition on the 7th. I paid them their wages for the month and we hope to see them in UB before we leave.

Some of Bayaraa's extended family.

Then we struck off up a valley to the northeast where Bayaraa's grandmother spends the summer with relatives in three gers, with a flock of goats, a few horses, and a ferocious dog, who almost attacked me when I climbed up the side of the goat corral to take a picture—defending the flock. Grandma was overcome with Bayaraa's visit and cried for the first 30 minutes. She's quite large for a Mongolian older woman (in her 70's I suppose) and was dressed in her finest red dell. She'd been alerted the day before that we were in town but thought we wouldn't take the time to visit her. But Bayaraa and she were favorites and it had to happen, particularly as her health is not good and partly because both probably think it might be their last visit. We received another big round of tea, airag, and local vodkha, then stew and other fare. All the while their television was playing an American broadcast of a college campus melodrama with lots and intrigue and bad scenes dubbed in Mongolian, while the original English was still clearly audible, put out through the Mongolian channel on the Russian satellite. The whole setup cost 22 million tugriks; I'm not sure what grandmother thinks of racy American TV melodramas, but everyone was rapt with attention.

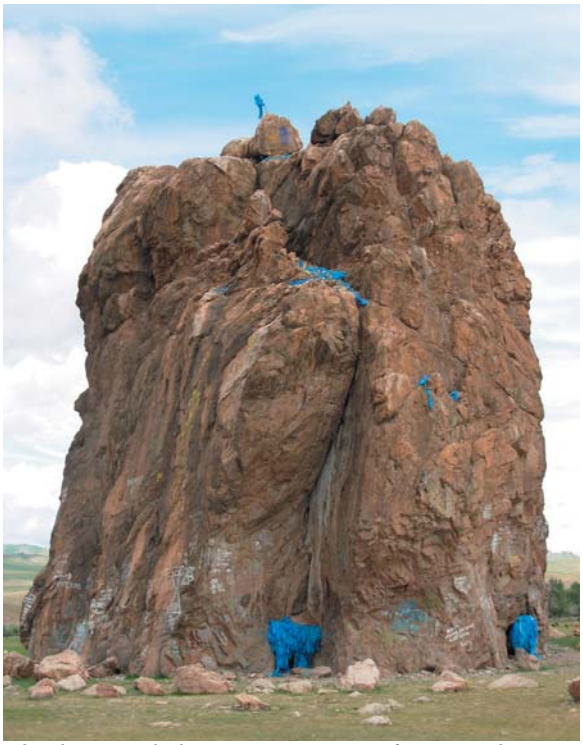
This little valley was beautiful, well-watered at least this year, and gets good protection in winter. The family moves from a winter place a bit further up the valley to a summer place (here) that is someone else's winter place. We left about 4 pm with the whole camp waving goodbye except the goats. Thunderstorms were building as we proceeded east and by the time we reached Tsaagan Nuur (White Lake—the second so-named in Mongolia) there had been some cloudburst that muddied the track and it got particularly bad around the lake edge. The area at the eastern end of the lake is a big tourist attraction and ger camps here popped like spring flowers. We must have passed 20-30 of them—most looking very cheesy, with few amenities. However a couple of new ones had bright orange ger covers and were trying to attract high-end visitors—both Mongolian and outsiders. Many Mongolians are now able to take vacations, and we find about 50% foreigners vs. locals in them. The road runs through some scary narrow notches in the rocks at some hill crests and at times you think the vehicle will plunge over edge into the lake. Tsog took advantage to scare us, especially Amara, who was in the front seat. At the east end of the lake the lava flow from the Khorgo Volcano reaches the shore and had flash-cooled into millions of small porous lava rocks. Someone years ago had the idea to build cairns with them, and a small army of these curious and somewhat ominous black sentinels line the shore. The flow reaches way around to the southeast side of the lake.

Next stop was the volcano itself, which is a remarkable site when seen from the distance; surrounded by a vast plain of lava rock that stretches for miles around it. The cone itself is nearly perfectly-shaped and rises about 800 feet with about a 400m wide crater. We climbed to the rim and before I could try and discourage it, Mendee and Tsomoo had dropped over the edge and were scrambling over the talus down to the bottom. The blocks were mostly stable, but some of the upper slopes were loose, bright red, and clearly unstable, and lots of the rocks had no lichen growth and had not been resting in their current position for long. I was very relieved when we got them back up out of this place. The antics that prompted them to go down (Tsog had said he'd done it once) were akin to those who like to get close to icebergs, only in this case I don't think they were aware of any danger of landslides. We collected some lava and pumice rock. The access road was awful and we were amazed to see a small private car in the

"parking lot." Passing the town of Ikh Tamir, we entered a broad plain underlain by volcanic flows, and camped above a gorge with yaks criss-crossing the slopes above. Soon after we were camped, we were visited by some very curious and shy kids from the ger nearby. We gave them some bread with butter cream and sugar. They were nine, seven, and five years old and had a play routine that was almost theatrical as they first approached us over the plain, playing "wheelbarrow" and hiding behind each other to look like first one and then two and three "snuck" up to us by hiding under the bank. The next morning they brought us fresh yogurt and milk. Another amazing sunset with mountains skylines too majestic and grand even to be photographed.

7 July 2006 (Ikh Tamir to Khunuu Khan)

Another long day as we made our way east towards UB. The broad Tamir valley seemed to stretch east and west to eternity and surely was one of the great highways of the past. The River Tamir runs in a gorge cut into the volcanic rocks for eons and is virtually invisible until you are at its brink because the trees along its entrenched bank do not reach the level of the plain above. I'll bet many a drunk, snow-blinded or just tired and unsuspecting traveler plunged to his and his horses' death over the brink. We turned off the valley toward the south and stopped at the sacred "100 branches" tree, a magnificent larch with an unusual growth pattern, branching out from the roots immediately like a bush and the upwards, with scores more branches, most of which are festooned with prayer sashes to their very tips. The large ovo beside it to the south was huge and had a gray squirrel as its host who entertained visitors and is responsible for thousands of cute photos every week by posing eating their cookies and crackers. After going over another branch of the Tamir we came to a great up-right pluton of rock standing in the flood plain all by itself and reaching perhaps 70-80 ft. high. This famous and spectacular stone pilar has been used as a tableau for painted text for hundreds of years, with the oldest going back into the 16/1700's. However, never having been protected, modern and not-so-modern grafitti artists and 'proclamateurs' have defaced the earlier writings with their own and today little remains from ancient times. Rock climbers have seen the rock as a challenge for aerial literary displays of verbiage and today the rock is a monument to the 'John Doe' affliction as well as the more serious-minded religious advertisers. It's still a great attraction for its natural and cultural realities. Crossing another pass to the south we descended into the charming town of Tsetserleg, which is nested at the base of dramatic granite slabs, rising several hundred feet, making the town very similar to Boulder, Colorado and its 'flat iron' granite slabs at the foothills of the Rockies. The town seems to have a similar get-up-and-go attitude and is quite stylish and colorful compared with most Mongolian towns I've seen, with multi-colored roofs and better housing. Perhaps this is because it also has a university, which may explain the many outdoor cafes and nice-looking shops. We had lunch in one that Rae Beaubien and her team visited last year—a sandwich shop and bakery with a guest house run by a British couple who started it ten years ago. The food was delight and a relief from our steady fare of mutton-based stews and rice/noodle combos. The beefsteak with dumplings was a hit with the Mongolians, while Christie and I had the spinach salad and pizza. Too bad we did not have more time to explore the town. The lady proprietor, hearing we were deer stone archaeologists, immediately recalled the "Three Unwashed Ladies," who had had lunch here a year ago.



This huge rock that seems to sprout from no where has been "decorated" for centuries.

From here we headed to Kharkhorum where we could pick up the paved road to UB, another 6-8 hours drive to the east. As we approached, black thunderclouds enveloped the old first capitol city of the Mongolian Empire, but which is known mostly for its ruins and some standing temples of the Erdenezuur Monastery. We could spend only a few minutes showing Christie the monastery and never got over to the German excavations of the remains of the ancient capitol, but I did try to get a few still shots of the monastery and its stuppa walls overhung by a huge sky of thunderheads. The old outhouse is still working effectively, like last year, I can report. Fortunately the sales shop had videotapes, so I replenished Bayaraa's, Christie's, and my zero balance here!

The paved road was delightful, even in the rain squalls, but we had decided to camp rather than pull an all-nighter to UB like last year. We turned off at Camp Delger sign (ger camp) and tried to find a camp site amidst a marshy area near the big sand dune field. All we found was water and millions of tiny frogs underfoot and in the shallow ponds teeming with fat tadpoles. Bayaraa, horrified, would not even set foot out of the van for fear of stepping on them. They were everywhere and you could not avoid crushing them underfoot or over them. A tough situation for a Buddhist philosophy, protecting life. Herds of horses were grazing the marsh pond—all with firm sandy bottoms – like moose, or those Yamal reindeer I photographed years ago. It was a paradise of grass and water and frogs. The birds and fish must be having a field day. Filling our water containers we headed off to the north over an eroding sandy hill where we stopped to check directions and found in the eroded sand the first piece of flaked stone (almost, since we had seen some at Soya) of the summer. However, we could not find an in situ site, and the chert piece could have been washed out from way further up the hill. Last year the museum had a small excavation at the "Older Persons" (Zaliuu Hiid) Monastery on the Khugnu Khan Mountain, and we wanted to visit the Zaluu Hiid (Younger Man's Monastery) located at the foot of the huge granite hill, now in ruins except for a couple of buildings and a reconstructed small temple perched above the main site on the lower slopes. We met a woman there who is a descendant of one of the former monks, and she gave us permission to look around. The monastery had been started in the 16th Century(?) and was destroyed by the Western Mongolian army forces in the Civil War of the 1920's. The museum had hoped to find some of the birch bark "books" which we had seen at the small museum in Khar Balgas last summer, but the excavation was not successful.

I took a few pictures; some of the crew said some prayers at the small hillside temple; and then we were removed to a grove of trees at the base of the hill nearby where huge blocks of granite had eroded into great pillow shapes, making a kind of grotto that was a fine camping spot. We immediately found flaked stone pieces of chert and cores of quartz that looked early, but none of us were experienced enough in the Mongolian Stone Age to tell exactly how early, so we collected some of the material for the museum (Stone tools; 4387 ft. elev. N 47°24.298', E 100°40.994'). Someone had piled many of the larger core fragments on a rock where the concentration was the largest, almost a like a backdirt pile, so I'm curious if anyone has ever excavated here. Most of the material is scattered in the loose sand and is being transported by the water channels that develop in rain storms, and we did not notice a source deposit except for the higher concentration nearer the base of the granite cliffs. We had a nice dinner, finishing off the big can of sweet corn and another of cooked beef—the last of our meat supplies, and sat chatting around the last campfire of the season. A big black dog appeared from the ger camp nearby to accept any scraps we had to offer, and throughout the evening lights of cars and vans brought clients to the camp, which is only 4 hours or so from UB.

8 July 2006 (Khugnu Khan to UB)

A wet and still morning with clouds hanging down, not moving – one of those days where the world seems to have stopped dead. We sorted gear for storage and packed excess food for Rae's apartment and hit the road, which for an hour or so was smooth macadam and then turned into a pot-holed mess that could not be driven on, so we were back to the dirt with lots of mudholes and mires from the rain. Most of the on-coming traffic was tandem gas tankers—nearly a steady stream of them. Fuel consumption is

starting to sky-rocket as people begin to afford vehicles, and for herdsmen motor bikes, and occasionally jeeps for camp moves. Camels are definitely on the way out as heavy transport carriers. One tandem wagon filled with merchandise had tipped over in a mud hole and was surrounded by people trying to salvage the load.

We had rain showers all the way in to UB As we approached town the traffic built up and we started seeing lots of horses staked out in the fields and many herds of sheep. Trucks loaded with steers and sheep were headed to town—all soon to be slaughtered for the crowds gathering around and in UB for the great 800 years Naadam festival.

As we got into town Adiya began working his cell phone—as would happen whenever we were passing through a village with cell service. Principally this was with his partner in his travel company business, who seems to be able to expedite anything, and had been helping Rae and Leslie during their week in UB. One of their Mormon Church associates (most everything with Adiya happens through Mormon associates) had gone out of town for a few weeks and had their apartment available to rent, and they were staying there. Christie and I could crash with them for a few days. So Adiya alerted them of our arrival and found them at the Institute of History, where they had been working on collections from Allard's and Erdenebaaker's Gol Mod site. Later we discovered they had had a busy week, meeting the French Gol Mod I team which was in Mongolia for some clean up work at the site. I'd met their boss at the National Geographic Society meeting last winter. A Russian archaeologist had also been in U.B. (Kobelev?) who had worked on Bronze Age sites in western Mongolia and was going to be digging some kherigsuurs around the Ushkiin Uver this summer. Presumably this was an arrangement through the Institute of Archaeology and Tseveendorj. Maybe next year we will reverse the trip and go to Altai for some work of our own, to check on the dates and styles of deer stone and kherigsuurs there.

We got our selves settled into the tiny apartment in the 1950/60's Russian-style concrete building with its dark, musty stairwells and gritty overall aspect. The apartment itself was clean and well-appointed and had some afternoon light and a porch for drying clothes. We had arranged with Ochirhuyag, my first research partner before he abandoned archaeology to become the general manager of the big cinema in town—called Tengis after the river we had traveled along for a day recently – to see a movie which he was hosting us free of charge. So after the equipment had been stored at the museum and we had tried out the apartment bath facilities, we went to the theater and met Ochir, who gave us a short introduction to the fairly glitzy and modern cinema, and heard about our project. He is still staying somewhat involved in archaeology and is writing a chapter on Mongolian archaeology for a UNESCO publication.

The movie we saw was "Ice Age 2," and was quite a sketch. This was the first movie some of our crew, like Amara, had ever seen, and perhaps also Tserenam. It was Amara's first visit to UB! About half the audience was tourists and English-speakers, so there were two laughter responses for every funny scene, one from the English audience and a delayed response from the Mongolians reading the subtitles and hearing audio. While we were in the movie Bayaraa hung out with Ochir and talked archaeology. After the movie everyone finally was able to go home to their families and showers and clean clothes. We went to sleep with the "bah-ing" of a lonely and perhaps fearful sheep tied out in the lot below our open windows, only one of the many sheep stabled around town "on the hoof" awaiting the holiday feast.

9 July 2006 (Ulaanbaatar)

The rains of the previous evening dispersed by morning, and the weather remained mercifully cool. This was Sunday and not much was open in town other than food and tourist shops. Adiya and I went to the Korean Air office in the Gengghis Khan Hotel, where we found more of his Mormon Mafia was on duty as clerks and managers. They get good jobs because Mormons are dependable and family people, Adiya says. We were able to change my flight home to the midnight of the 11th, saving me two days, which I needed for Quebec preps and to visit Lynne in Vermont. The afternoon was spent sorting and listing and

photographing the few artifacts we'd found, and selecting dating samples. Christie went off with the boys to the black market, where they formed a phalanx to defend against the thieves who are getting more brazen and are sometimes in league with the police. She came back with a beautiful green del and orange sash and was very proud of it. I bought some wine, beer, and cheese and when the ladies returned we spent most of the evening snacking, until a pizza craze hit and we went to check out a pizza place near the state department store that we were considering for the picnic fare planned for the Monday farewell gathering down by the river. More bleating from the luckless sheep that night amidst blustery, thundering weather.

10 July 2006 (Ulaanbaatar)

Last day in Mongolia. The girls had arranged with Adiya for a tour to a monastery outside town and left at 10:00am. I went to visit Peter Marsh at his ACMS University office and cleared up some details—like transferring our Ambassador Fund account to Adiya and me, what to do with half of the books we have in UB (250 have been sent to D.C. in the container of materials Gankhuyag Natsag has collected for the October festival). He says the shipments went out efficiently under Chris Miller's guidance and will cost us about $2,500 for the UB—LA leg, plus the LA to DC leg. He also said that ACMS will sponsor one person coming to the October festival and decided that Dr. Ochir, director of the National Museum of Mongolian History, would be most appropriate. Peter is leaving his post in UB in August and has a chance to for a job in DC at IREX. That would be great! I suggested that he try for a post-doc fellowship. I tried to find Orgilmaa, but she was not at work, and Peter said she had not put any furniture into the shipment. Santis, like everything else, is closed down now for the holiday, and there were festivities with flag presentations and bands, plus uniformed talks in the square in front of the big new colonnade that has been erected in front of the Parliament building, along with the removal of the Lenin-like Mausoleum that stood in front of the building in all its marble Soviet-style splendor. Lots of foreigners were beginning to appear around the square, and I heard conversations about "still trying to find tickets" for the Naadam events.

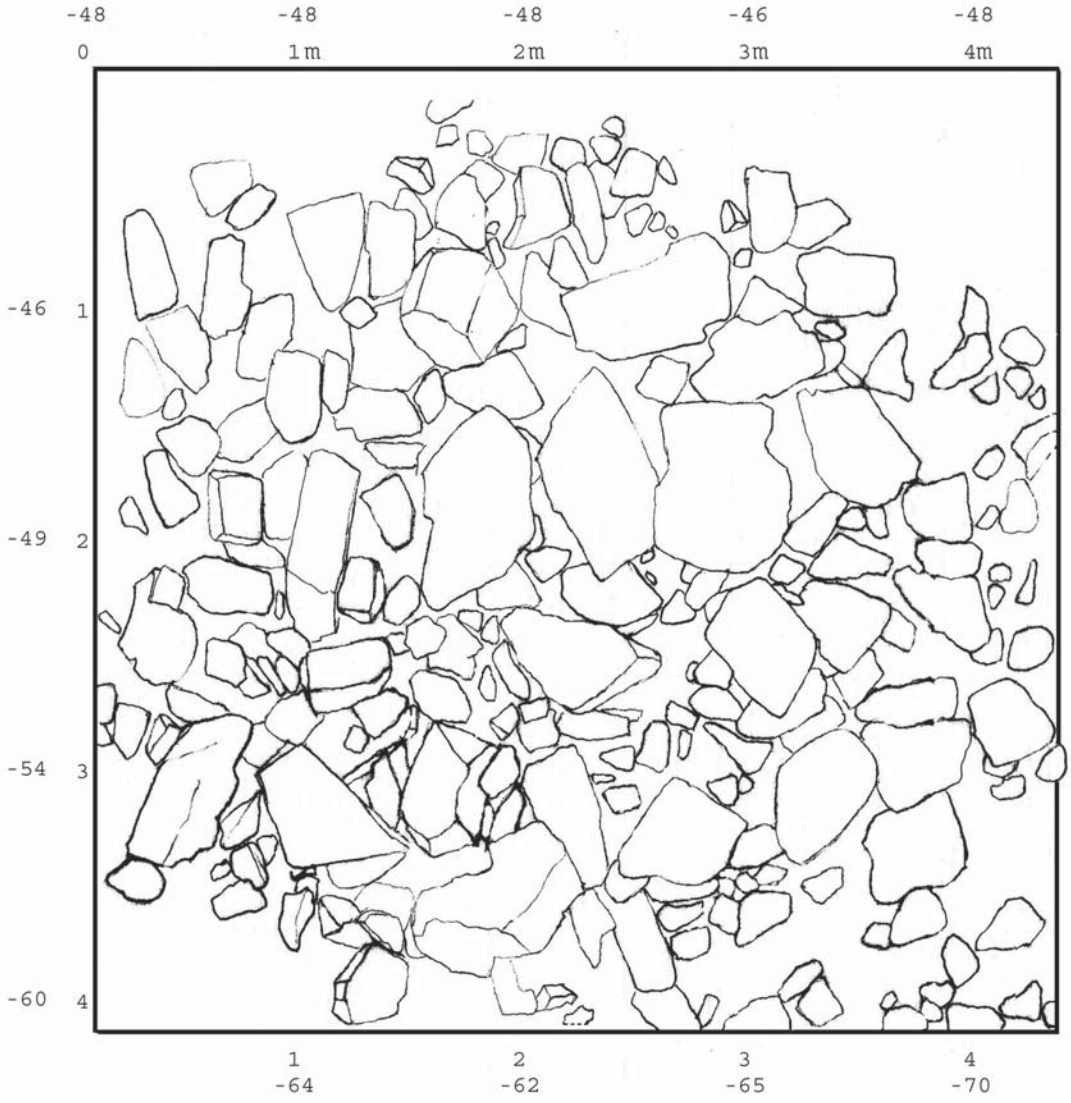
The girls came back late and we had to scramble to get the food together for our farewell picnic, but with the chartered van and a blitz at the hugely-crowded state department store food shop—now in new quarters and owned by a private company—everyone buying stuff at the last minute for the holidays, we got it together and rendezvoused at the museum with 15 hot pizzas. Sasha had shown up and presented me with his new Bronze Age book, co-authored with Enktuvshin, with lots of color pictures of bronze objects and deer stones. I hadn't paid him yet, so I did that, and later Ayush too. The river party was nice and Mendee and Onoloo came, plus Tserenyam, whose van is being rebuilt in UB and is not yet done. Adiya's family also came: Tuul and their two delightful children. The water was very high and raging through the river grass, which was 2-3 feet tall. The authorities had re-painted the great face of Genghis Khan on the hillside above us, and many people were climbing the hill to the Soviet monument. A new golden Buddha statue has also been built nearby, another of the 800 year projects.

It was a great five weeks in Mongolia. I think we're at a transition point now, but to what I'm not quite certain! People, science, everything; our colleagues in Mongolia are getting older, families growing, businesses expanding, and academic skills increasing. I'm pleased to see all these developments and the impact of our work increasing. I've been thinking of organizing a big book on Mongolia based on our work but with popular appeal and contributions from many of our team. Perhaps I could get Harper Collins to do it—a crossroads of inner Asia story with far-reaching connections and lots of illustrations. I've also been thinking about what kind of exhibit we could do that features Mongolia—the potential is there, but where to find the bucks is the question.

(My diaries of the 2006 Monoglian project were transcribed by Matthew Bass as part of a Smithsonian internship that included preparing all our Mongolian field maps and notes for publication in our annual project report.)

PART III

FIELD NOTES AND MAPS

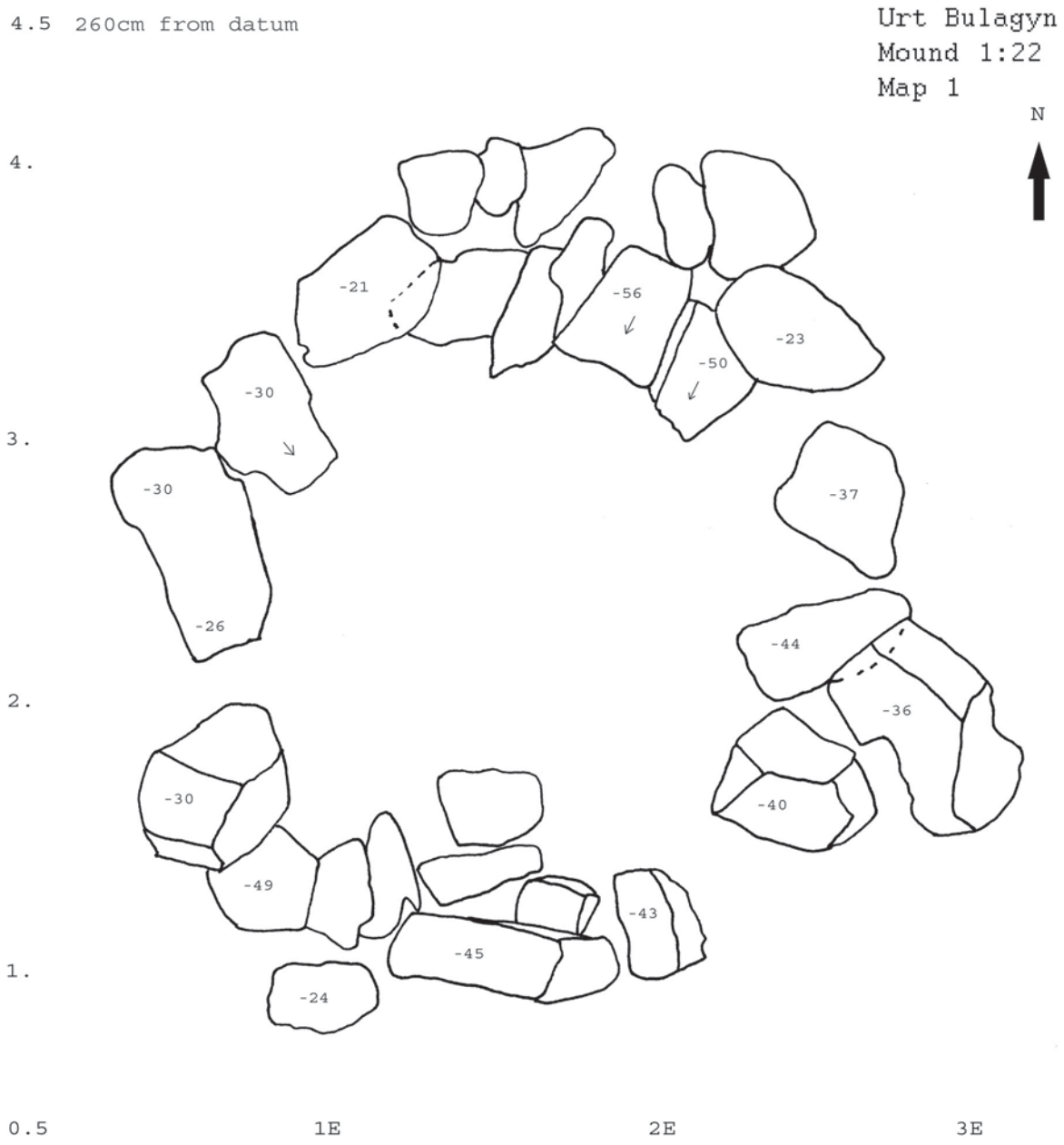


Urt Bulagyn
KYR 1:22
8 June 2006

50cm

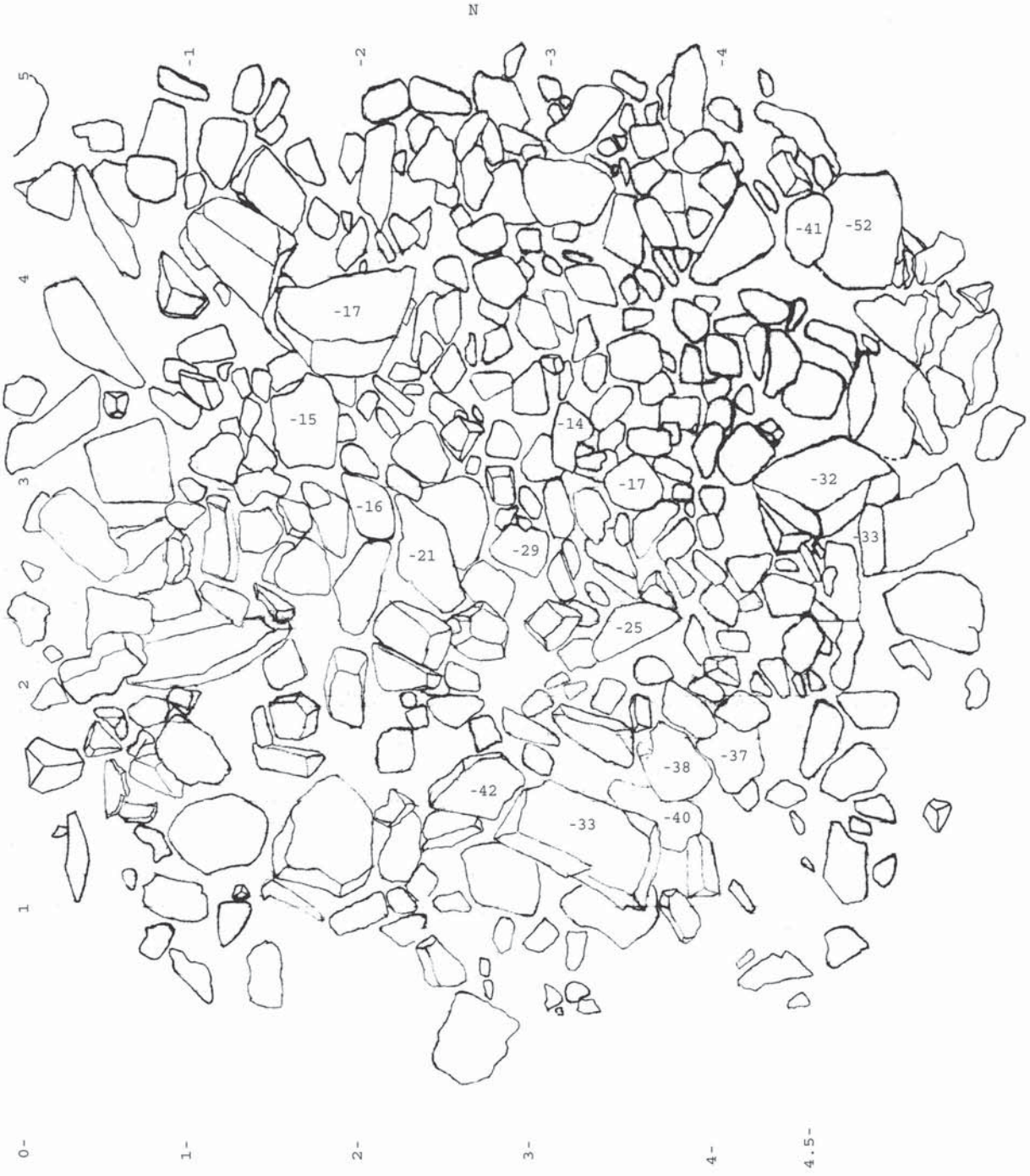
GPS Station 190
5489'
N 48°05.546'
E101°03.504'

-#'s=depths below datum


4.5 260cm from datum
Urt Bulagyn
Mound 1:22
Map 1
N
4.
3.
2.
1.
-21
-56
-23
-50
-30
-30
-37
-26
-44
-36
-40
-30
-49
-43
-45
-24
0.5
1E
2E
3E

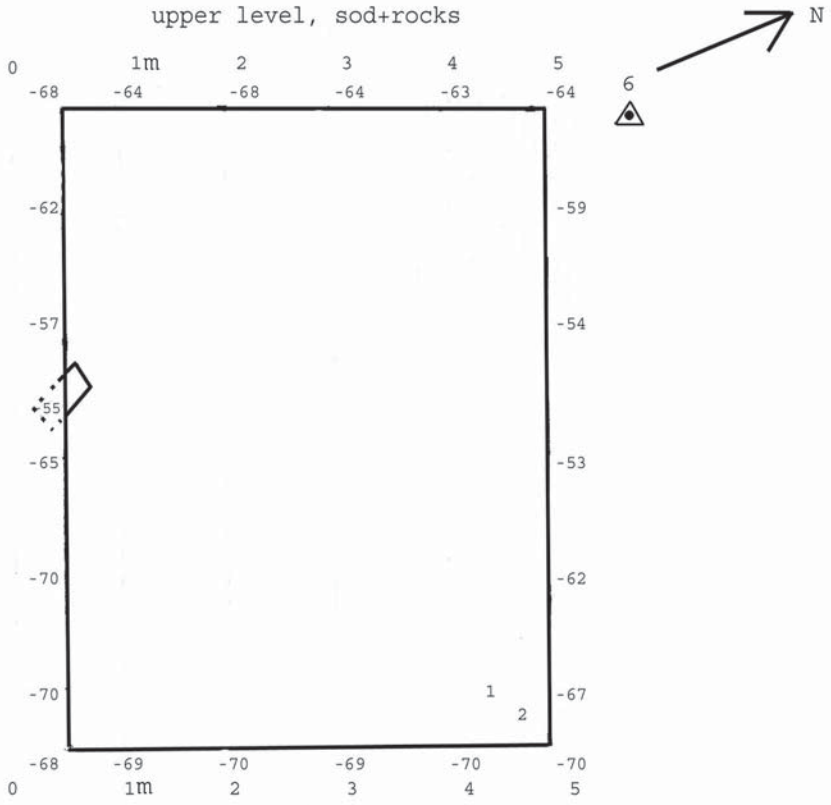
Urt Bulagyn
KYR 1:21

-94 cm below surface,
fragments of bone were uncovered
175 cm from N wall
304 cm from West



Station 192
GPS- 5491'
N 48°05.547'
E 101°03.465'
"long water"

Urt Bulagyn
KYR 1:21
Inner Fence Mound
8 June 2006



1. Long bone in dark humus soil 4cm below surface

*42.5m to SW mound ramp corner

*54m to SE fence corner pile-quartz rock

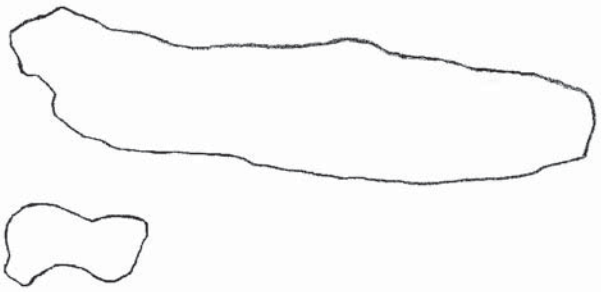
*5.05m to datum

*4m ro datum rock in next mound to the North-
highest corner of highest rock

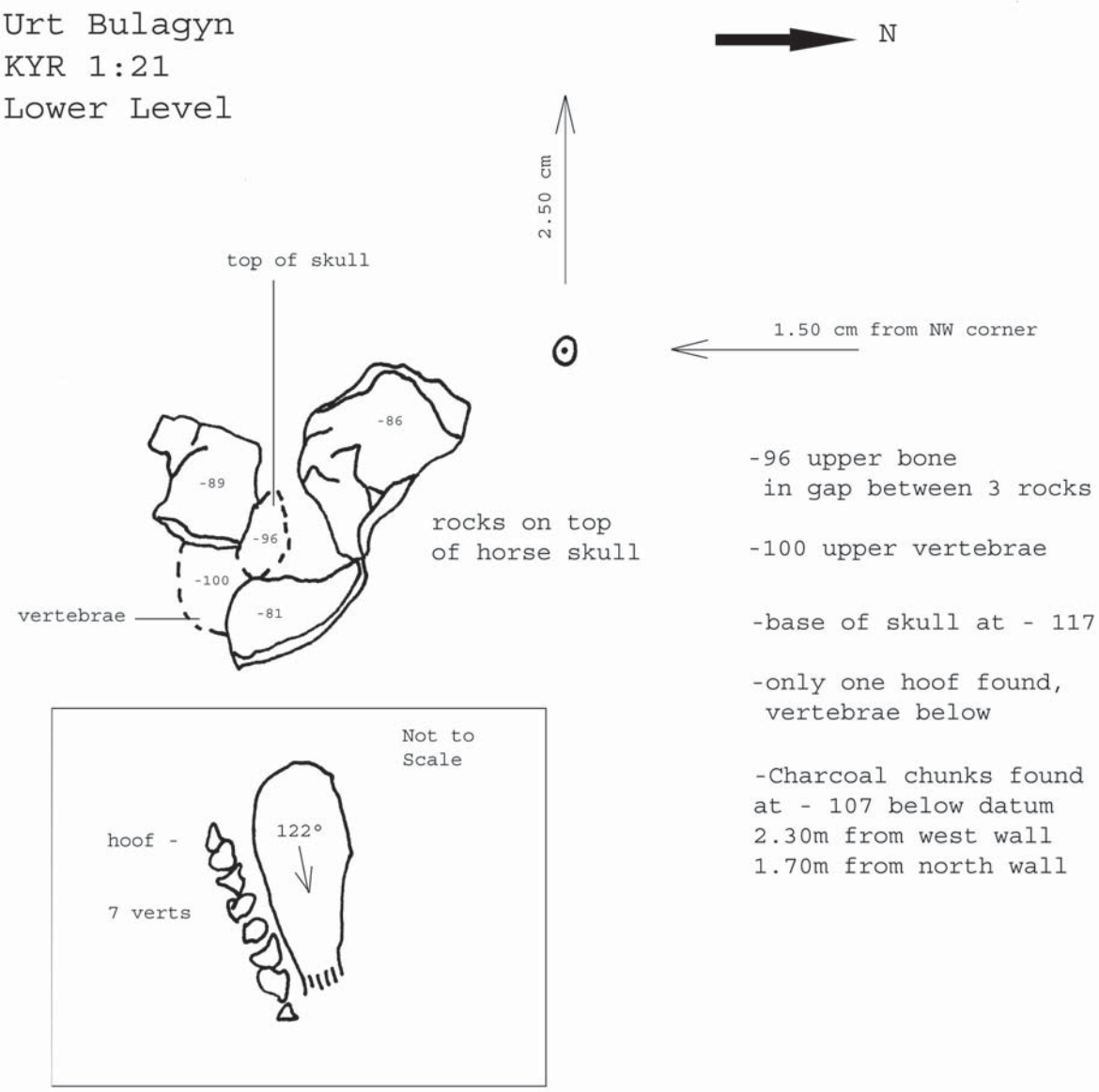
Urt Bulagyn
KYR 1:21(inner fence mound)
8 June 2006

1. Long bone fragment (recent) 4 cm below surface
   in humic soil/sod.
   (split for marrow?)

2. Carpel bone 5 cm
   below surface



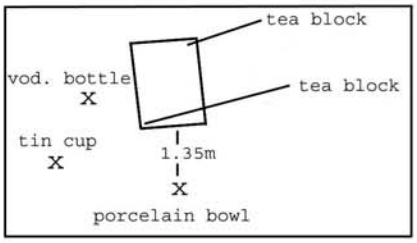
Urt Bulagyn
KYR 1:21
Lower Level

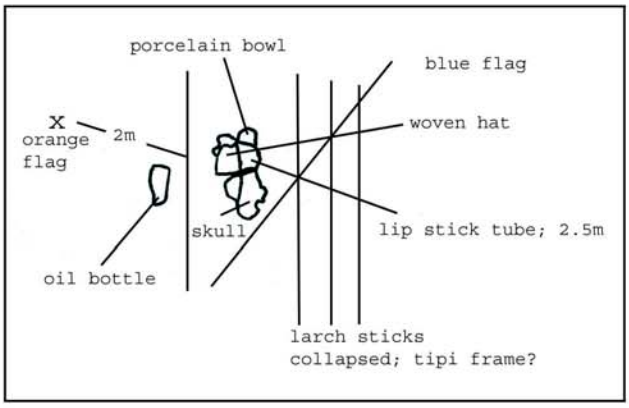


Datum: tree with double trunk(larger one) 190°/8.2 to south

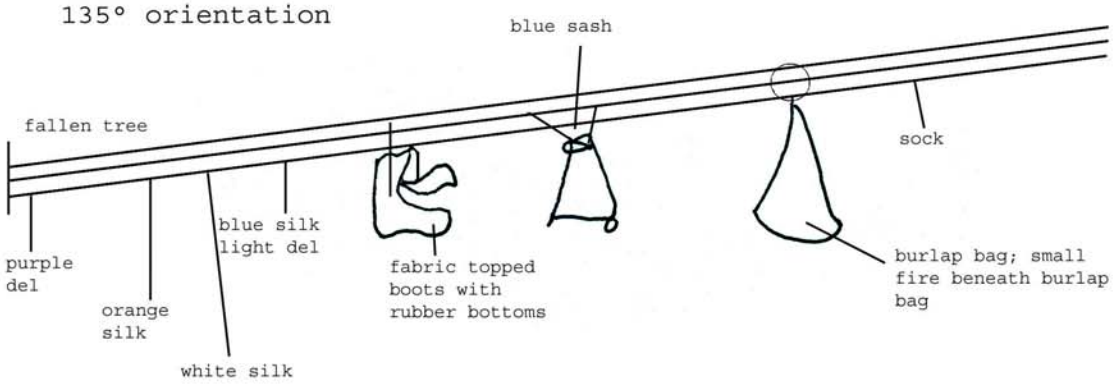
081°/21.5m to near end of tree "closet"
089°/25m to end of tree "closet"
125°/7.5m to end of rectangular feature
130°/5.7m to near corner of rec. feature
173°/3.6m white flagged tree
147°/19m white flagged tree and rice bag
146°/25.4m black sweater and shawl on tree
198°/18.3m white flag in tree
207°/23.5m white flag in tree
240°/12m white flag in tree
243°/13m white flag in tree
260°/4m blue and white flags, and juniper bundle in tree
290°/2.6m white flag
310°/6.7m white flag
330°/7m white flag
340°/5.8m white flag
340°/5m open suitacse
345°/3.8m white flag and chasecloth
000°/4.1m white flag
020°/4.5m white flag
030°/5.6m white flag
035°/9m white flag
283°/21.7m orange flag
285°/21.1m skull
294°/20.7m blue flag

Modern Burial Site
Above Shishged River
Camp GPS 205
Mapped by W.F. and
Marion Sikora
15 June 2006





Fallen tree, 1.5m above ground was hanging wedged in another tree. (see photos)
4.80m long
135° orientation

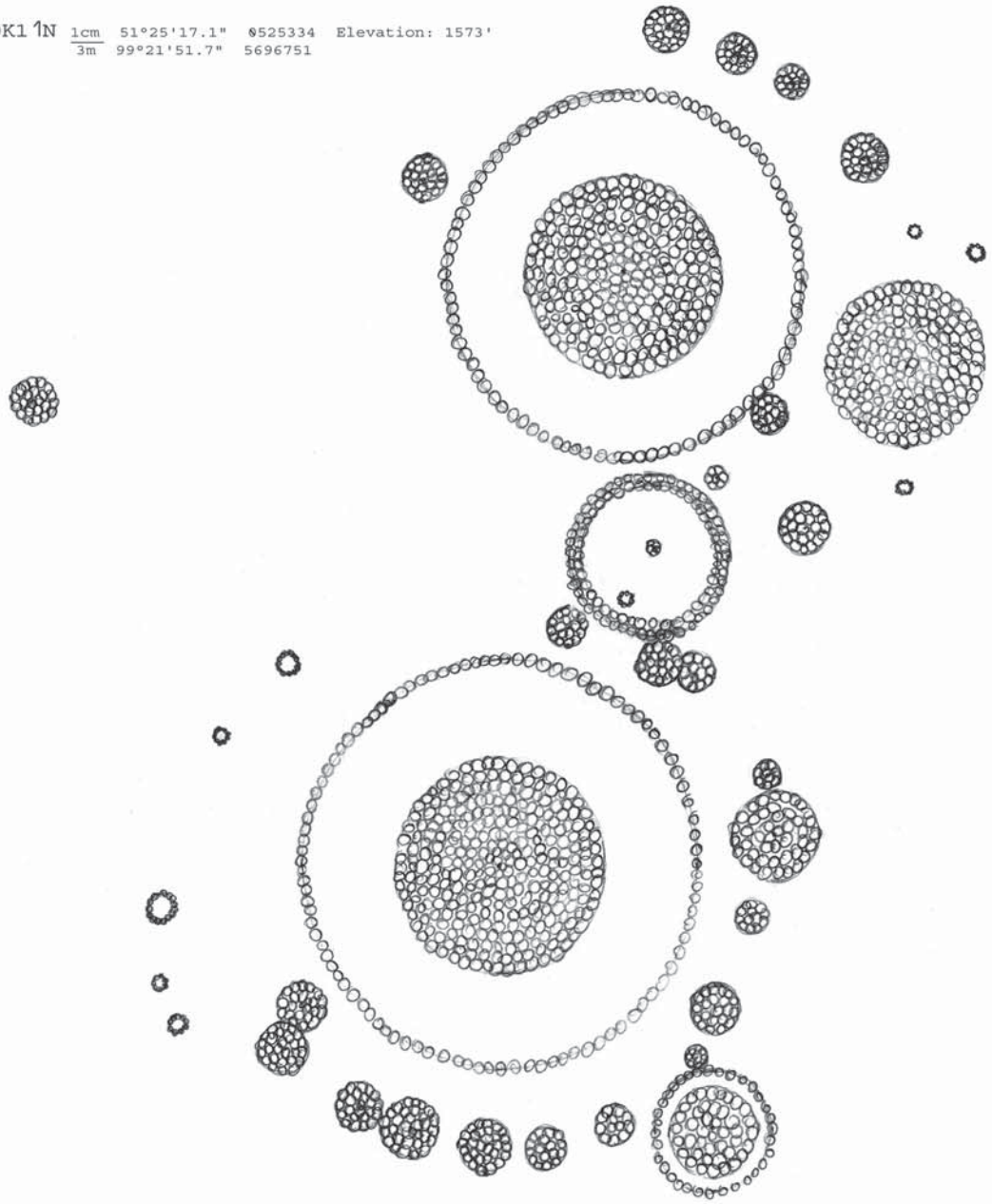


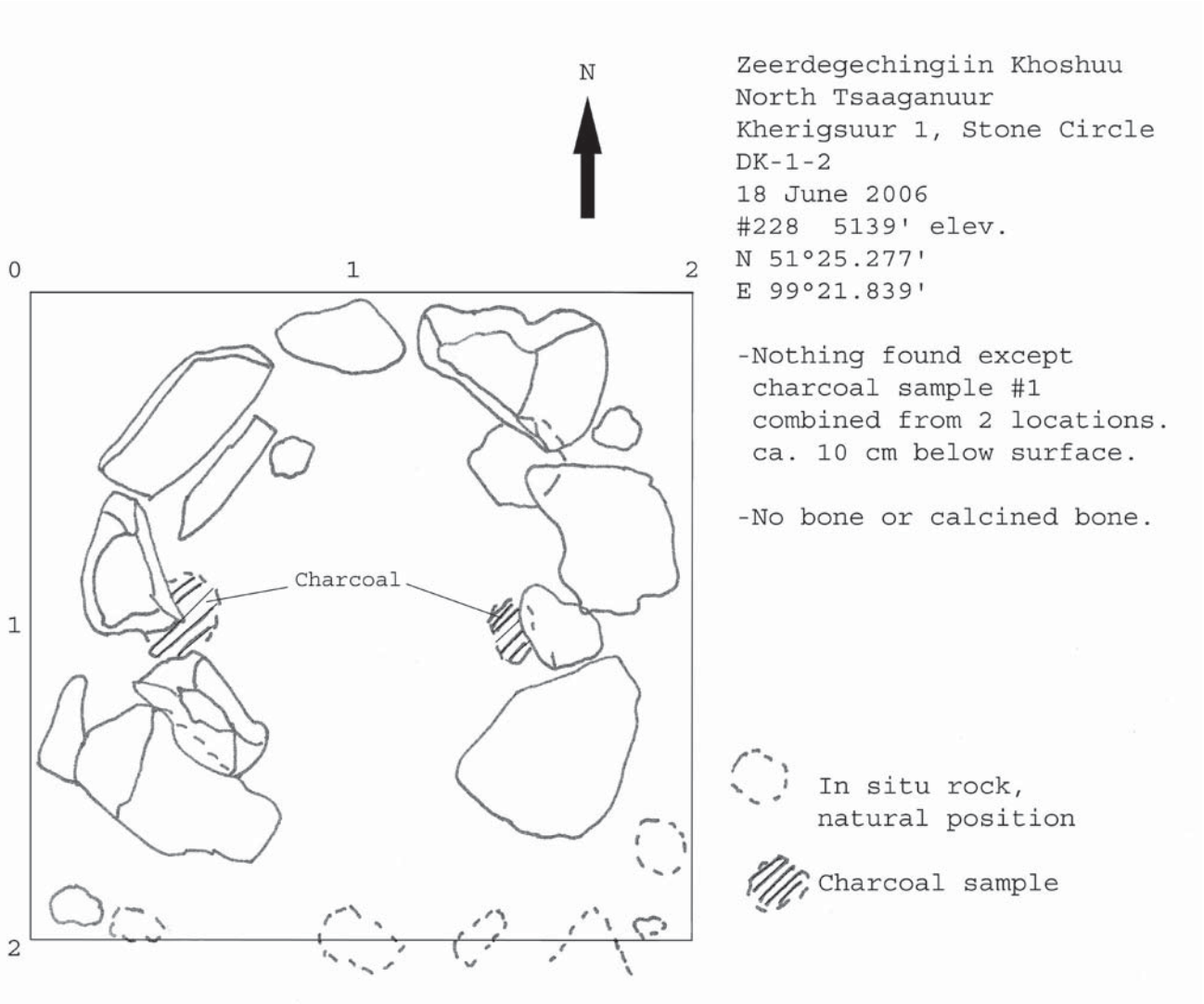
1. small pouch with green, clear plastic beads was hanging in tree, 1.5m south of "hanger" tree

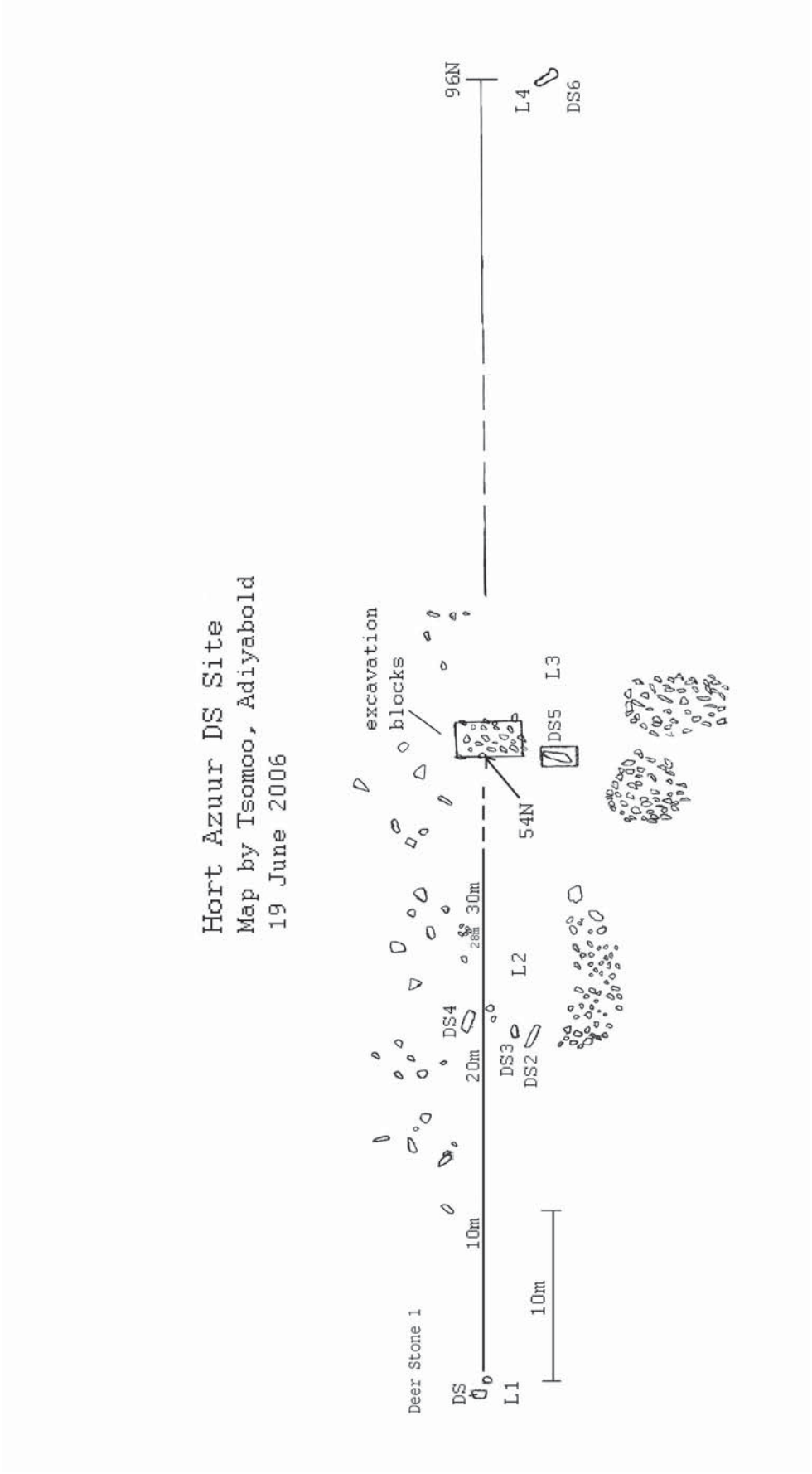
2. ground: 2 scarfs, felt coat liner, boot liner, and plastic comb in plastic case

(DK-1)
Mapped by Laura Short and Francis Allard

DK1 1N 1cm 51°25'17.1" 0525334 Elevation: 1573'
3m 99°21'51.7" 5696751

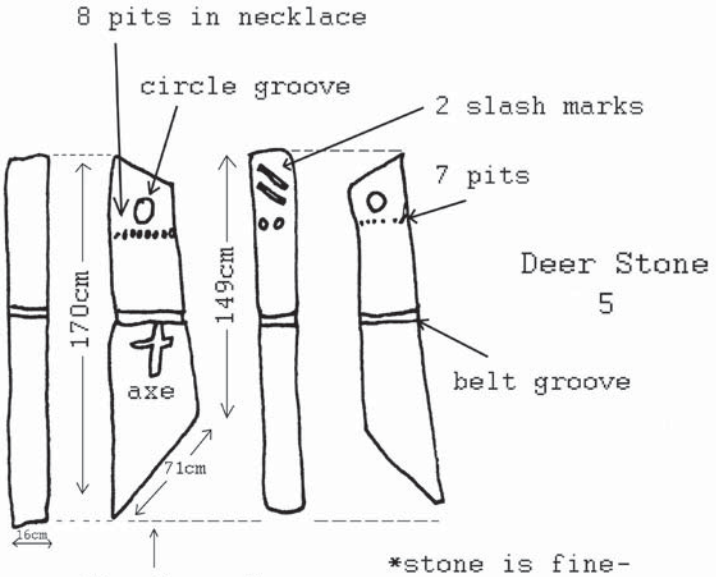



N
0
1
2
1
2
Charcoal
Zeerdegechingiin Khoshuu
North Tsaaganuur
Kherigsuur 1, Stone Circle
DK-1-2
18 June 2006
#228 5139' elev.
N 51°25.277'
E 99°21.839'
-Nothing found except
charcoal sample #1
combined from 2 locations.
ca. 10 cm below surface.
-No bone or calcined bone.
In situ rock,
natural position
Charcoal sample


Hort Azuur DS Site
Map by Tsomoo, Adiyabold
19 June 2006
Deer Stone 1
DS
L1
10m
10m
20m
30m
28m
DS2
DS3
DS4
L2
54N
excavation
blocks
DS5
L3
96N
L4
DS6

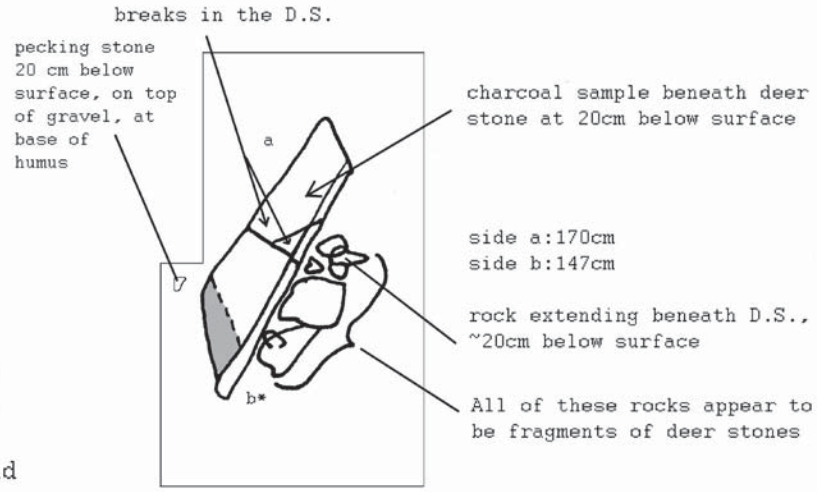
L3 Area

Hort Azuur
Deer Stone 5
19 June 2006



*stone is fine-grained, light-colored granite

*bone sample 20 cm below surface in brown soil

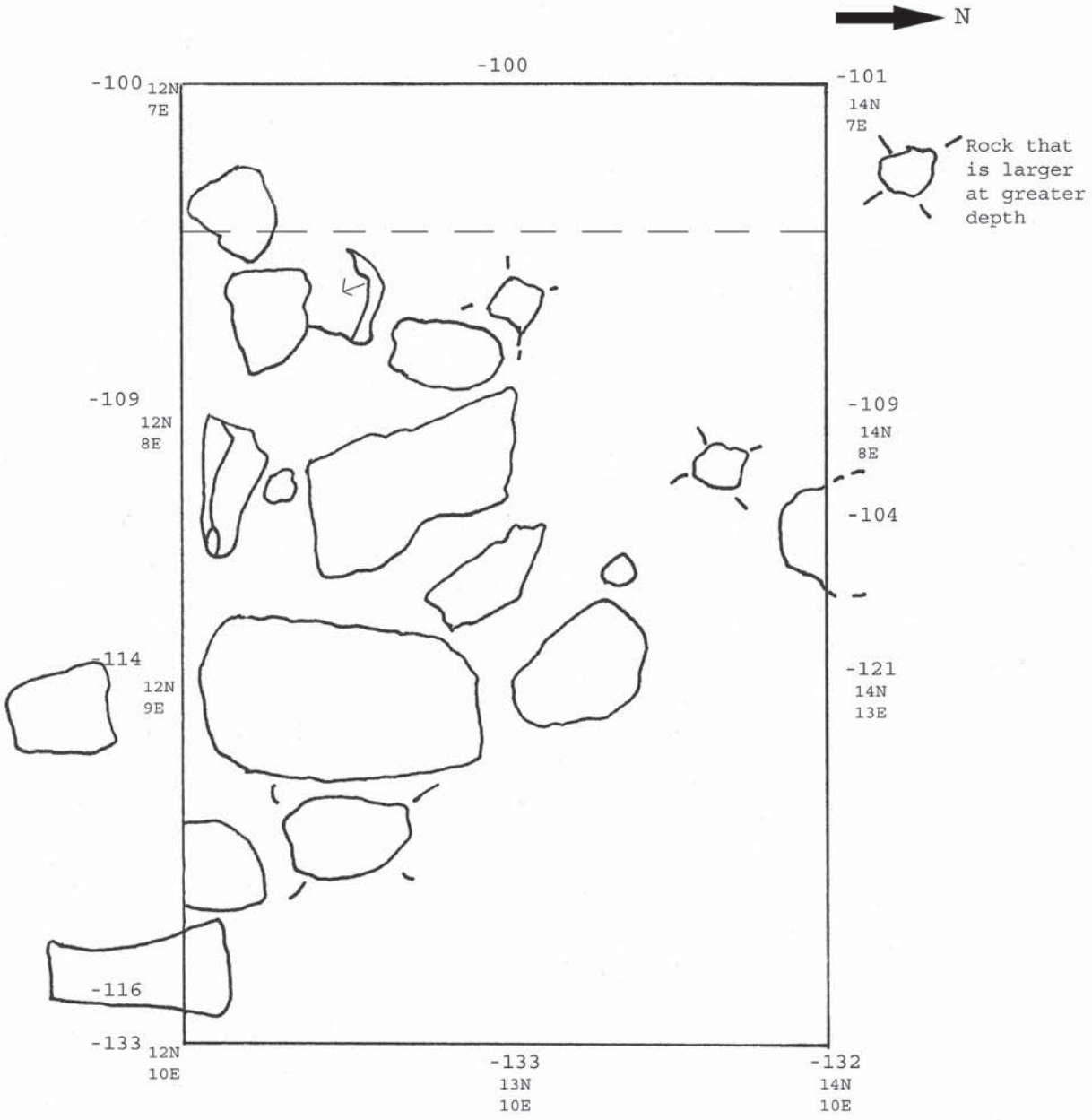


Stratigraphy

1. 3cm turf
2. Brown soil extends to 15 cm in east end of square, and to 30 cm at west end, conforming to the shape of the D.S. Perhaps the pit the D.S. was in originally and then it got turned around with its bast pointing East.
3. Yellow silty sand from 15cm-30cm
4. Yellow silty sand with cobbles below 30 cm

Ulaan Tolgoi
21 June 2006
Deer Stone 5
Feature 3, Map 1

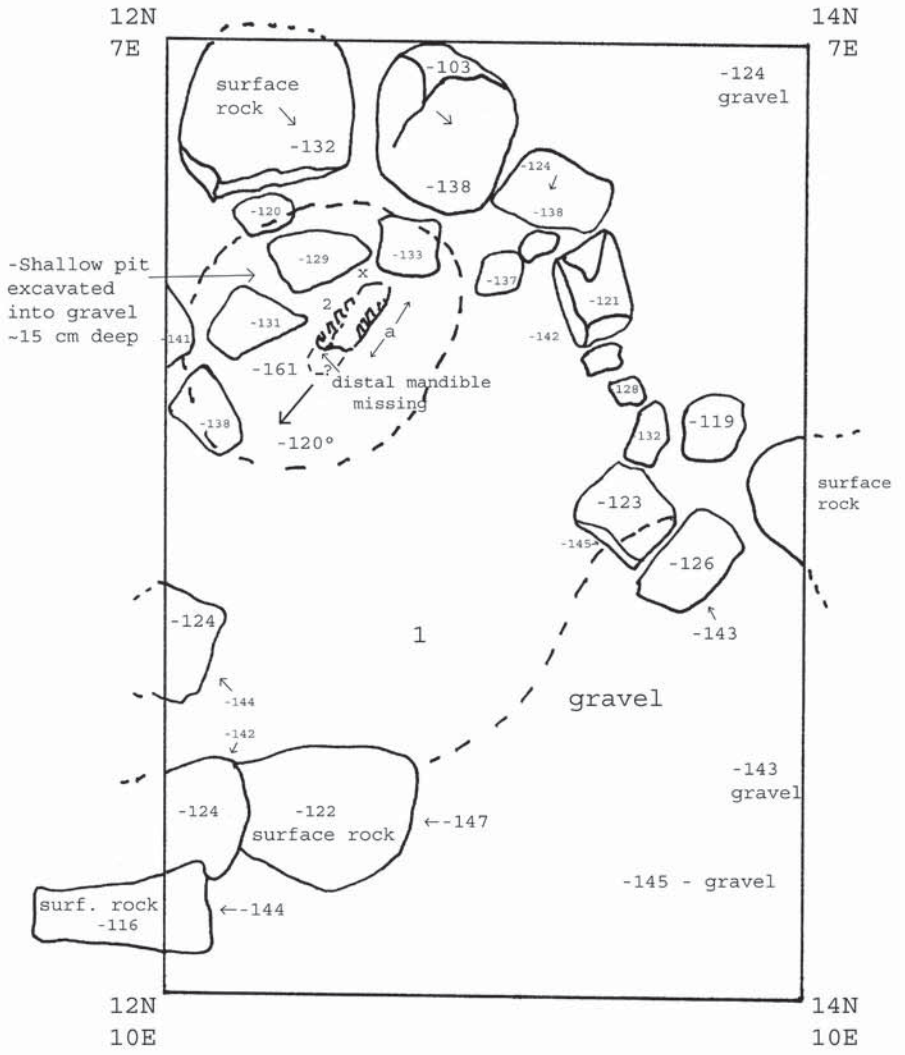
Datum level set at the upper belt line at the NE corner of Deer Stone 5.



Nothing found in upper level

Ulaan Tolgoi
22 June 2006
Deer Stone 5
Feature 3
Map 2

-Outer rock ring forms a good feature wall
-Rock depths are for top and bottom



a=26 cm
end of ramus to embedded canine

head aligns 120°
-horse head depths (cm)
-148 top
-161 bottom

*horse molar found separated from skull

right mandible

left mandible orientation

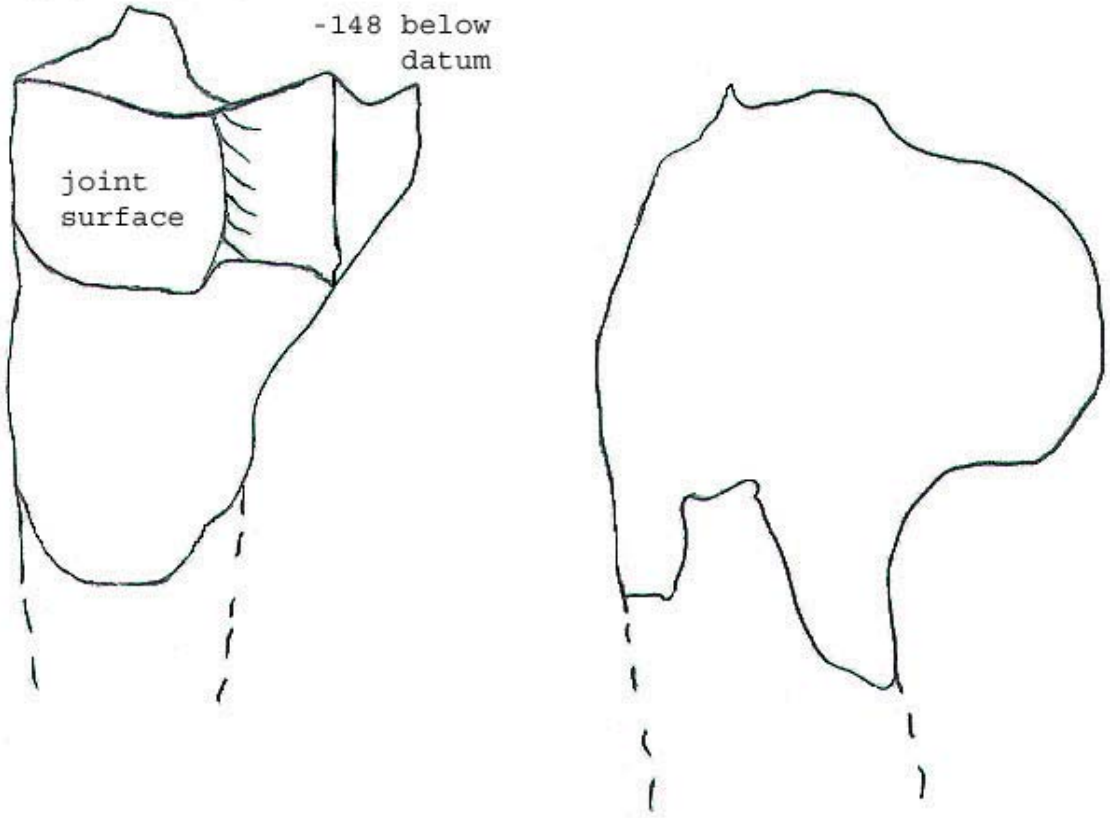
(**) two unerupted canines found in the bone; molars had very little wear

Locus 1: Leg joint of horse(?) found in brown silty soil at -148 below datum - does is belong to horse burial in Locus 2?

Locus 2: Crushed and badly preserved young male horse (**) skull found between -148 and -161 cm. B.D. in brown silty soil. The skull was not intact and had been crushed during/after burial, displacing its original position, but the general orientation of 120° was observed. The distal end of the mandible was eroded away and 2 ramuses had different orientations. One molar 10cm to west of skull-no hooves or vertebrae present.

Ulaan Tolgoi
Deer Stone 5
Feature 3
21 June '06

L-1 leg joint fragment in brown sand



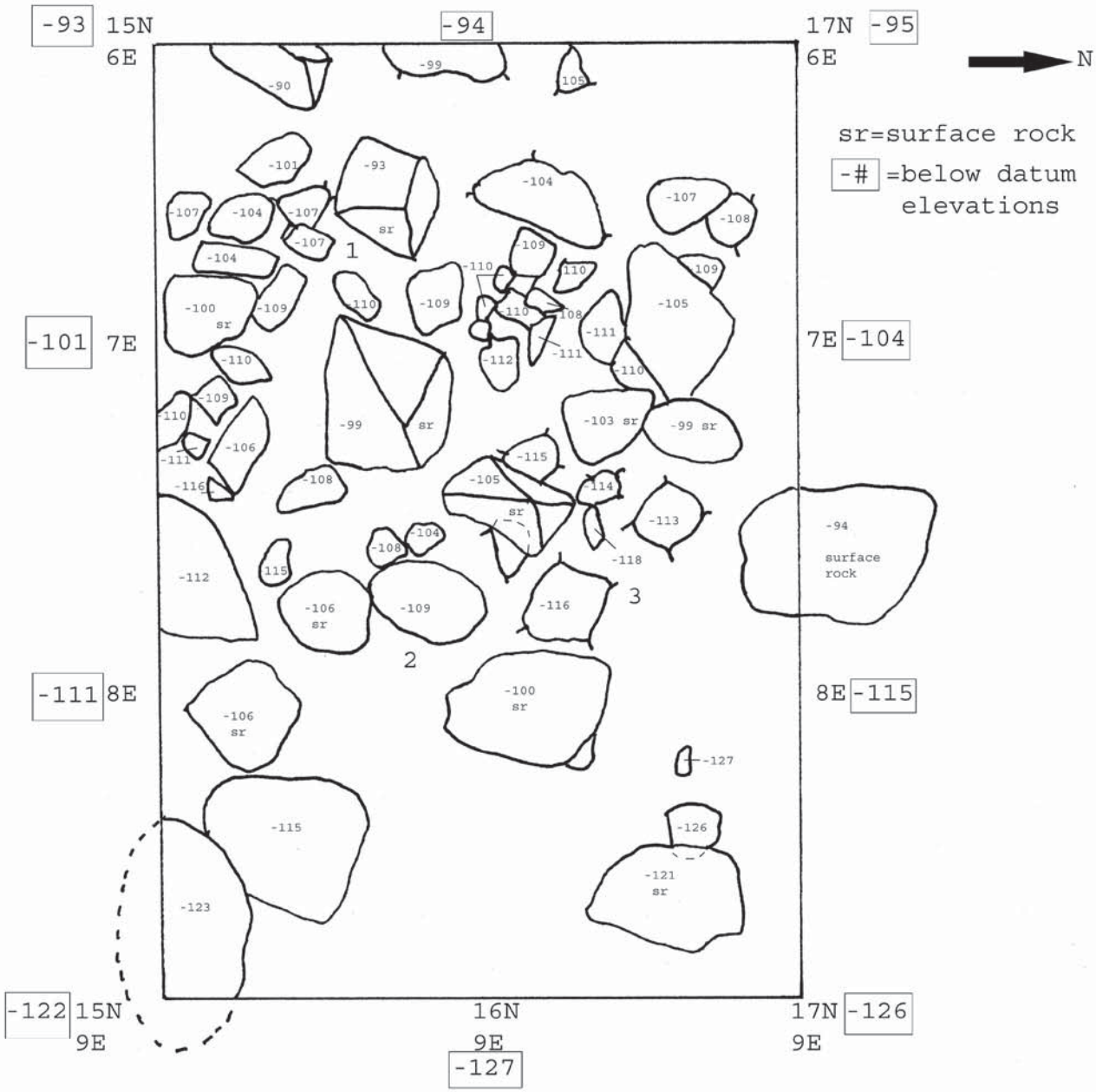
L-2 Young horse skull, only the mandible and teeth were preserved. One tooth collected separately for C14 dating.

2 Unerupted canines and little wear on the teeth, oriented 120°

It may be significant that a young male horse was buried in the outermost of the two rings of horse burials at DS-5; a less-prestigious location?

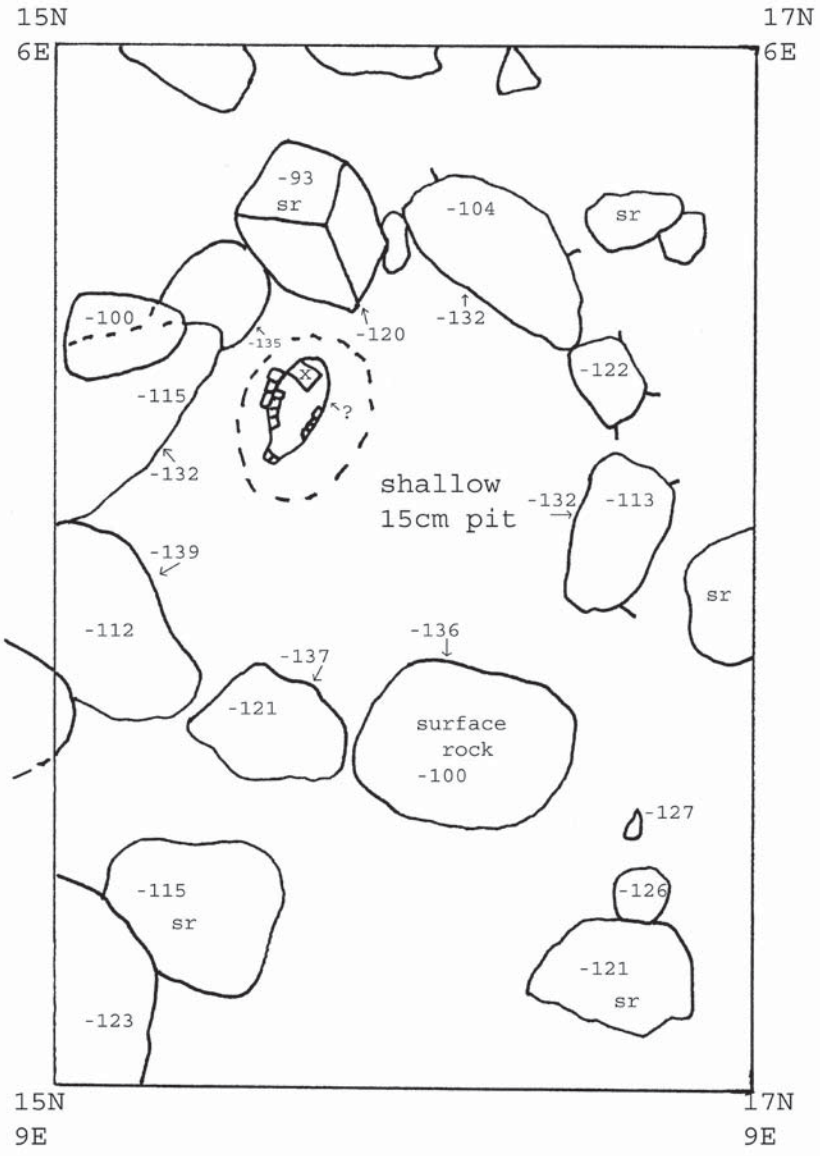
Map 1

Ulaan Tolgoi
Deer Stone 5
Feature 4
23 June 2006



1. Small piece of calcined mammal bone in upper brown soil at -121
2. Small piece of calcined mammal bone in upper brown soil at -132
3. Charcoal in upper brown soil at -133

Ulaan Tolgoi
Deer Stone 5
Feature 4
23 June 2006
Map 2



sr=surface rock

x=top of horse head
-143cm below surface
-collapsed skull frag?

-3 possible vertebrae along south side of skull
-Upper part of skull is not present
-Head oriented 109°
-Length from incisor to back of jaw: 19cm
-?=unusual incisor placement in dirt in back of jaw.
-Orientation of tooth was of a lower jaw tooth
-Bottom of horse head at -152
-No hooves and possibly 3 vertebrae

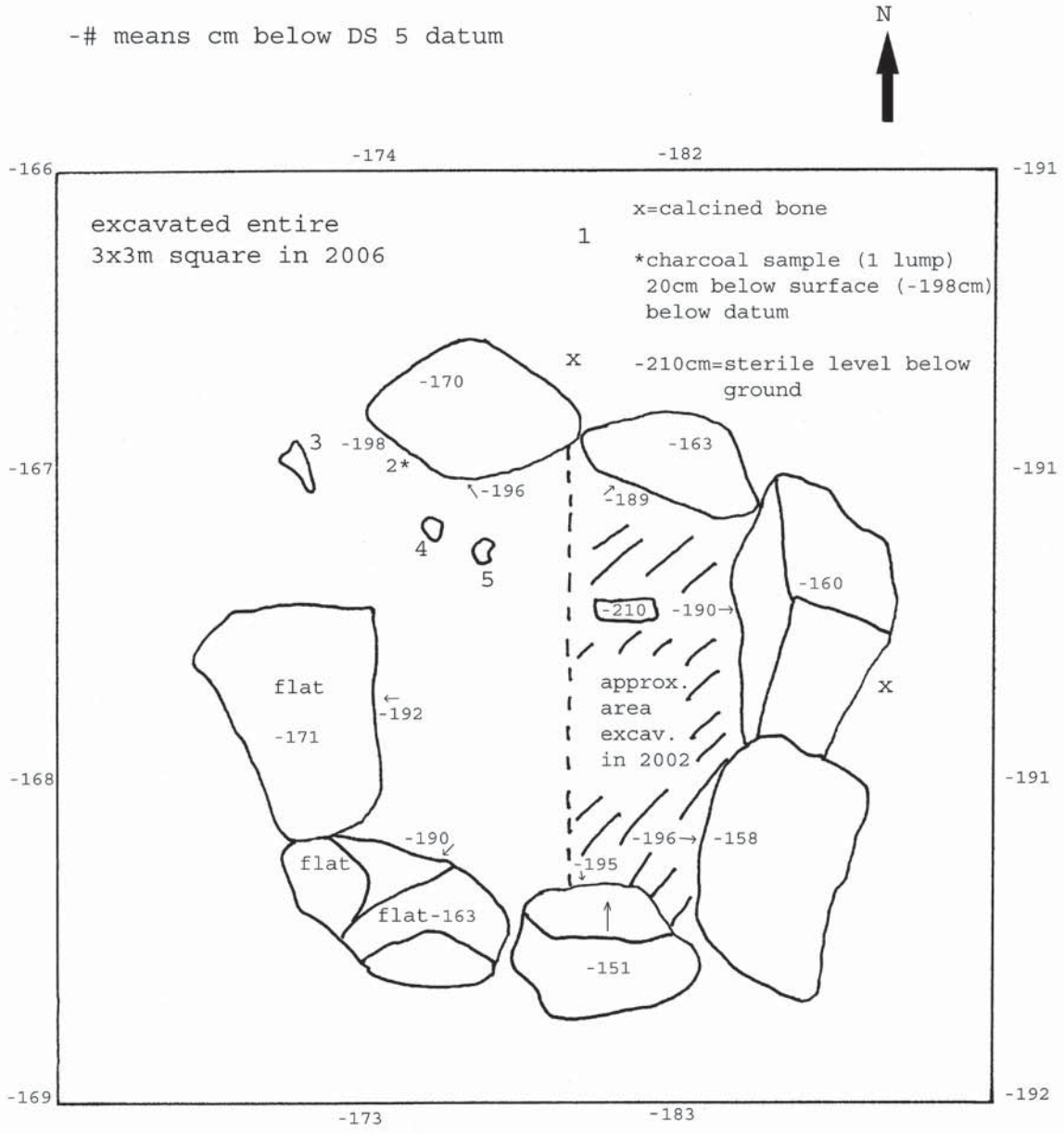
Brown silty soil extends 15cm below base of rocks to gravelly soil. About 5-8cm of gravel soil was scooped out to make the depression the horse skull was put into.

The base of the feature rocks is probably the original level of the surface ground, into which the buried pit was excavated. If so, about 25cm of soil has developed here in the past 3,000 years.

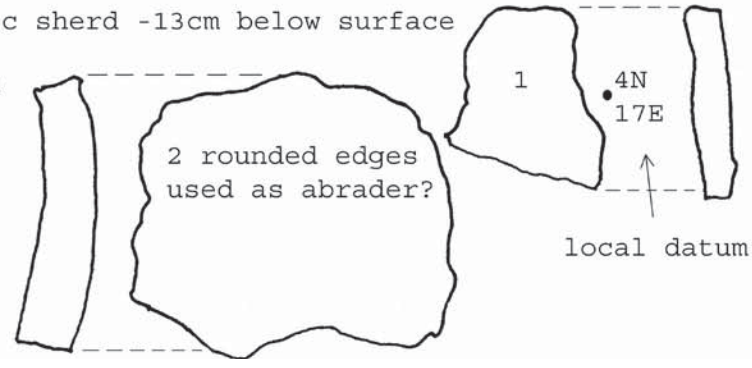
Ulaan Tolgoi
2002 Ring Feature
24 June 2006

The eastern half of this feature was excavated by W.F. and Sanjmiatav in 2002.

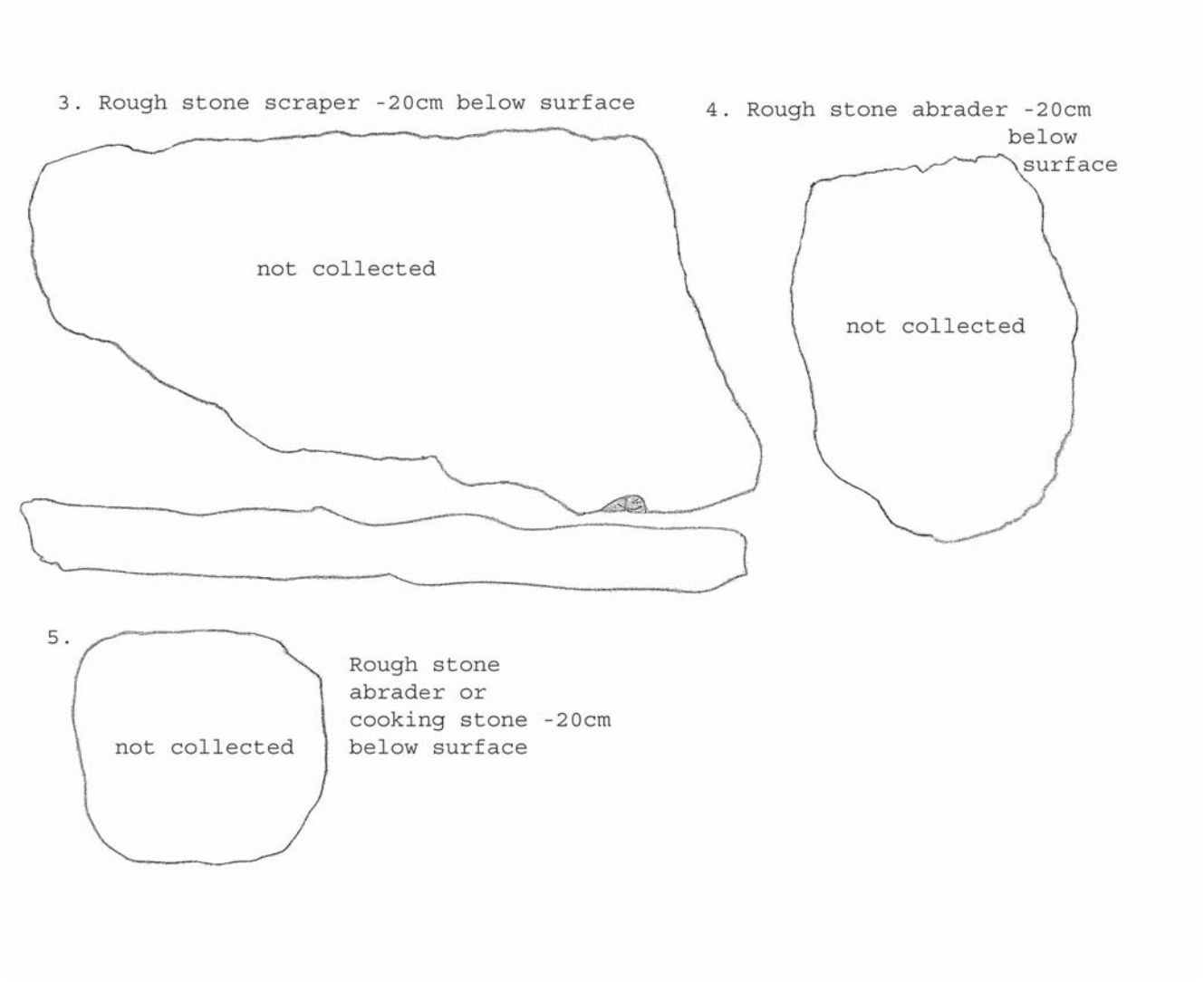
-# means cm below DS 5 datum



1. plain sand-tempered ceramic sherd -13cm below surface on top of coarse gravel.
2. plain sand-tempered ceramic sherd -20cm below surface in brown gravelly sand.
3. rough stone scraper (not collected)
4. stone abrador -20cm below surface.



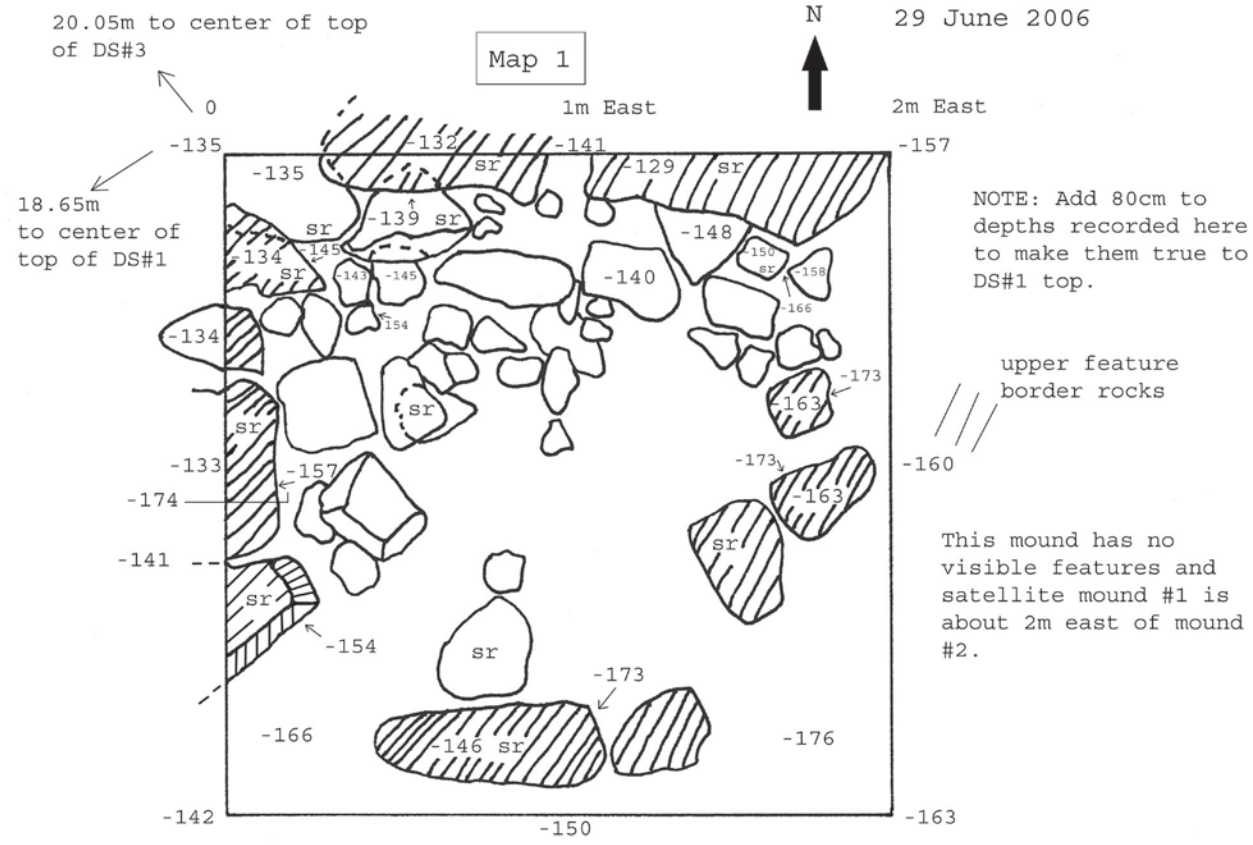
Ulaan Tolgoi
4N, 17E area
29 June 2006
2002 ring feature



*This mound is located a few meters east of DS 1/2.

Ulaan Tolgoi
Mound 2
Satellite Mound 1
29 June 2006

Map 1



NOTE: Add 80cm to depths recorded here to make them true to DS#1 top.

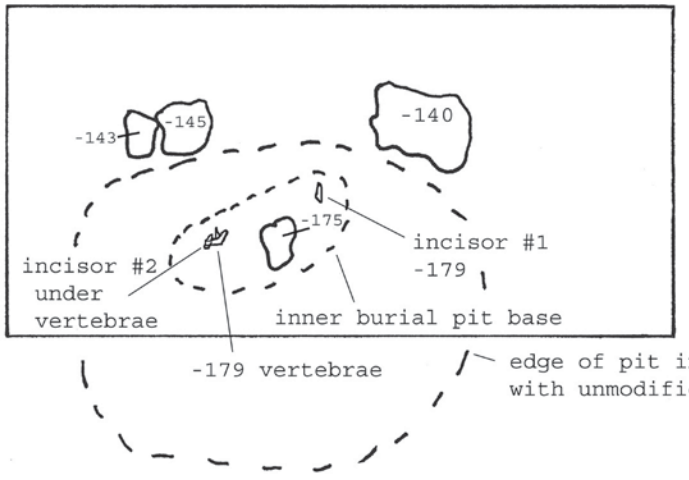
upper feature border rocks

This mound has no visible features and satellite mound #1 is about 2m east of mound #2.

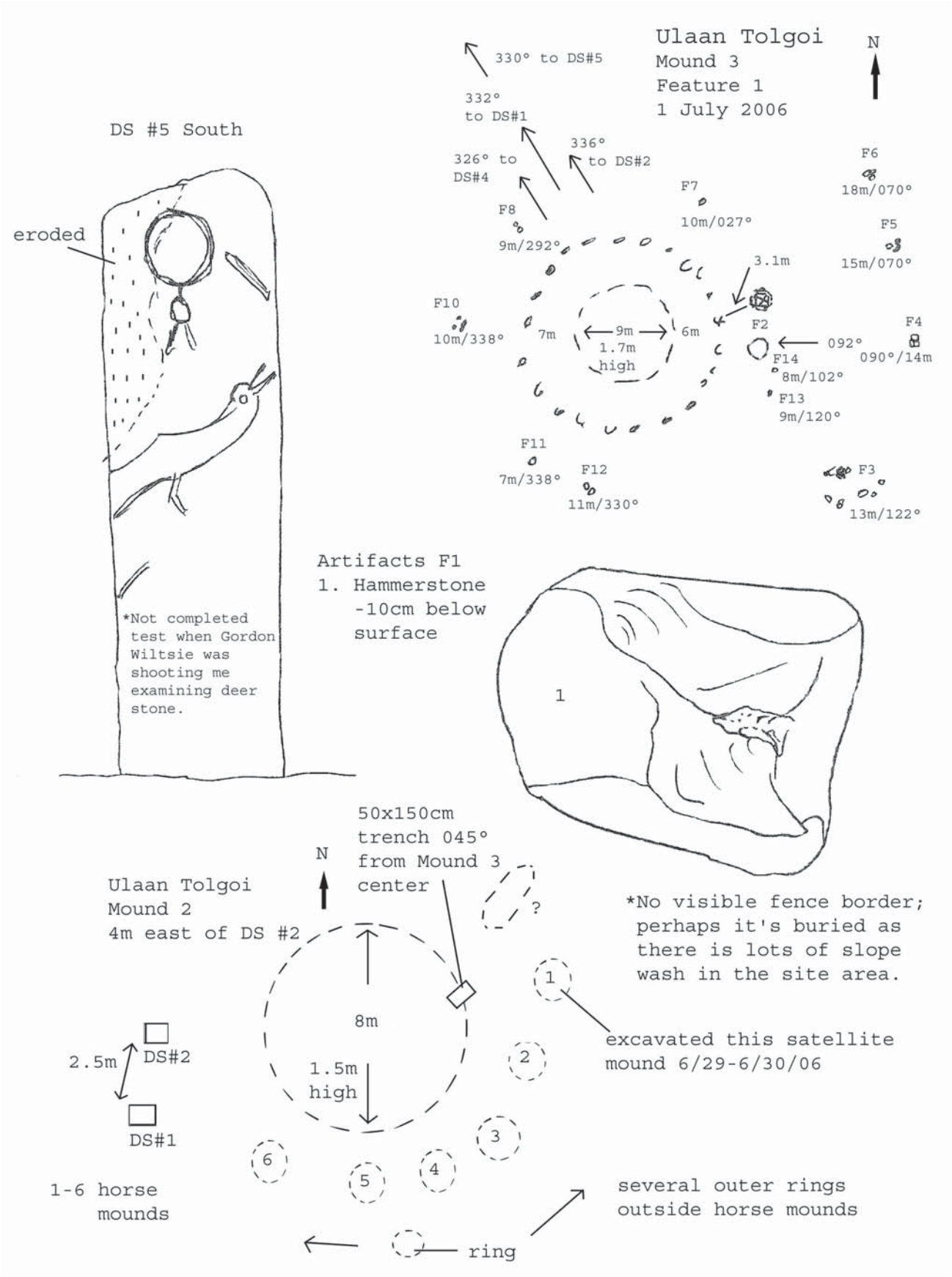
-Rich brown soil from turf level to -25cm below surface in center of the feature where there is a depression and no rocks from SE to NE.

Map 2

-Good preservation of bone, but no other pieces present. No orientation of skull/parts possible- unless this can be determined from photo of vertebra.



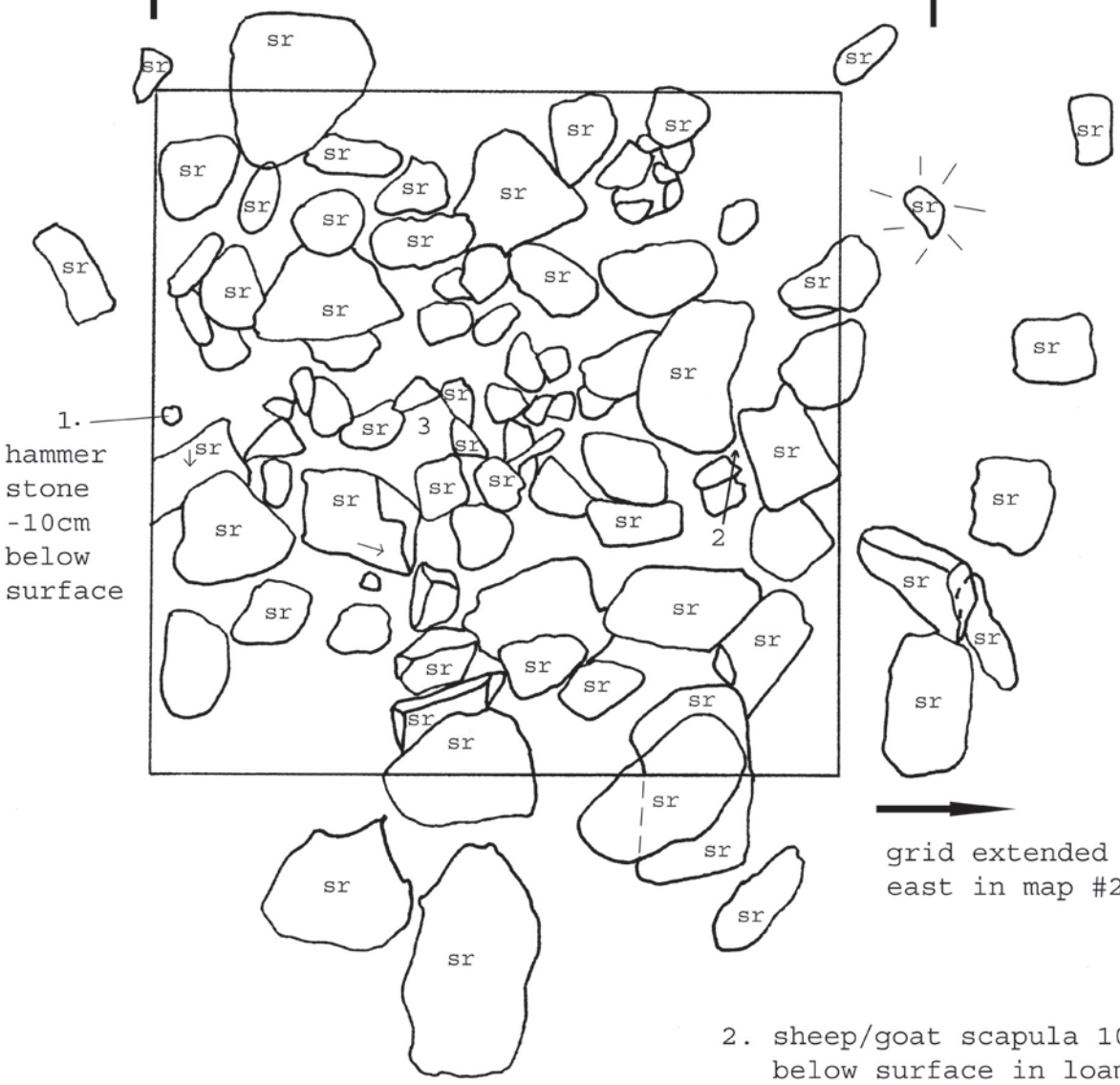
A single cervical verterbra partly covered with a small slab (-175) with incisor #2 beneath left side of vert. and #1 30cm to NE. No other bones. Burial is directly on coarse in situ gravel. No charcoal or other traces.


Ulaan Tolgoi
Mound 3
Feature 1
1 July 2006
N
330° to DS#5
332° to DS#1
336° to DS#2
326° to DS#4
F6
18m/070°
F7
10m/027°
F8
9m/292°
F5
15m/070°
3.1m
F10
10m/338°
7m
9m
1.7m high
6m
F2
092°
F4
090°/14m
F14
8m/102°
F13
9m/120°
F11
7m/338°
F12
11m/330°
F3
13m/122°
DS #5 South
eroded
*Not completed test when Gordon Wiltsie was shooting me examining deer stone.
Artifacts F1
1. Hammerstone
-10cm below surface
1
50x150cm trench 045° from Mound 3 center
N
Ulaan Tolgoi
Mound 2
4m east of DS #2
?
*No visible fence border; perhaps it's buried as there is lots of slope wash in the site area.
1
8m
2.5m
DS#2
DS#1
1.5m high
2
3
4
5
6
excavated this satellite mound 6/29-6/30/06
1-6 horse mounds
several outer rings outside horse mounds
ring

Ulaan Tolgoi
Mound 3
Feature 1, Map 1
30 June 2006

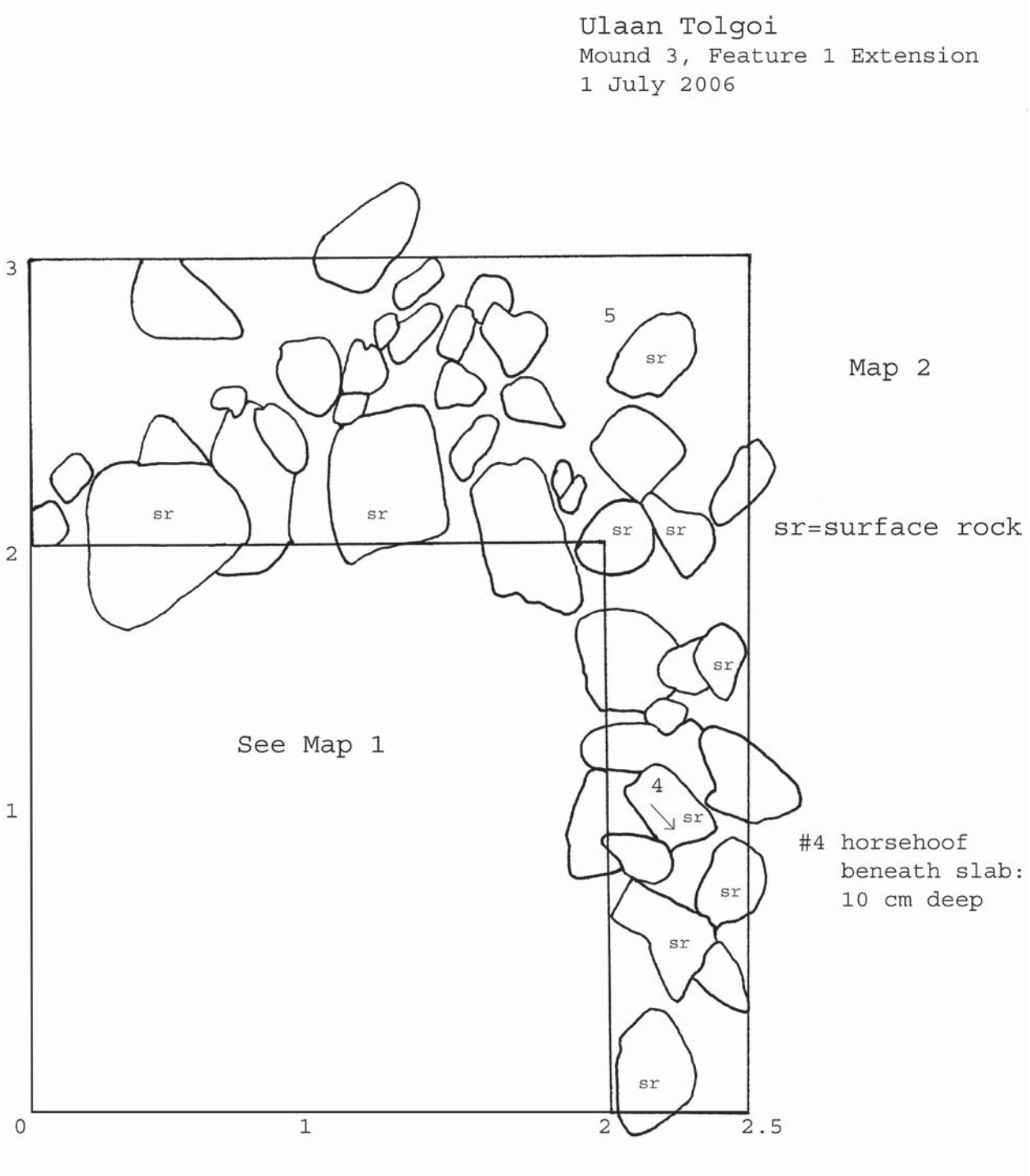
*Grid one meter north and 50cm to east in order to continue search for horse head.

N



2. sheep/goat scapula 10cm below surface in loam brown loam, found in this orientation.

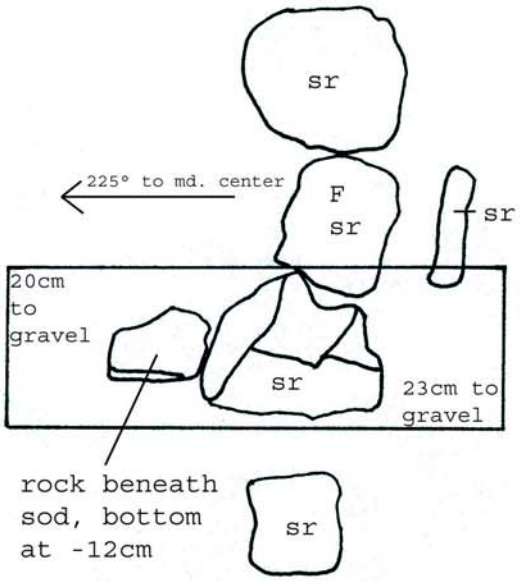
3. chert core at 47cm below surface beneath a small rock slab.


Ulaan Tolgoi
Mound 3, Feature 1 Extension
1 July 2006
Map 2
sr=surface rock
See Map 1
#4 horsehoof
beneath slab:
10 cm deep
sr
5
4
3
2
1
0
1
2
2.5

Ulaan Tolgoi
1 July 2006

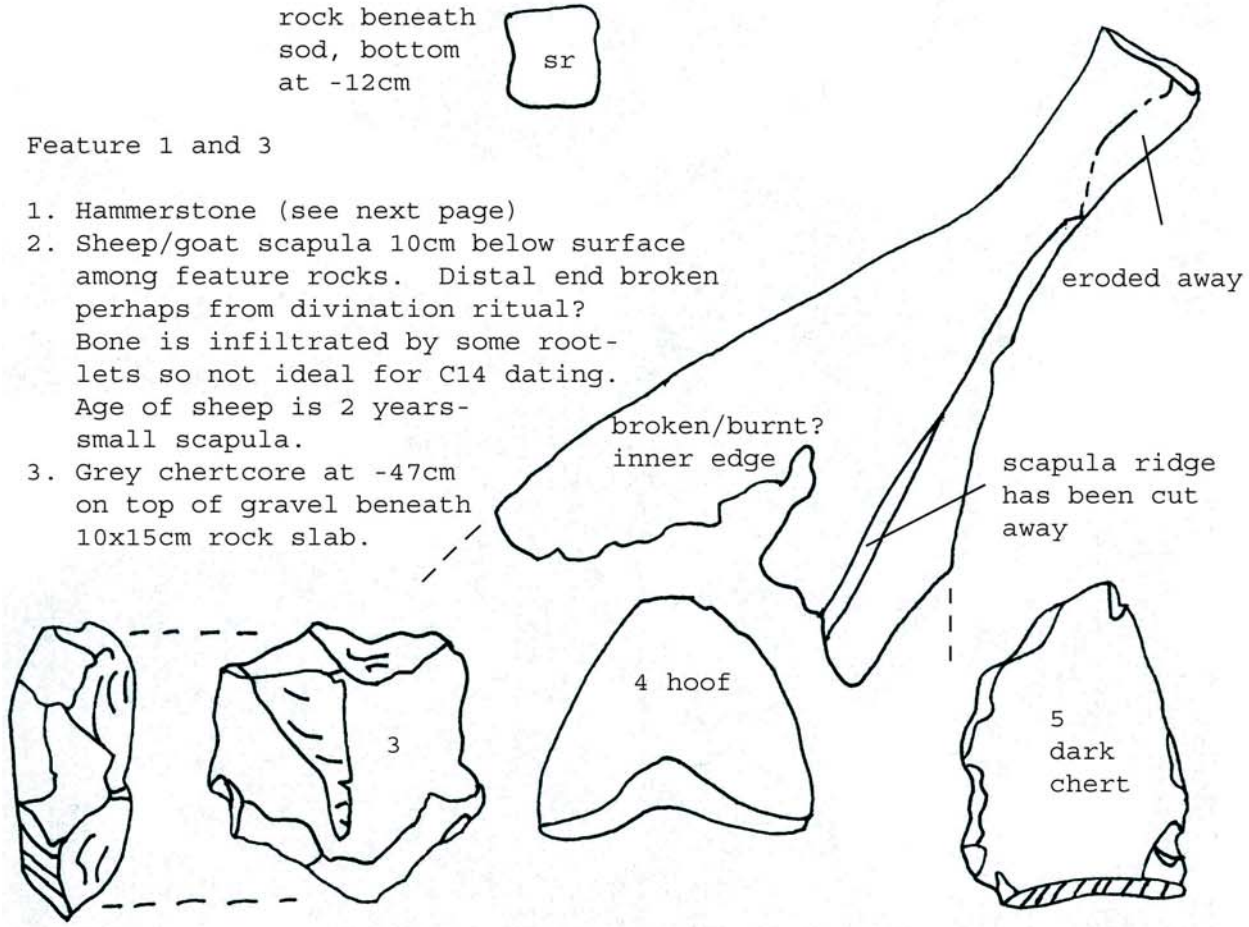
Test trench in NE fence in Mound 3: 20cm silty brown loam with no pebbles or charcoal. Single tier of fence rocks here. No sign of plaza pavement as at Kherig. on the rocky hill-slope above steppe.

Fence rocks lie on gravel at the base of brown soil.



Feature 1 and 3

1. Hammerstone (see next page)
2. Sheep/goat scapula 10cm below surface among feature rocks. Distal end broken perhaps from divination ritual? Bone is infiltrated by some root-lets so not ideal for C14 dating. Age of sheep is 2 years-small scapula.
3. Grey chertcore at -47cm on top of gravel beneath 10x15cm rock slab.

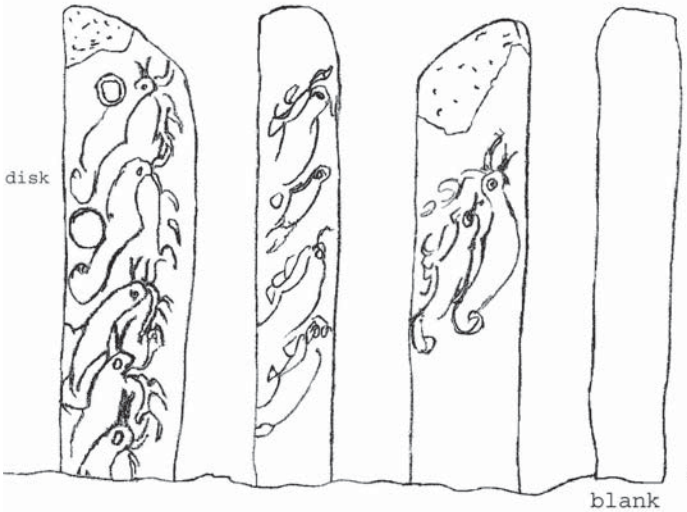


4. Horse hoof 8cm below surface beneath rock; what's it doing way up here?

5. Chert nodule with worked edges; strike-a-light? 12cm below surface in brown soil among rocks.

Khushuugiin Devseg Site
East Erkhel
1 July 2006

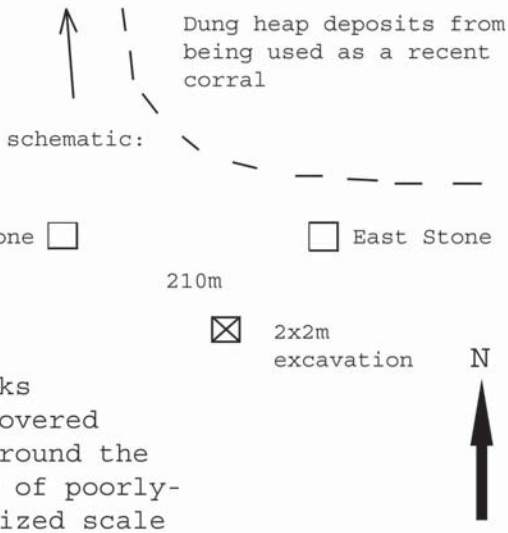
West Stone



-Irregular surfaces-nice carvings but roughly finished slab overall.

-See photos from 2005/2006

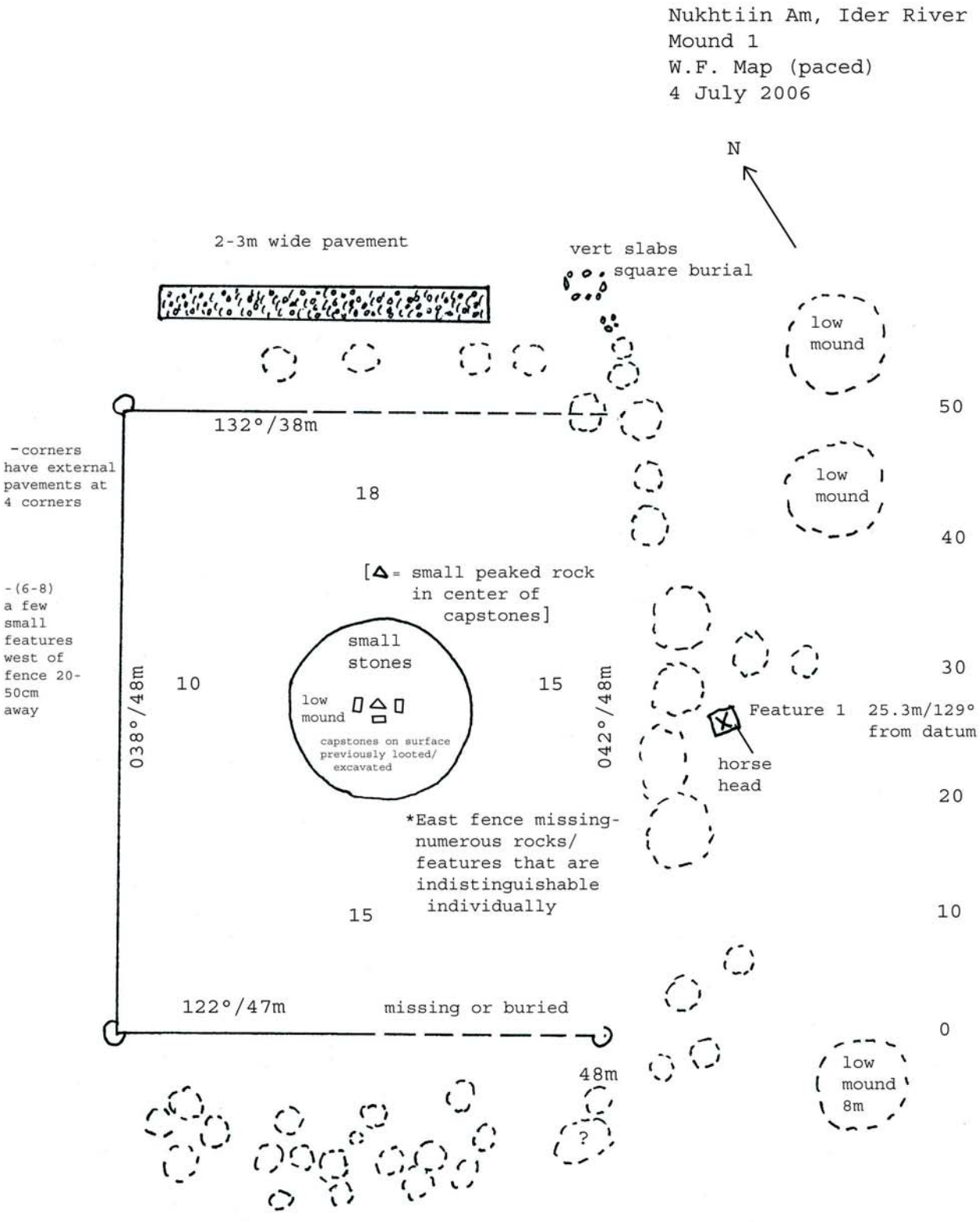
-See Bayaraa's notes and maps



Bayaraa's 2x2m test excavation revealed 40cm of black earth midden with many rocks and boulders. No horse remains were recovered but are likely in the rock-strewn area around the deer stones. The deposit contained lots of poorly-fired potsherds, most coated with carbonized scale on the outside, and many were broken in place. It might be possible to date these directly with AMS.

A horse tooth was also recovered and could be dated. Bayaraa thinks the ceramics and deposit date the deer stones, since there were no other stratigraphic indicators of another occupation.

The site is on a level plateau extending out toward the northwest from surrounding higher hills, and overlooks the Erkhel valley and lake. It is a very prominent location, and it may have other cultural components present in the vicinity. Presently, it is used as a modern herder's winter camp.



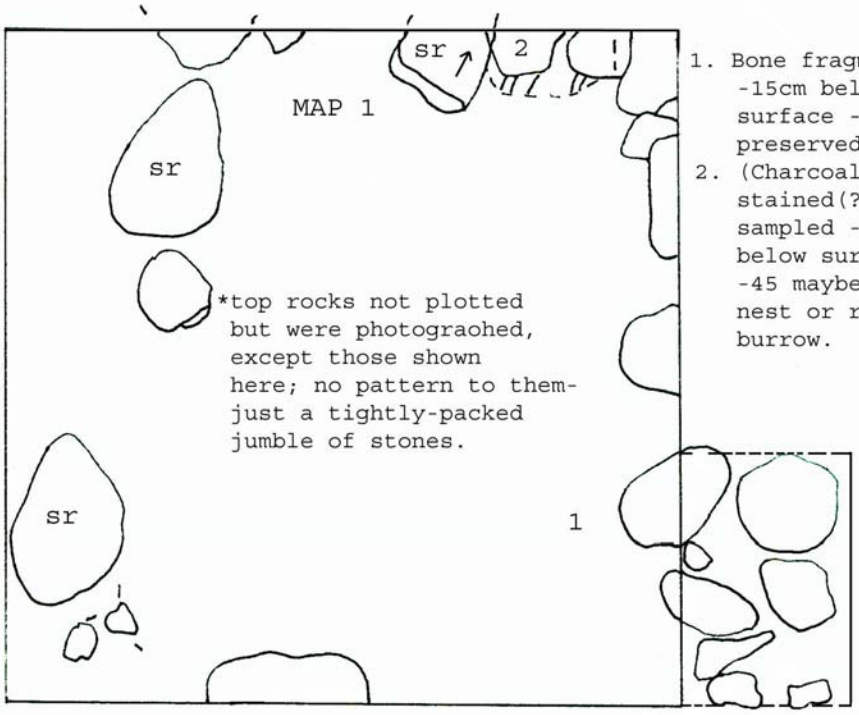
*difficult to distinguish these as individual features

Nukhtiin Am,Ider River
Mound 1
Feature 1
Satellite Mound
(C.Leece, Mendee,W.F.)
4 July 2006

N

-sterile gravel 15-20cm below surface

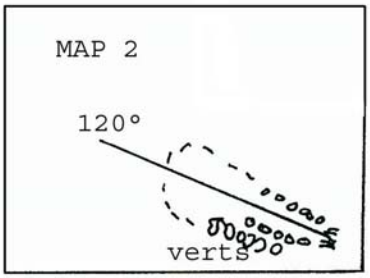
-upper soil is sandy silt with little or no organic content



1. Bone fragments -15cm below surface - poorly preserved.
2. (Charcoal?)-stained(?) soil, sampled -38cm below surface to -45 maybe an ant nest or rodent burrow.

*top rocks not plotted but were photograohed, except those shown here; no pattern to them- just a tightly-packed jumble of stones.

*these rocks are directly above the horsehead



-top of remains 15cm below surface

-50cm from maxilla incisors to end of skull

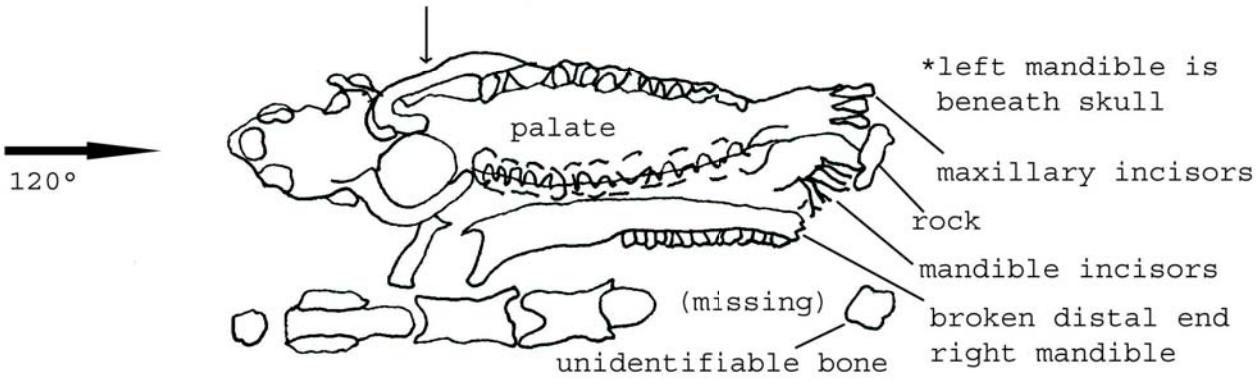
Excavation fine silty sand from surface to top of rock level. Below rocks fine sand continued to sterile gravel level at -30cm to -32cm below surface. Below 5cm of gravel, fine silty sand begins again. So gravel level is probably an erosion/lag surface.

Bone was first found in SE corner of square near the wall, so we expanded the square 50x75cm and found the front teeth very poorly preserved because it was only 10-15cm below the surface. Cranium mostly just flakes of bone and even the teeth are not very solid. Vertebrae line is on south side of skull with 4-5 verts present in very flaky condition.

*Orientation of head similar to N,S fences of the Kherigsuur S=122, N=132. Base of skull is 20cm below surface.

Nukhtiin Am, Ider River
Mound 1
Feature 1
4 July 2006

*this is a mystery bone: see photo (two bones, articulated)



*No hooves found

50cm teeth to proximal end of skull

PART IV

DOCUMENTATION OF MONGOLIA'S DEER STONES – 2006 Field Season

Harriet F. (Rae) Beaubien
Senior Objects Conservator

Basiliki Vicky Karas
Contract Conservator, 3D scanning

Leslie G. Weber
Conservation Fellow, FY2006

OVERVIEW OF THE 2006 FIELD SEASON

The 2006 field season was the second year of conservators' involvement in the field activities of the Joint Mongolian-Smithsonian Deer Stone Project [DSP], directed by William W. Fitzhugh, of the National Museum of Natural History's Arctic Studies Center.[1] Led by senior conservator Harriet F. (Rae) Beaubien (primary author of this report), the conservation team consisted of conservation fellow Leslie G. Weber and contract conservator Basiliki Vicky Karas, who was also part of the 2005 field team. Our primary goal during the 2006 field season was to continue our deer stone documentation program, featuring 3D scanning. MCI's participation was supported by funds from the Smithsonian's Under Secretary for Science Endowment and the Samuel H. Kress Foundation.[2]

Beaubien and Weber arrived in Mongolia on 1 June 2006, along with most of the DSP team, with Karas following on 4 June. The 3rd Annual Symposium of the Joint Mongolian-Smithsonian Deer Stone Project was held in Ulaanbaatar, with conference presentations on 2 June and workshops on 3 June. Results from our previous season's scanning pilot test and plans for the 2006 season were outlined in Beaubien's presentation, entitled *3D laser scanning deer stones in Hovsgol aimag – 2005 field results*. Other contributions to the symposium included a presentation by Weber, sharing the results to date of her project at MCI, entitled *Analytical study and conservation of two extraordinary objects from the Xiongnu Cemetery, Gol Mod 2*. Excavated by the Khanuy Valley Project on Early Nomadic Pastoralism [KVP], under the direction of Drs. Francis Allard (Indiana University of Pennsylvania) and D. Erdenebaatar (University of Ulaanbaatar), the objects were conserved on site in 2005 and then later temporarily transferred to MCI for further study.[3]

After provisioning for the field, the DSP team left Ulaanbaatar on 6 June, along with KVP team members collaborating in the archaeological and ethnographic field work this year. The joint team spent several days (7-10 June) in the Khanuy Valley (Arkhangai aimag) en route to Hovsgol aimag. Once in the aimag capital of Muren, the scanning team, which now included an archaeological assistant, Songuulkhuu Namjil, and driver Narangil, remained to carry out deer stone scanning activities at the site of Ushkiin Uver (11-26 June) (**Fig.1**). Subsequently, we joined the DSP encampment at Ulaan Tolgoi for additional scanning (26-29 June). At the conclusion of the scanning phase, the conservation team returned to Ulaanbaatar, arriving 30 June. Karas and the equipment returned to the United States on 1 July, while Beaubien and Weber remained until 13 July in order to carry out archaeological conservation work on stored collections, including those of the KVP (this work is the subject of a separate report.[4]

All conservation activities were recorded in a hardbound notebook, supplemented with

worksheets for individual deer stones, digital photographs and digital scan files. The original documents and additional reports are archived at MCI, in Suitland, Maryland. The deer stone documentation activities are summarized below, with selected illustrations provided in the Illustrations section.

DEER STONE DOCUMENTATION

The documentation effort initiated by MCI in 2005 includes the following components: physical measurements and condition notes, photography, and 3D scanning, using systematic monument labels and side designations. Additional information, including context and previous documentation and conservation efforts, is expected to be incorporated into these records. Of these components, our focal activity has been 3D scanning, as a promising technology for serving both documentation and preservation needs.

3D Scanning – Background

For capturing deer stone information 3-dimensionally, the only method that had been tested previously by the DSP was direct molding, carried out on deer stone #14 at the Ushkiin Uver site by Smithsonian model-makers in 2002.[5] This method produces accurate documentation-to-scale of topographic and dimensional aspects, and is generally considered a relatively safe, simple and inexpensive procedure. There is, however, considerable risk of staining or damaging sensitive object surfaces during the application and removal of mold materials. In this particular case, all materials had to be imported, the molding stage took two days, and best results required experienced personnel at both molding and casting stages, making it an impractical choice for documenting deer stones on a bigger scale.

The scanning technique offers significant advantages: high-resolution dimensional and topographic information is gathered in a matter of hours and in digital format, without directly contacting the object surface. The digital files can be displayed graphically and exported, with further manipulation, for use in virtual exhibit and analysis applications, and to specialized milling and 3D printing machines to create high-resolution models. The digital files themselves have a better long-term preservation prognosis than any other 3D documentation method, with storage on CD and migration to other digital media as needed, and any number of reproductions can be made without data degradation, in contrast to a conventional mold's limited reusability.

For the 2005 pilot project, the 3-person MCI team used a Polhemus FastSCAN Cobra™ laser system for scanning.[6] Its portability and compactness were ideal for use in the field, but several features posed challenges in creating a suitable scanning environment for each deer stone: sensitivity to direct sunlight, which interferes with the data capture; poor performance in cold environments; and inability to be used in the vicinity of metal objects, given the system's use of magnetic field triangulation and resulting distortion in spatial data. To create adequate conditions for scanning, temporary tent-like shelters were built over the deer stones using wooden poles, including 5-meter lengths borrowed from nearby animal corrals, draped with medium-weight canvas and supplemented inside with light-weight black fabric.

Over a three-week period, scanning tests were conducted on twelve deer stones at six sites in the DSP's key research area – Ushkiin Uver (#1), Tsatstain Khoshun (#1), Evdt Valley (#1), Ulaan Tolgoi (#1-#5), Erkhel East 1 (#1-#2) and Erkhel North 1 (#1-#2). Complete raw data files were produced for ten of these (all but the first two) but one of them (Ulaan Tolgoi #2) was seriously flawed. Its great height exposed a shortcoming of the Polhemus system: its reliance

on a fixed datum point and functional range limits between the system components meant that objects over a certain size (approximately 2 m) could not be scanned as a single unit. In this case, files for upper and lower halves were generated, which would have to be unified during post-processing.

While the raw data files are generally good, they contain significant digital "noise" derived from an inherent weakness in the working properties of the hand-held laser scanner and system software. The post-processing steps, currently underway at MCI, have been time-consuming, in order to produce relatively clean exportable data files (.stl format). In the meantime, a second scanning system was acquired by MCI and this was selected for use in the 2006 project (described in the Materials and Methods section below).

Documentation Sites in 2006

The site of Ushkiin Uver was selected as a focus for the 2006 project because it contains one of the largest concentrations of deer stones, and includes the unusual "face" stone (#14), molded and cast by Smithsonian staff from the Office of Exhibits Central in 2002, as well as other exceptionally carved stones (**Fig.2**). It is considered a site at particularly high risk of vandalism because of the site's ready accessibility to visitor traffic via Muren. From published accounts within the last 20 years, the site originally contained 15 deer stones, one of which was subsequently lost to theft. Several pieces were recently recovered, and are now in storage at the Hovsgol Museum in Muren. Most of the stones at the site appear to have been cleaned of lichens; they display localized discoloration from animal rubbing, as the site is a thoroughfare for neighboring herds, and suffer from occasional graffiti. Since 1999, the site has been investigated by the Permanent Archaeological Joint Mongolian and Japanese Mission [PAJMJM], directed by Drs. D. Erdenebaatar and Dr. Takahama Shu (Kanazawa University).

Other deer stone sites were included in the documentation schedule as time permitted. Preference for additional scanning was given to Ulaan Tolgoi, the focus of our 2005 scanning effort as well as of the DSP's archaeological investigations (**Fig.3**). Another site of particular interest was KYR119, a ritual site in the Khanuy Valley (Arkhangai aimag), at which dozens of deer stones, re-used in later slab burial constructions, were excavated by Soviet-Mongolian projects in the mid-20th century (**Fig.4**). The site and neighboring *khirigsuur* sites have been a focus of investigation in recent years by the KVP.[7] Only photographic documentation was carried out at the latter, along with two other sites en route, Burdnii Ekh and Khushuutii Am (**Figs.5, 6**).

Methods and Materials

Deer Stone Labeling. The deer stone designations used for these records are described below. For upright stones, our convention for labeling the individual sides is to begin with the south face (side 1) and continue around the stone clockwise (west as side 2, etc.).

• Ushkiin Uver. The deer stone designations follow those used by Volkov[8] and by the PAJMJM[9] (**Figs.7, 8**). Deer stones 1-3 form the eastern row (from south to north) and continue with 4-14 in the western row (from north to south). Deer stone 15 is no longer extant on site, but two recently recovered fragments are now in the Hovsgol Museum, and designated as such.

• Ulaan Tolgoi. Following the system used in previous years by the DSP,[10] the stones at the site are numbered 1 through 5, from south to north (**Fig.9**).

• Burdnii Ekh. The deer stones, numbered by Beaubien on a sketch plan made at the site (**Fig.10**), were designated differently in Volkov's recording of the same site, named Khairkhan

Khundii.[11] His site plans are included for reference (**Figs.11, 12**).
• KYR119. Deer stone designations were assigned by Beaubien team in consultation with Allard. Deer stones 1-3 are located within the khirigsuur complex (**Fig.13**). The larger deer stone clusters were informally referred to as Group 1 (5-14), Group 2 (15-22), Group 3 (23-28), as shown on Allard's schematic plan map (**Fig.14**).
• Khushuutii Am. The 6 stones were designated 1 through 6 from south to north, following the system used by Volkov and also by PAJMJM[12] (**Fig.15**). The isolated stone to the north (mentioned also by PAJMJM but not recorded by Volkov) was assigned number 7.

General documentation. In addition to the scanning records, documentation included the following information. Digital photographs were taken of all accessible sides; these incorporated label, standard color and dimension scales where possible. Condition notes and measurements of the Ushkiin Uver deer stones were recorded using acetate overlays on photographs taken in 2005 (**Fig.16**). The color-coded condition features included deep cracks, spalling cracks, areas of exposed lamination layers, and losses; lichen, bird droppings and other biological accretions; stains from human applications and from animal rubbing; mineral crusts, concrete residues, and graffiti. For sides not previously photographed, drawings were made and coded as above. Site location and elevation were recorded with a Garmin GPS device**.** Tilt angle of sides and directional orientation of deer stone footprints were recorded with a Brunton pocket transit and compass. Any cleaning actions were also recorded, which included occasional removal of accretions using bamboo skewer and toothbrush, and clearance of loose stones and plant growth at the bases prior to scanning.

3D Scanning. MCI's Breuckmann triTos™ (GmbH) structured light scanning system was used during the 2006 field season, safely transported within a custom-made hard case. Its components include the sensor bar 30cm long), projector and camera, mounted together on a tripod, and the controller (**Figs.17, 18**). The camera lenses on the triTos™ are interchangeable to give varying fields of view; 325mm lenses were used, which allowed a 30cm field of view on the diagonal and a working distance of 1.38m. The triTos™ system software was run on a Hewlett-Packard Pentium IV laptop computer. The computer and scanner were powered in the field by a Honda EU1000i™ generator developed specifically for use with precision equipment (used in 2005 and stored in the interim in Ulaanbaatar).

Structured light scanning projects a sequence of organized patterns of structured light on a scan subject (seen in **Fig. 21**) as it is simultaneously photographed using a digital camera that is specially aligned with the projector. The photographic images show the distortion of the projected light pattern as it strikes the scan subject. Associated structured light software processes the projected light pattern distortion and color information disclosed by the digital photographs to generate point cloud data. Because the point cloud's (XYZ) range and (RGB) color values are recorded together, the color information is registered exactly with its corresponding 3D point.

The structured light scanning system is sensitive to light conditions, which diminish contrast in the light patterns projected onto the object. As in 2005, day-time scanning required that temporary shade shelters be built over the deer stones, but these also needed to accommodate the 1.38m working distance between the tripod-mounted camera and surfaces to be scanned. We modified our earlier shelter design by using traditional *ger* (yurt) walls to form a spacious rigid enclosure, in conjunction with a superstructure of wooden poles and large expanses of canvas to create a relatively light-tight tent-like structure (**Figs.19, 20**). The Breuckmann scanner did

not have the Polhemus' temperature sensitivity, so we were also able to scan at night, making a shelter unnecessary (**Figs.21, 22**). As a result, we selected deer stones that could be easily accommodated by shade shelters for scanning from mid-afternoon until dusk (approximately 11:00 pm) and more challenging deer stones for night-until-dawn scanning (**Figs.23, 24**).

Our procedure typically included mechanical removal of dimensional accretions (mostly bird droppings) and intrusive grass or stones around the base, prior to scanning. Because of its more cumbersome tripod mounting, scanning with the Breuckmann required at least 5 hours per stone (compared with 1-2 hours for the Polhemus). However, the data quality – much higher resolution (at micron levels, compared with ~0.5mm), as well as color information (not possible with the Polhemus) – and efficient post-processing software argued convincingly for the use of this system.

SUMMARY OF DOCUMENTATION ACTIVITIES

On-Site Documentation in 2006

The chart below summarizes the documentation activities carried out by the conservation team during the 2006 field season. Ushkiin Uver and Ulaan Tolgoi, the two sites at which 3D scanning was carried out, are listed first, followed chronologically by Burdnii Ekh, KYR119 and Khushuutii Am. Photographs of general views of the sites were taken in each location, in addition to the other documentation listed for each of the individual deer stones below.

DS Label	2006	General Documentation	Scanning Record
13-26 June 2006	**USHKIIN UVER** (Hovsgol aimag) [DSP]; **Uushigiin Övör** (Khövsgöl) [Volkov]; **Ulaan Uushig I** [PAJMJM] GPS location (for UU.01): UTM 47U0567007/5500721; Elevation 1314m [DSP-06]		
DS.01	Vertical	Log sheet with footprint measurements and compass orientation of sides, vertical tilt of sides [HFB]; condition record [SN]; Photos: 4 sides, top [LGW] – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05]	Complete raw data file of above-ground portion
UU.02	Vertical	Log sheet as above [HFB; LGW-SN; LGW]; sample taken; Photos: 4 sides, top – 13,14 June [2005 Photos: 4 sides, top – HFB, 2 July 05] [Volkov:188-Table 73]	Complete raw data file of above-ground portion
UU.03	Vertical	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, top – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:188-Table 73]	Complete raw data file of above-ground portion
UU.04	Vertical	Log sheet as above [HFB; HFB; LGW]; Photos: 4 sides, top – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:189-Table 74] [PAJMJM 1999 excavation]	Complete raw data file of above-ground portion
UU.05a	Loose (middle)	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, 2 breaks – 13,14,16,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:190-Table 75]	Complete raw data file
UU.05b	Vertical (base)	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, break – 13,14,16,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:190-Table 75]	Complete raw data file of above-ground portion
UU.05c	Loose (top)	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, break – 13,14,16,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:190-Table 75]	Complete raw data file
UU.06	Vertical	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, top – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:190-Table 75]	Complete raw data file of above-ground portion
UU.07	Vertical (angled)	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, top – 13,14,25 June [2005 Photos: 4 sides, top – HFB, 2 July 05] [Volkov:188-Table 73][PAJMJM 2005-06 excavation]	Complete raw data file of above-ground portion
UU.08	Vertical	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, top – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:191-Table 76]	Complete raw data file of above-ground portion
UU.09	Vertical	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, top – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:191-Table 76]	Complete raw data file of above-ground portion

UU.10	Vertical	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, top – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:192-Table 77]	Complete raw data file of above-ground portion
UU.11	Vertical	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, top – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:192-Table 77]	Complete raw data file of above-ground portion
UU.12	Vertical	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides, top – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:189-Table 74]	Complete raw data file of above-ground portion
UU.13	Vertical	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05]	Complete raw data file of above-ground portion
UU.14	Vertical	Log sheet as above [HFB; SN; LGW]; Photos: 4 sides – 13,14,25 June [2005 Photos: 4 sides – HFB, 2 July 05] [Volkov:194-Table 79]	Complete raw data file of above-ground portion
UU.x1	Horizontal, loose	Log sheet with condition record on drawings [HFB; HFB; LGW]; Photos: 4 sides, 2 breaks – 13,14,25 June [2005 Photos: (upright) 4 sides, top – HFB, 2 July 05]	Complete raw data file
UU.x2	Horizontal, loose	Log sheet with condition record on drawings [HFB; HFB; LGW]; Photos: 4 sides, 2 breaks – 13,14,25 June [2005 Photos: (angled) 4 sides, top – HFB, 2 July 05]	Complete raw data file
UU.x3	Loose	Log sheet with condition record on drawings [HFB; HFB; LGW]; Photos: 3 sides, 2 breaks – 13,14,25 June [2005 Photos: –]	Complete raw data file
		North khirigsuur complex	
xx	Vertical, burial	Photos: 4 sides (with top), plus context views– HFB, 25 June [PAJMJM 2003:28-Fig.4]	–
xx	Vertical, mound	Photos: 1 side, plus context views – HFB, 25 June [PAJMJM 2003:16-Fig.9]	–
26 June 2006	**HOVSGOL MUSEUM**, Muren (Hovsgol aimag)		
UU.15-1	Loose, upper	Photos: 4 sides, top, break – HFB, 26 June [Volkov:193-Table 78]	–
UU.15-2	Loose, lower	Photos: 4 sides, 2 breaks – HFB, 26 June [Volkov:193-Table 78]	–
27-28 June 2006	**ULAAN TOLGOI**, Lake Erkhel (Hovsgol aimag) [DSP] GPS location and elevation (for UT.02): N49° 55.907 / E99° 48.250; Elevation 1620m [DSP-05]		
UT.02	Vertical	– [2005 log sheet and Photos: 4 sides – HFB, 7 July 05**;** also see DSP reports]	Complete raw data file of above-ground portion [incomplete data in 2005]
7 June 2006	**BURDNII EKH** (Bulgan aimag, Saikhan sum) [DSP]; **Khairkhan Khundii** [Volkov] GPS location: N48° 34.639 / E102° 37.626; N48° 20.784 / E102° 22.581; Elevation 4402 ft. [DSP-06]		
DS.01 (Volkov #2)	Vertical	Photos: 4 sides – HFB, 7 June 06 [2005 Photos: 3 sides, in general views – HFB, 21 June 05] [Volkov:T.47]	–
DS.02 (Volkov #3)	Vertical	Photos: 4 sides – HFB, 7 June 06 [2005 Photos: 1 side – HFB, 21 June 05] [Volkov: not pictured]	–
DS.03 (Volkov #4)	Vertical	Photos: 4 sides – HFB, 7 June 06 [2005 Photos: 1 side, in general views – HFB, 21 June 05] [Volkov T.47]	–
DS.04 (Volkov #1)	Vertical	Photos: 4 sides – HFB, 7 June 06 [2005 Photos: 1 view, in general views – HFB, 21 June 05] [Volkov T.47]	–
DS.05 (Volkov #5)	Horizontal	Photos: 2 exposed (long) sides – HFB, 7 June 06 [2005 Photos: 2 views, in general views – HFB, 21 June 05] [Volkov T.47]	–
DS.06 (Volkov #6)	Angled, part buried	Photos: 2 exposed sides, 1 broken end – HFB, 7 June 06 [2005 Photos: as above – HFB, 21 June 05] [Volkov T. 48]	–
DS.07 (Volkov #7)	Angled, part buried	Photos: 2 overall – HFB, 7 June 06 [2005 Photos: as above – HFB, 21 June 05] [Volkov T.49]	–
DS.08 (Volkov #9)	Angled, part buried	Photos: 2 exposed sides, top – HFB, 7 June 06 [2005 Photos: as above – HFB, 21 June 05] [Volkov T.46]	–
DS.09 (Volkov#10)	Horizontal	Photos: 3 sides, broken base, top – HFB, 7 June 06 [2005 Photos: (inverted) 3 sides, base – HFB, 21 June 05] [Volkov T.46]	–
(Volkov #8)	–	Note that this deer stone was not visible in 2006[Volkov T.49]	
9 June 2006	**KYR119**, Khanuy Valley (Arkhangai aimag) [KVP]; Zhargalant / Öndör-Ulaan [PAJMJM] GPS location and elevation: N48° 10'10-30" / E101° 05' 34-35" [PAJMJM]		
DS.01	Vertical (tilted)	Photos: 4 sides, top – 9 June 06 [2005 Photos: as above – HFB, 12 June 05]	–

DS.02	Nearly horizontal part buried	Photos: 4 sides, top – 9 June 06 [2005 Photos: as above – HFB, 12 June 05]	–
DS.03	Nearly horizontal part buried	Photos: 4 sides, top – 9 June 06 [2005 Photos: as above – HFB, 12 June 05]	–
DS.04	Loose	Photos: 4 sides, top – 9 June 06 [2005 Photos: –]	–
DS.05	Horizontal	Photos: 3 sides, 2 ends – 9 June 06 [2005 Photos: 1 side – HFB, 12 June 05]	–
DS.06	Horizontal	Photos: 3 sides, top – 9 June 06 [2005 Photos: –]	–
DS.07	Horizontal	Photos: 3 sides, top – 9 June 06 [2005 Photos: 1 view – HFB, 12 June 05]	–
DS.08	Horizontal	Photos: 3 sides, base – 9 June 06 [2005 Photos: 1 side – HFB, 12 June 05]	–
DS.09	Horizontal	Photos: 2 sides + 1 edge, 2 ends – 9 June 06 [2005 Photos: –]	–
DS.10	Horizontal	Photos: 3 sides, 2 ends – 9 June 06 [2005 Photos: 1 view – HFB, 12 June 05]	–
DS.11	Vertical	Photos: 4 sides – 9 June 06 [2005 Photos: 2 side – HFB, 12 June 05]	–
DS.12	Vertical	Photos: 4 sides, top – 9 June 06 [2005 Photos: (horizontal) 2 sides – HFB, 12 June 05	–
DS.13	Horizontal	Photos: 3 sides + 1 edge, 2 ends – 9 June 06 [2005 Photos: 2 sides – HFB, 12 June 05]	–
DS.14	Horizontal	Photos: 3 sides, 2 ends – 9 June 06 [2005 Photos: –]	–
DS.15	Horizontal	Photos: 1 side + 2 edges, 2 ends – 9 June 06 [2005 Photos: –]	–
DS.16	Horizontal	Photos: 1 side + 2 edges, 2 ends – 9 June 06 [2005 Photos: –]	–
DS.17	Horizontal, part buried	Photos: 1 side + 1 edge, 1 end – 9 June 06 [2005 Photos: (exposed) 2 views – HFB, 12 June 05]	–
DS.18	Horizontal, part buried	Photos: 3 sides, 1 end – 9 June 06 [2005 Photos : (exposed) 2 views – HFB, 12 June 05]	–
DS.19	Horizontal	Photos: 2 sides – 9 June 06 [2005 Photos: 2 views – HFB, 12 June 05]	–
DS.20	Horizontal	Photos: 3 sides, 2 ends – 9 June 06 [2005 Photos: 3 views – HFB, 12 June 05]	–
DS.21	Horizontal	Photos: 3 sides, 2 ends – 9 June 06 [2005 Photos: (vertical) 1 view – HFB, 12 June 05]	–
DS.22	Horizontal	Photos: 3 sides, ends hidden – 9 June 06 [2005 Photos: 1 view – HFB, 12 June 05]	–
DS.23	Horizontal	Photos: 2 sides + 1 edge, 2 ends – 9 June 06 [2005 Photos: 1 view – HFB, 12 June 05]	–
DS.24	Horizontal	Photos: 2 sides + 1 edge, top – 9 June 06 [2005 Photos: –]	–
DS.25	Horizontal	Photos: 2 sides – 9 June 06 [2005 Photos: –]	–
DS.26	Horizontal	Photos: 2 sides + 1 edge, 2 ends – 9 June 06 [2005 Photos: 1 view – HFB, 12 June 05]	–
DS.27	Horizontal	Photos: 3 sides, 2 ends – 9 June 06 [2005 Photos: 1 view – HFB, 12 June 05]	–
DS.28	Horizontal	Photos: 2 sides + 1 edge, 2 ends – 9 June 06 [2005 Photos: 1 view – HFB, 12 June 05]	–
10-11 June 2006	**KHUSHUUTII AM** (Hovsgol aimag, Galt sum) [DSP]; **Khöshöötiyn am** (Khövsgöl) [Volkov, PAJMJM] GPS location and elevation: N48º 74.495 / E99º 91.994; Elevation 1557m [DSP-06]; N48º 42’ 41.6”-42’ 18.2” / E99º 53’ 54.5”-53’40.4” [PAJMJM]		
DS.01	Vertical	Photos: 3 sides (S,W,N) plus various views – HFB, 10 June [Volkov:201-T.86]	–
DS.02	Vertical	Photos: 2 sides (W, SE); plus various views – HFB, 10 June [Volkov:201-T.86]	–
DS.03	Vertical	Photos: 2 sides (NW, SE), plus various views – HFB, 10 June [Volkov:201-T.86]	–
DS.04	Vertical	Photos: 4 sides (N,S,E,W), plus various views – HFB, 10 June [Volkov:201-T.86][PAJMJM 2005:Fig.11 (inverted from Volkov)]	–
DS.05	Vertical	Photos: 3 sides (N,W,S); plus various views – HFB, 10 June	–
DS.06	Vertical	Photos: 2 sides (N,W); plus various views – HFB, 10 June	–
DS.07	Horizontal	Photos: 3 sides, broken end – HFB, 11 June [PAJMJM 2005:Fig.12]	–

On-going Data Processing and Dissemination of Results

Digital data generated from 3D scanning during the 2006 field season are currently being post-processed at MCI, for iconographic analysis of imagery, synthesis with archaeological information for publication and production of graphic and 3D models for exhibition. The raw data files are converted into .bre files using the triTos™ system software (Optocat) and exported to Rapid Form™ (XOS) 3D graphic software for all alignment, merging and subsequent processing steps. This includes filling holes, which is done by extrapolating information from the surrounding data mesh to close a void, i.e. if the data mesh surrounding a hole curves, then the hole fill function will continue the curve. Fills are recognizable as areas with a uniform mesh (in this viewing mode) or as smooth patches (in solid view). The final processed data files are exported in .stl format, and are archived at MCI.[13]

To date, OEC and other providers have contributed their expertise in the graphic modeling and model production stages of the project, which utilize the data in .stl format. Thus far, several techniques of model production have been tested, including computer numerical controlled (CNC) milling and rapid prototyping (also called 3D printing). Some of the graphic products and a partial digitally derived model of deer stone #14 from Ushkiin Uver, along with the 2002 cast, were included in the family festival entitled "Genghis Khan's Mongolia: 800 Years of Nationhood" held October 6-8, 2006 at the National Museum of Natural History. A number of recent talks and publications by members of the MCI scanning team have featured our work in Mongolia, including results from both 2005 and the 2006 seasons.[14]

Footnotes

[1]This collaboration began in June 2004, with Beaubien's participation as a workshop organizer/presenter in the DSP's first annual symposium, held in Ulaanbaatar; see Beaubien, in (W.W. Fitzhugh, J. Bayarsaikhan, and P.K. Marsh, eds.) (2005) *The Deer Stone Project: Anthropological Studies in Mongolia 2002-2004*, 163-184. Reports for the first year of participation in the field season (2005) is archived under *MCI 5974* and *MCI 5999* at MCI; see also Beaubien, in Arctic Studies Newsletter 13 (December 2005):26-28.

[2]The Archaeological Conservation Program, administered by Beaubien, promotes the partnership of conservation and field archaeology through a variety of activities, including provision of on-site conservation assistance to participating projects. On-site staffing is provided by Beaubien and conservation fellows and interns, with funding support for participant travel from the Samuel H. Kress Foundation, as well as the Smithsonian Institution and participating archaeological projects.

[3]Reports for the on-going conservation at MCI are archived under *MCI 6005*, in addition to *MCI 5999*.

[4]The report is archived under *MCI 6048* at MCI.

[5]A brief description of molding and casting procedures is provided in Beaubien, Karas, and Fitzhugh (in press), Documenting Mongolia's Deer Stones: application of digital imaging technology to preservation, *Third Forbes Symposium on Scientific Research in the Field of Asian Art* (Washington, DC: Freer Gallery of Art, Smithsonian Institution); Fitzhugh (2003), in *Mongolia's Arctic Connections: The Hovsgol Deer Stone Project, 2001-2002 field report* (Washington DC: Arctic Studies Center, NMNH), p.31.

[6]Procedures and results are described more fully in the report for *MCI 5945*, and in the following publications: Beaubien, Karas and Fitzhugh *op.cit*.; and Karas, Beaubien, and Fitzhugh (forthcoming), Documenting Mongolia's Deer Stones: application of 3D laser scanning technology to archaeological conservation, *Conservation of Archaeological Materials: current trends and future directions* (Williamsburg, VA: Colonial Williamsburg Foundation).

[7]Allard, Francis and Diimaajav Erdenebaatar (2005), Khirigsuurs, ritual and mobility in the Bronze Age of Mongolia, *Antiquity* 79#305:547-563. The site's excavation in 1990 is reported by Volkov (2002:100) and also in T. Sanjmiatov (1993), *Early History and Culture of Arkhangai* [in Russian] (Ulaanbaatar: D. Nabaan). Testing at part of the site was done by PAJMJM (2003:32).

[8]Volkov V.V. (2002), Stone Stelaes from Mongolia ("deer stones") [in Russian] (Moscow: Scientific World), pp.78-83, 187-194 (Tables 72-79).

[9]Shu, Takahama, Hayashi Tshio, Kawamata Masanor, Matshuhara Ryuji, D. Erdenebaatar (2006), Preliminary Report of the Archaeological Investigations in Ulaan Uushig (Uushigiin Övör) in Mongolia, *Bulletin of Archaeology, The University of Kanazawa* 28:61-102. Also see PAJMJM, Preliminary Report of the Archaeological Investigations in Mongolia, 2003:11-35; Preliminary Report of the Archaeological Investigations in Mongolia, 2004:57-62; Preliminary Report of the Archaeological

Investigations in Mongolia, 2005:63-92.
[10]Fitzhugh (2003) *op.cit*.; Fitzhugh (ed.) (2004), *The Hovsgol Deer Stone Project, 2003 Field Report*; Fitzhugh et.al. (2005) *op.cit*.
[11]Volkov 2002:57-59, 161-164 (Tables 46-49).
[12]PAJMJM 2005:87-88, Figs.10-12.
[13]Data files are archived at MCI, under *MCI 6084* through *MCI 6089*.
[14]In addition to previous citations: Karas and Beaubien, 3D scanning Mongolia's ancient deer stones *Arctic Studies Center Newsletter* 14 (February 2007):43-44; Karas and Steve Hand, Polyworks and the Mongolian Deer Stone Project, *International PolyWorks Users Meeting* (October 2006), Quebec City; Beaubien (for Beaubien, Karas and Weber), 3D scanning deer stones on the Mongolian steppe, *American Institution for Conservation annual meeting* (April 2007), Richmond, VA; Beaubien (for Beaubien, Karas and Fitzhugh), 3D scanning for field documentation of Mongolia's deer stone monuments, *Society for American Archaeology, 72nd annual meeting* (April 2007), Austin, TX; Beaubien, 3-D Scanning of Mongolian Deer Stones: tools for preservation and access, *UCLA/Getty Program in Ethnographic and Archaeological Conservation* (May 2007), Los Angeles.

ILLUSTRATIONS

Fig.1 Weber, Songo, Beaubien, Narangil and Karas [29 June 2006]

Fig. 2 Ushkiin Uver-western row, looking south (15 June 2006)

Fig.3 Ulaan Tolgoi, near Erkhel Lake (2 July 2005)

Fig. 4 KYR119, Khanuy Valley-one of several clusters of deer stones (9 June 2006)

Fig. 5 Burdnii Ekh, looking north (21 June 2005)

Fig. 6 Khushuutii Am, looking southeaset (10 June 2006)

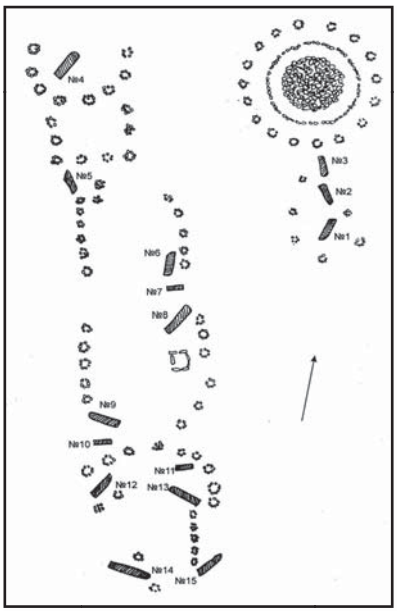


Fig. 7 Ushkiin Uver plan map, as shown in Volkov (2002: 187-Table 72)

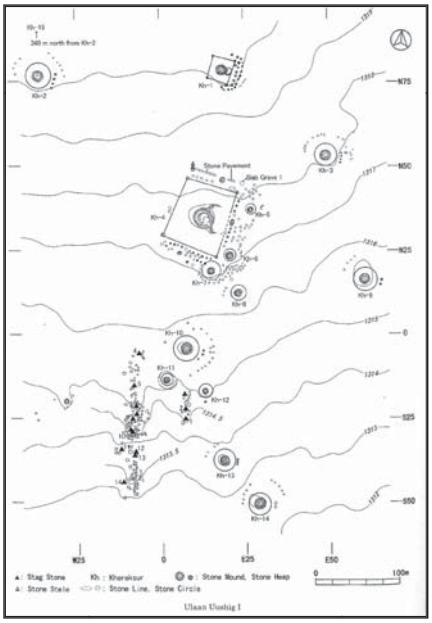


Fig. 8 Ushkiin Uver plan map, as shown in PAJMJM (2006:84-Pl.2)

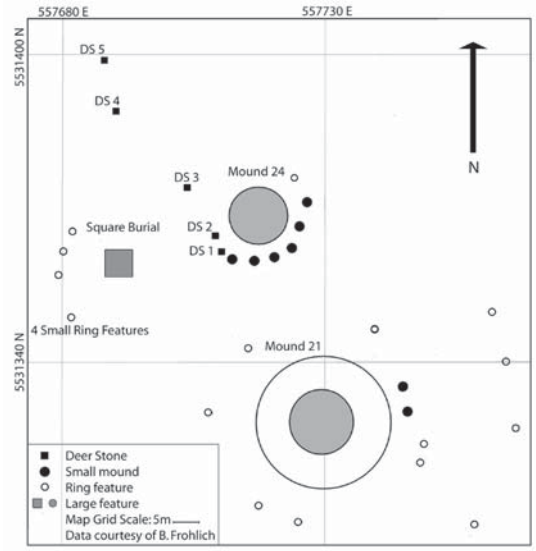


Fig. 9 Ulaan Tolgoi plan map (DSP-06)

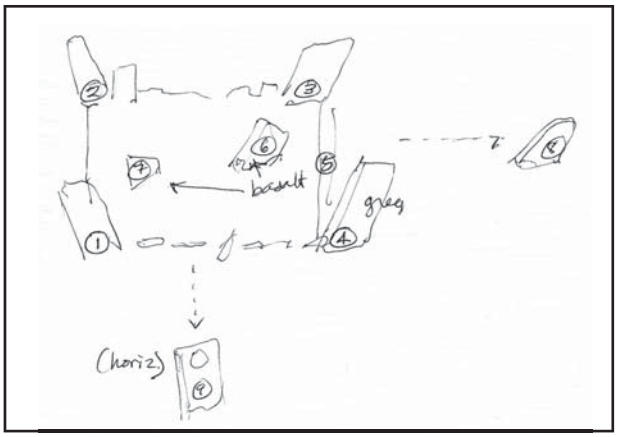


Fig. 10 Burdnii Ekh sketch plan (Beaubien, 7 June 2006)

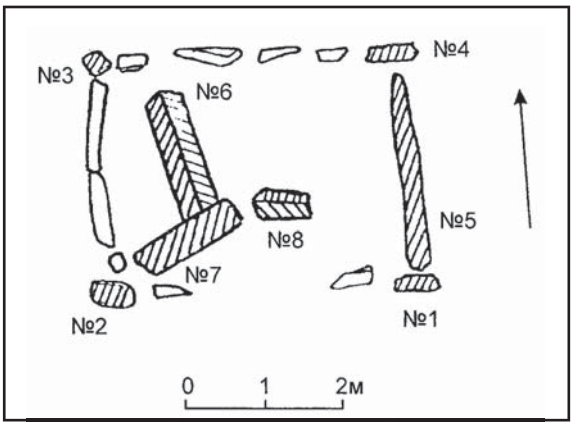


Fig. 11 Burdnii Ekh plan map of main group in Volkov (2002: 162-Table 47)

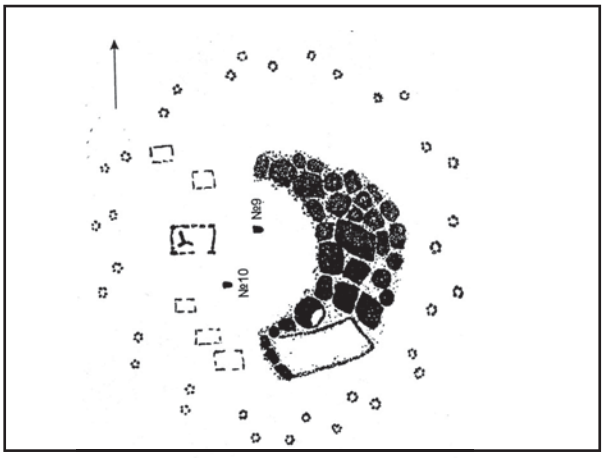


Fig. 12 Burdnii Ekh plan map of periphery in Volkov (2002:161-Table 46)

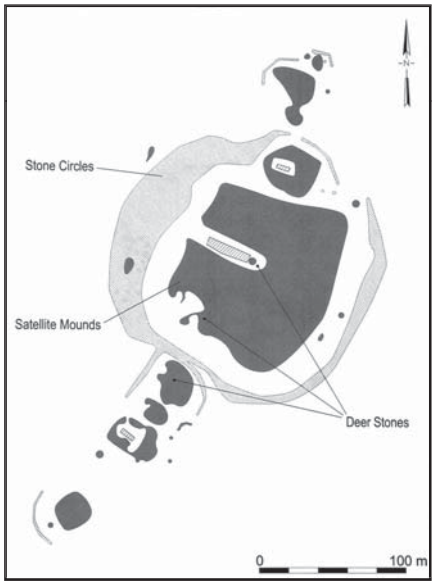


Fig. 13 KYR119 plan map of area with deer stones 1-4, from Allard (2005)

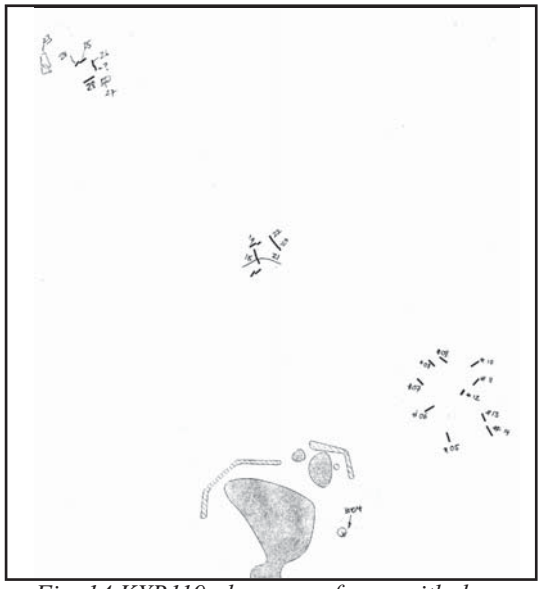


Fig. 14 KYR119 plan map of area with deer stones 5-28, from Allard (2005), annotated (9 June 2006)

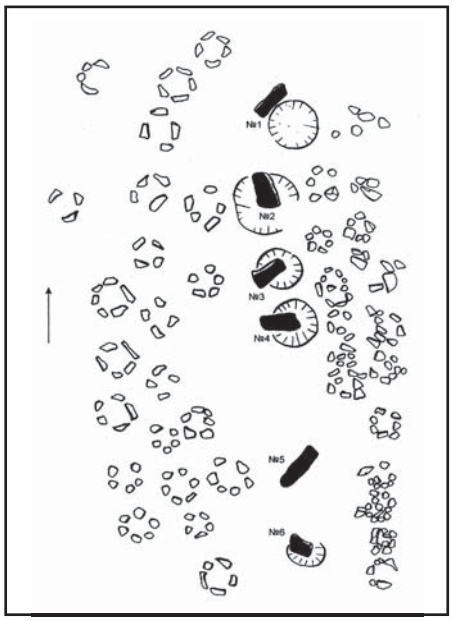


Fig. 15 Khushuutii Am plan map from Volkov (2002:200-Table 85)

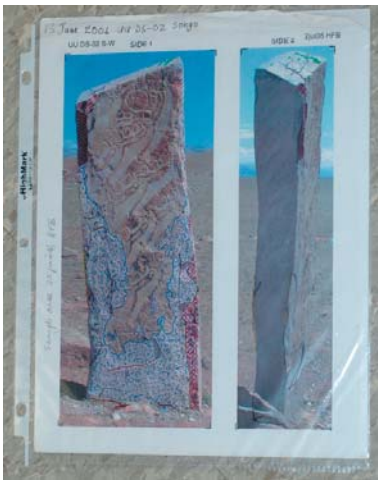


Fig. 16 Part of the condition record for deer stone #2 at Ushkiin Uver (June 2006)

Fig. 17 Weber and Karas scanning deer stone #12 at Ushkiin Uver, with the computer and controller components (June 2006)

Fig. 18 Beaubien scanning deer stone #12 at Ushkiin Uver, with projector-camera component (June 2006)

Fig. 19 Constructing the ger shade shelter in preparation for scanning deer stone #3 at Ushkiin Uver (June 2006)

Fig. 20 The completed ger shade shelter for deer stone #3 at Ushkiin Uver (June 2006)

Fig. 21 Scanning deer stone #2 at Ushkiin Uver (June 2006)

Fig. 22 Scanning deer stone #14 at Ushkiin Uver (June 2006)

Fig. 23 Scanning the lower portions of deer stone #2 at Ulaan Tolgoi (June 2006)

Fig. 24 Scanning the upper portions of deer stoe #2 at Ulaan Tolgoi (June 2006)

PART V

ARCHAEOLOGICAL CONSERVATION IN ULAANBAATAR, MONGOLIA
2006 Field Season

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Archaeological conservation activities typically take place during the excavation and study phases of an archaeological project, and range from involvement in the field recovery of artifacts, basic stabilization of excavated finds – including aspects such as cleaning, consolidation, reassembly, as well as housing for safe transport and storage – and other preparations that allow these important materials to be studied and enjoyed in the future. This report describes the artifacts conservation activities of conservators from the Smithsonian's Museum Conservation Institute (MCI), particularly during a short period of residency in the capital city, Ulaanbaatar, during the 2006 field season of the Joint Mongolian-Smithsonian Deer Stone Project (DSP).

BACKGROUND

MCI conservators have been part of the Deer Stone Project since 2004, and began assisting with archaeological conservation challenges in the field in 2005. That year, both the DSP and the Khanuy Valley Project on Early Nomadic Pastoralism (KVP), led by Drs. Francis Allard and Diimaajav Erdenebaatar, benefited from conservation involvement in the lifting and stabilization of newly excavated artifacts. With official permission, two artifacts and several samples from KVP excavations were temporarily transferred at the end of the field season for further conservation and analysis at MCI, which is currently in progress. Conservators' participation in the 2006 field activities was arranged as a collaboration between these projects and MCI, through a specialized program for archaeological conservation under Beaubien's management, with financial support from the Smithsonian Institution, including a research grant from the Office of the Under Secretary for Science, and the Samuel H. Kress Foundation.

OVERVIEW OF THE 2006 FIELD SEASON

The conservation team was composed of Harriet F. (Rae) Beaubien (senior objects conservator), Leslie G. Weber (conservation fellow), and Basiliki Vicky Karas (contract conservator, 3D scanning). Beaubien and Weber arrived in Ulaanbaatar with the majority of the DSP team on June 1. For the third year, the DSP organized a professional symposium for presentation of current archaeological and ethnographic research in Mongolia, including presentations by Beaubien and Weber. The symposium was accompanied by a day of practical workshops, followed by a one-week consultancy, with a focus this year on paper-based materials, led by Nora Lockshin (conservator, Smithsonian Institution Archives), and on taxidermy specimens, led by Paul Rhymer (exhibit specialist, Smithsonian's National Museum of Natural History). These events have provided an active forum for bringing together the conservation and museum community in Mongolia, and facilitated the interactions and collaborations that are features of the activities that took place during the 2006 field season.

Departing Ulaanbaatar on June 6, the DSP team, including Mongolian archaeological

professionals and students, accompanied by the KVP team, began their research activities in northern Mongolia. The primary focus for Beaubien, Weber and Karas (who had arrived June 5) was the field documentation of ancient deer stones using 3D scanning technology among other more conventional recording methods. The conservation team concentrated on documenting 28 deer stones at the Khanuy Valley site KYR119 (these were not scanned), over 14 deer stones at Ushkiin Uver in the environs of Moron, and 1 deer stone at Ulaan Tolgoi near Erkhel Lake. These activities are described more fully in a separate report.

Conservation of artifacts was also a part of the season's activities, especially during a short period of residency for Beaubien and Weber in Ulaanbaatar between June 30 and July 13 at the end of the field season. During that time period, we were able to spend some time with staff at the Cultural Heritage Center, the hub of the conservation community in Ulaanbaatar. The CHC is charged with registering the historical and cultural monuments of Mongolia, which includes a program of molding and replicating key sculptures, as well as restoration; current projects include cleaning and mounting leather garment and other costume elements, and stabilization of flaking paint on polychrome sculpture. These provided opportunities to discuss conservation materials and methods, and possibilities for future training.

Conservation of newly excavated materials is of growing interest in the Mongolian archaeological community, not just among DSP colleagues based at the National Museum of Mongolian History but also within the Institutes of Archaeology and of History (components of the Mongolian Academy of Sciences). The KVP began incorporating conservation in both field and laboratory operations during the 2005 field season, in collaboration with MCI conservators. In July, we continued our work with this team in a laboratory setting, using a 3rd floor office room provided by Dr. Erdenebaatar at the Institute of History, where the project's field supplies and excavated materials are stored. This season, the KVP team and the French-Mongolian team excavating Gol Mod (1), another Xiongnu cemetery, had an opportunity to interact closely for the first time. The team, which included a conservator, was carrying out lab work at the Institute of Archaeology nearby, allowing a fruitful exchange of ideas about the artifacts, as well as future archaeology-conservation collaborations in Mongolia.

The following section provides information about the specific conservation actions undertaken.

ARTIFACT CONSERVATION

Fig. 1 Dr. Francis Allard (3 July 2006)

Conservation attention was given to artifacts identified as priorities in discussions with Dr. Francis Allard (KVP director) [Fig.1] and Bryan K. Miller (Gol Mod 2 field supervisor) [Fig.2], both of whom were either present or in close consultative contact with Beaubien and Weber during all phases of the conservation work. Our focus was on artifacts recovered from excavations of the Tomb 1 complex at Gol Mod 2, an important Xiongnu period cemetery dating between approximately 300 BC and 200 AD. [Note: The numbers for Tomb 1's 27 satellite burials were adjusted in 2006 to make their designations consecutive, vs. field numbers given in order of excavation. The new numbers are as follows: Burials 1-6 (unchanged), 7-21 (previously 9-23), 22 (previously 7), 23 (previously 8), 24-27 (unchanged).]

The conservation process was documented through daily notes

Fig.3 Bryan Miller [8 July 2006]

written in a notebook and on conservation forms (one for each artifact) with detailed descriptions of any actions. Digital photographs were taken to document artifact condition before, during and after these actions. Copies of the report and a CD of conservation images were prepared for distribution to primary project personnel for the project archives. The original notebook and supporting documents are archived at MCI, in Suitland, Maryland, under *MCI 6048*.

The conservation actions for each artifact are summarized below. For reference, an overview of general conservation principles and procedures, including selection of conservation materials and methods, is provided in the Appendix; those materials used for this project are detailed, along with procurement source.

GM2-1-21.C – *Iron lattice decoration (block lifted segment of coffin wall), Burial 21*
(previously GM2-1-23.8C, Burial 23)

This artifact, block-lifted by Beaubien and Karas during the 2005 field season, was a conservation priority for Beaubien and Weber in 2006 [Fig.3]. Its iron components, found in associated with degraded wood, include two strips (GM2-1-21.C-1 and C-2, each made up of pieces a-h) and 3 quatrefoils (GM2-1-21.C-3, C-4 and C-5).

Summary of conservation actions in 2005. The west wall, composed of tangent walls of the inner and outer coffins, was left relatively undisturbed during the excavation of Burial 21 (then 23) in order to preserve the layout of iron lattice decoration on the outer surface of the inner coffin, sandwiched between the walls. (It is thought to be of a similar type to that found on the exterior surface of the inner coffin of Burial 27, excavated in 2004; in this case, the iron pieces were removed as loose pieces following photographic documentation.)

Fig3 Blocklifted segment, resting on its interior side [3 July 2006]

The block-lifting of a 110 cm segment of the wall was carried out on 15 July 2005 by Beaubien and Karas. The general preparation for lifting involved protecting the wall surface with aluminum foil, pressed to conform closely, and then applying plaster-impregnated gauze bandage, wetted with water, to form a continuous layer, which would form a rigid conforming support once dry. The wall segment leaned outward, so the bandage was layered on to the interior side first; this was followed by bandage application on the deeply undercut exterior side. During this process it became apparent that the outer coffin may have been partially removed by the excavators, potentially disturbing the decoration. Several loose iron pieces were found; these were tucked against the wall, within the plaster jacket, but no longer in their original position. To lift the jacketed segment, the soil underneath the wall was loosened and the block was gently tilted back on to its interior surface, resting in a large tray. Aluminum foil was wrapped around the exposed edge, and duct tape was strapped around the block in several places along the length. The artifact was subsequently transported at the end of the 2005 field season to the KVP storage container behind the Institute of History building in Ulaanbaatar (reference: *MCI 5974*).

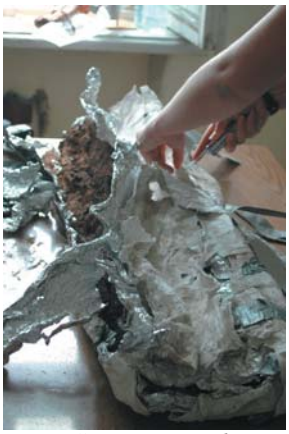

Fig.4 Cutting open the plaster jacket [4 July 2006]

Excavation of the block [3-6 July]. The plaster jacketed block containing the coffin wall segment was moved by Allard and Miller from the storage container to the laboratory room. Still resting on the side corresponding to the coffin wall interior, the block was opened by cutting plaster and tape along the edges to remove the uppermost material, exposing the coffin wall exterior [Figs.4-6]. This wood (degraded), obscuring the decorated inner coffin wall, was gently broken up with bamboo skewers and removed with brushes. Rootlets were cut with scissors and sand was brushed off until the corroded iron strapwork pieces were exposed. These had a plain surface, with a textile pattern pseudomorphed in the corrosion on the other side. The pseudomorphs, produced by contact between the iron and a textile, provide evidence that the exterior surface of the inner coffin wall was once covered with a textile; with iron pieces attached on top, the plain side represents the presentation surface.

Fig.5 Northern half (exterior) before conservation [4 July 2006]

Fig.6 Southern half (exterior) before conservation [4 July 2006]

As anticipated, the original layout had been significantly disturbed. A number of pieces were found concentrated near the base of the wall and others were found with the textile side facing up [Figs.7-10]. This may have occurred with the deformation of the coffin wall, caused by pressure from a log making up the coffin lid; this log was included in the block-lift and had partially covered the iron pieces [Fig.11].

Fig.7 Iron pieces exposed in the central area near the base of the wall (as seen from wall top) [4 July 2006]

Fig.8 Detail of iron pieces exposed in the central area near the base of the wall [4 July 2006]

Fig.9 Detail of iron pieces in the central area near the base of the wall, with small fragment showing side with pseudomorphs [4 July 2006]

Fig.10 Southern half with iron pieces exposed [4 July 2006]

Fig.11 Northern half after removal of iron pieces, showing wood from coffin lid articulated [5 July 2006]

Reassembly of the iron pieces [3-6 July]. The iron pieces were documented *in situ* as they were uncovered, then removed and laid out on trays covered with cotton cloth [Figs.12,13]. Approximately 43 pieces making up strips, 3 plaques (quatrefoils) and very small iron fragments were found; among the latter was one very small piece with attached gold foil. A flanged arrow head was also found (identified by Miller), along with an arrow tang fragment with wood pseudomorphs and a few curled dark grey paint chips. All removed wood and sand material cleared from the plaster jacket was checked for overlooked fragments, before it was bagged for discard.

Fig.12 Iron pieces from the northern half, during reassembly, shown with drawing of their as-found positions [4 July 2006]

Fig.13 Iron pieces from the southern half, during reassembly [4 July 2006]

Most of the iron pieces could be directly linked to other pieces. Pieces were joined using HMG adhesive (cellulose nitrate), which produced sufficiently strong joints, cured quickly and was very easy to administer from the tube onto the break face. The pieces were assembled in ca. 15cm lengths, to prevent overly long segments that would be prone to snapping. The glued segments were propped in a sand tray during adhesive drying.

To reconstruct the decoration pattern, the conjoining components were laid out**,** approximating their as-found location in the block. These formed two long strips (labeled GM2-1-21.C-1 and C-2) [Fig.14]**.** Although the pattern was somewhat collapsed and disturbed, the pieces making up the strips crossed over each other in one place, at the approximate center of the preserved strips. This suggested that they had formed a large X, a reconstruction supported by Miller who cited similar examples from other coffin wall decorations [Fig.15,16]. The textile pseudomorphs on the back sides (see *Technical notes* below).were critically important in determining the spatial relationships of the components, assuming that they had been affixed to a continuous piece of textile (or at least similarly aligned pieces). The weave pattern had pronounced facing threads in one of the weave directions, which allowed the iron components to be placed relative to each other, thus fixing their crossing angle. Non-conjoining pieces were positioned in best-guess positions, using such clues as strip width, corrosion appearance and textile pattern, in addition to find spot, to confirm location.

Fig.14 Reassembled segments, aligned to form strips [5 July 2006]

Fig.15 Components positioned to show the reconstructed decoration [6 July 2006]

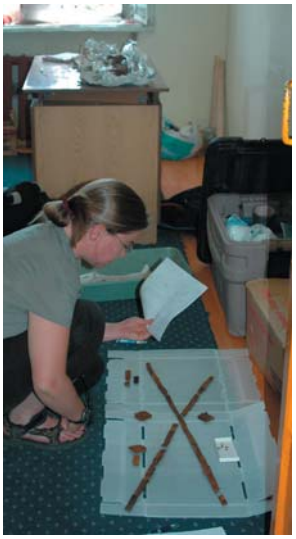

Fig.16 Weber laying out the components [6 July 2006]

Strip C-1 angles from the north end wall top toward the south end wall bottom, and consists of 8 components (C-1a through C-1h): 6 conjoining segments (a,b,d-g) and 2 non-conjoining individual pieces (c,h). Strip C-2 angles from the north end wall bottom toward the south end wall top, and is made up of 8 components (C-2a through C-2h): 5 conjoining segments (c-g) and 3 non-conjoining segment (a,b,h). The original position of the quatrefoils (labeled C-3, -4, and -5) relative to the iron strips could not be confirmed. Based on comparative information, they were placed in the open zones between strips, corresponding to their as-found location. Two found near the crossing point were placed above and below; the third, found at the southern end of the block, was placed centrally in the open zone south of the crossing point. For photography, conjoining segments were placed in contact; non-conjoining components were "floated" in approximate locations (without direct joins).

Storage housing [6, 8 July]. A protective storage box was fabricated, with the goal of making the pieces and their overall arrangement

accessible for further study. Unfortunately, the reconstructed decoration extended over an area of ca. 80 x 40 cm, which was too large a format to fit into the designated storage cupboard. With Miller's input, we made the following modifications to accommodate a smaller box [Fig.17]. Because the crossing area was the most important in the overall design, the strip components in this area were laid out in position. The segments that extended the strips toward their ends were arranged in the intermediary spaces. In the quadrant to the left of (or counterclockwise from) a crossing strip, the adjoining segment was laid out alongside it, followed by the next segment, and so on. There was sufficient space to position the quatrefoils in their appropriate quadrants. The pieces were laid out with the presentation (plain) side facing up, but oriented appropriately according to weave pattern on the back side.

Fig.17 Components arranged and secured in the storage box [8 July 2006]

The storage box was constructed of Coroplast, using sheet and pre-cut trays to form a base and lid; joins were made with hot-melt glue. The iron pieces were mounted on a rigid white Coroplast-type board; two corners were folded up to serve as handles to allow easy removal. This tray was lined with a sheet of Volara foam, adhered with hot-melt glue, which formed a soft layer on which the iron pieces were organized in the pattern described above. To keep all the components in place, 1 cm wide Volara strips were used to form fitted compartments, attached with hot-melt glue to the Volara surface. Each compartment was labeled with the component's number using a permanent black marker (Sharpie). A ziplock bag with the small loose fragments and other associated items was positioned in an available space. The stored iron pieces were covered with a protective piece of Tyvek; on it was a reconstruction drawing of the iron decoration fully extended, with segments labeled.

The space between the tray and the lid was filled with a pillow, made of a Tyvek cover stuffed with four layers of polyester batting [Fig.18]. This was attached to the inside of the lid using hot-melt glue. This pillow serves to fill up the empty space and to exert gentle pressure on the pieces to prevent any movement. The lid and base were held together by two cotton bands, which were glued onto the outside of the base and can be tied on top of the lid. The box was labeled with the artifact number, packing date, and "top" designation.

Fig.18 Storage housing, opened (left) and secured for storage [8 July 2006]

Technical notes. The iron pieces were mounted on the wood coffin wall, which had been covered with cloth, judging from textile pseudomorphs on their back (non-presentation) sides formed as follows. As the iron corroded, the corrosion products infiltrated the threads of the adjacent cloth. Although the organic fibers eventually decomposed (including all the portions of cloth not covered with iron pieces), the absorbed corrosion products had taken their shape through a mineralization or pseudomorphing process. The pseudomorphs (now a feature of the iron pieces) represent what would have been the non-presentation side of the textile. The individual threads are Z-spun and have a twist angle of about 45 degrees (estimated). The thread count is 19-20 x 5-6 per square cm. This results in what appears to be a coarse fabric in an unbalanced (or ribbed) plain weave, in which threads in one of the directions are dominant (a function of thread dimension or spacing tightness). On one of the iron strip fragments, a small patch of a very different textile pseudomorph was found on the front (presentation) side. It has an extremely fine weave with a shiny appearance, possibly once part of a silk cloth. Several fragments retain small protruding corrosion lumps on their back sides that may be the remains of the shafts of iron attachment hardware.

GM2-1-22.33 – ***Copper alloy disk, Burial 22*** (previously GM2-1-7.9/33, Burial 7)

Fig.19 Disk with organic remnants on upper side and cushion from below [6 July 2006]

Fig.20 Stone beads (22.33A) and cordage fragments (22.33B) associated with the disk [4,6 July 2006]

This unusual disk with associated materials [Figs.19, 20]was excavated in July 2004, and is the closest comparison to another found in 2005 in Burial 21 (previously Burial 23), which is currently being analyzed and conserved at MCI, on loan from the Mongolian Academy of Sciences (reference: *MCI 6005*).

One surface is covered with organic remnants composed of multiple textile layers, including a possible fur layer and a leather patch. The textiles and fur adhere together but are detached from the disk. The leather patch is also only loosely sitting on the disk. Two stone beads (GM2-1-22.33A) were originally sitting underneath the leather patch, but were removed and stored in a ziplock bag. Other items associated with the disk are a cord fragment (GM2-1-22.33B) and other textile fragments (GM2-1-22.33C), which seem to be part of the textile that covers the disk. The disk (with no organic remnants on that side) rested on a cushion of what seems to be compressed plant material. In addition to the main mass, loose material originating from this mass are stored in several small ziplock bags. All the components (disk, textile-fur layer, leather patch, plant material cushion) have been taken apart for examination several times since excavation, and are no longer in their exact as-found positions.

Documentation [6 July]. The disk was photographed by Weber both as a whole with all components in place, as well as with the covering textile-fur layer, the leather patch and the underlying compressed plant material taken off [Figs. 21,22].

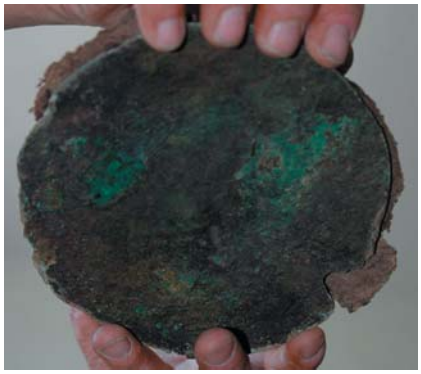

Fig.21 Disk underside [6 July 2006]

Fig.22 Upper surface of disk with organic covering removed [6 July 2006]

Protective housing [6, 8 July]. The disk and associated components were re-housed by Beaubien within a plastic lidded box, divided into three levels to hold the disk and all associated materials.

The plant material found beneath the disk was housed in the bottommost level [Figs.23, 24]. A container was made from two polystyrene weighing dishes, cut and taped together. A piece of Volara foam was glued to the bottom for cushioning. The plant material was placed in piece of Tyvek, which was folded loosely over the top. The walls extend just above the level of the contents, so that the shelf forming the next level provides a protective roof.

Fig.23 Dish to house organic cushion [8 July 2006]

Fig.24 Bottommost level of the bin, with shelf for middle level [8 July 2006]

The disk and its organic remnants were housed in the middle level on a shelf created with Coroplast sheet. Its sides were folded down to form supporting walls, which fit snugly between the edges of the container (below) and the bin long sides. The tray for the disk consisted of a rigid Coroplast-type square [Fig.25]. A central prop was added for easier access, if removal of the disk was necessary. The prop was created with an inverted polystyrene dish (cut down to form a low platform), with a Volara cushion; this was taped to the tray. Four bumpers, placed around the perimeter, were created using curved strips of archival board. These were covered with Volara and glued to the tray; with the disk in place, there was ca. 2 mm clearance from the fragile edges. Finally, all these elements were covered with a single piece of Tyvek tissue (tacked in place) to form an inert, smooth, minimally abrasive surface for the disk.

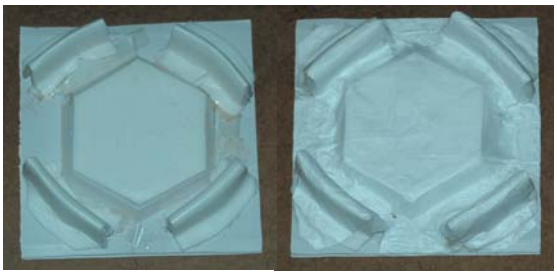

Fig.25 Stages of construction of the disk support [8 July 2006]

Fig.26 Disk housed in middle level of bin, shown with the padded shelf [8 July 2006]

A second Coroplast shelf was constructed, with a small cushion of polyester batting covered with Tyvek attached to its underside [Fig.26]. With its supporting walls resting on the lower shelf along the bin's short sides, this formed a protective compartment for the disk, the cushion gently immobilizing the organic deposit on its upper surface. The small bags of associated material were stored on top of this shelf, on the uppermost level. Finally, a pillow of batting covered with Tyvek was attached to the inside surface of the bin lid, in order to fill up the remaining space and help immobilize the bin contents [Figs.27,28]. The lid latches to the bin with two exterior clamps. The bin was clearly labeled with permanent marker.

Fig.27 Uppermost level of bin with bags of associated material [8 July 2006]

Fig.28 Storage bin with disk and associated materials [8 July 2006]

GM2-1-7 – ***Wood coffin corners, Burial 7*** (previously GM2-1-9.7, Burial 9)

Burial 7 was excavated in July 2004. The southwest and southeast corners of the coffin were kept as examples, preserving evidence of tenon construction. These had been stored in a small plastic lidded box [Fig.29].

Fig.29 Wood coffin corners before rehousing [3 July 2006]

Storage housing [8 July]. The artifacts were each wrapped in Tyvek to reduce abrasion and contain detaching fragments. Part of a Coroplast tray was used to create a rigid base for one of them, with a panel of Coroplast sheet to serve as a vertical support. A second level was created with a Coroplast sheet, which provided support for the second artifact.

GM2-1/4 – *Plaque, Burial 4*

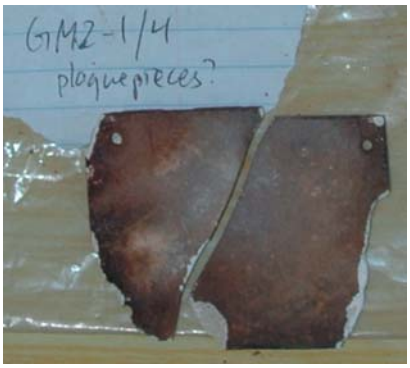

Fig.30 Plaque fragments [3 July 2006]

The two fragments, excavated in 2006, comprise a thin rectangular object with perforations, made of an unknown material [Fig.30]. All surfaces, including some of the breakage surfaces, are brown in color, except where the surface is damaged and crumbling; here the bulk material appears white. According to Andrea Steffen, the conservator for the French-Mongolia mission excavating at the Gol Mod (1) cemetery, the material is some kind of stone.

Sampling for material identification [8 July]. To identify the plaque material, a sample was collected from crumbled material in the bag. The sample was stored in a glass vial and brought by Beaubien and Weber to MCI for analysis. A mineralogical identification would be possible with X-ray diffraction analysis, guided by elemental information from energy dispersive X-ray analysis.

Other Activities

Fig.31 Rehousing iron objects [3 July 2006]

Other materials were examined and selected items photographed for comparative purposes, as part of the conservation actions described above [Fig.31]. Of particular interest were remains of the iron latticework recovered from Burial 27, the only other one besides Burial 21 with this decoration.

The examined materials were resorted and repacked in four containers as follows: small plastic lidded bin with Burial 7 items; medium plastic lidded bin with Burial 27 items (small bags); medium cardboard box with Burial 27 items (heavier bags); small cardboard box with Burial 27 animal bones.

The KVP collection of excavated materials is currently distributed between cabinet storage in provisional office space and outdoor container storage, both at the Institute of History. Planning was in progress to find secure storage at the University of Ulaanbaatar, with the advice of the conservation team.

APPENDIX: CONSERVATION PRIORITIES and PROCEDURES

The primary goal of conservation is to preserve as much about an artifact as possible – its material and its informational content – to enable it to be studied and appreciated in the future. The key preservation strategies focus on (1) stabilization actions, to eliminate or minimize potential agents of deterioration; and (2) elucidation actions, to make accessible and clarify important features (such as by cleaning and reassembly, and technical analysis).

In selecting conservation materials and methods to achieve these goals, certain key principles are followed. These include altering the original as little as possible to achieve the preservation goals. Passive (non-invasive) methods, focusing on protective storage and environmental control, are favored over ones that introduce new material, where possible. When interventive approaches are appropriate, a minimalist approach is favored. Conservation materials should meet high performance standards (e.g. being well-tested, stable over time, reversible if possible), be appropriate for the particular application and the issues presented by the artifact materials, and not inhibit further conservation or analysis. Documentation of all actions, including details of materials and methods used, is critical. Since these may result in changes of appearance or composition, this documentation adds information potentially significant to those conducting research using these artifacts.

Conservation actions beyond basic stabilization carried out in the field are typically deferred to a laboratory phase. In 2006, we were able to continue the technical investigation and conservation of an artifact that had received *in situ* attention during the excavation process. In 2005, a support to enclose the artifact for lifting was created with *plaster of Paris-impregnated gauze bandage*. During application, a barrier layer, such as *aluminum foil* (used here), is always used to protect the artifact materials and especially when easy release from the surface is desirable. Bandage strips are dipped in water to activate the plaster, and are smoothed in place to bond the layers; these form a rigid support upon curing/drying.

While plaster jacketing is sufficiently stable for storage on a temporary basis, it is preferable to fully excavate the enclosed artifact in a timely manner, both for reasons of accessibility and appropriate housing. Tools to excavate the artifact from its matrix are typically sturdy but unlikely (with proper handling) to scar or damage original materials, such as air puffers, bamboo skewers, and soft paint brushes. When fragments could be glued together directly, *HMG adhesive* was used; this dries quickly, is durable over a wide temperature range, and can be reversed easily with acetone.

Providing protective storage housings for artifacts remained a priority, particularly as a suitable storage location has not been finalized for the collection. Supports and enclosures were created with a range of stable synthetic materials to contain and securely prop artifacts for routine examination and handling, during transport and in storage. These included commercially available rigid plastic bins, *Coroplast* (stiff cardboard-like material), *Volara* (thin sponge-like cushioning material), and *Tyvek* tissue to provide a smooth cushioned surface adjacent to the object.

Conservation Products used in 2006

Coroplast™ (Coroplast): a corrugated board made of a polypropylene/polyethylene copolymer, used for making storage pallets, trays and boxes.

Sheet products are available in various gauges. Selected type: translucent, ⅛-inch thickness. *Vendor*: University Products, Talas and other archival suppliers.

Pre-fabricated trays are available by special order in a variety of sizes. Selected type: 10in x 12in x 2in, translucent, ⅛-inch thickness. *Vendor*: Coroplast.

Cotton ribbon, ½-inch width. *Vendor*: commercial sewing suppliers.

HMG™ heat and waterproof adhesive (H. Marcel Guest): a cellulose nitrate adhesive. It is readily reversible in acetone and is durable at high temperatures. *Vendor*: available pre-mixed in tube form from Conservation Support Services and other conservation suppliers.

Hot-melt glue: an adhesive composed of wax and ethylene/vinyl acetate copolymers, used in the construction of supports and storage containers (not artifacts). It is supplied in stick form and is administered with a hot-melt glue gun; the low-temperature variety is suitable for use with Tyvek. *Vendor*: plastics suppliers and hardware stores (low-temperature).

Polyester batting, used as cushioning or filling material. *Vendor*: commercial sewing suppliers.

Polyethylene and other rigid plastic lidded containers, such as Tupperware™, Rubbermaid™ and similar products. *Vendor*: household product stores.

Polystyrene weighing dishes, used to create housing container. Note that this plastic material is reactive to organic solvents. *Vendor*: Fisher Scientific and other chemical suppliers.

Tyvek™ 1422A and 1443R (DuPont): a vapor barrier made of spunbonded olefin, used as a paper substitute for wrapping and padding. *Vendor*: University Products and other archival suppliers.

Volara™ (Voltek): white cross-linked polyethylene microfoam, supplied in sheet form and used for non-abrasive padding. Selected type: white, ⅛-inch thickness.
Vendor: University Products and Cantwell-Cleary.

PART VI

TRADITIONAL PLANT KNOWLEDGE AND SHAMANISM AMONGST THE TSAATAN REINDEER HERDERS OF NORTHERN MONGOLIA

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Introduction

The Tsaatan reindeer-herders of Northern Mongolia are shamanists who utilize plants for food, medicine (for people and their animals), shelter and other forms of material culture. Plants are also important metaphysically. They are offered to the spirits as a request for knowledge, guidance and assistance to balance and harmonize the physical and spirit worlds. They are used to treat disorders of the mind, body and spirit, and to maintain ecosystem health. Traditional plant knowledge (TPK) is an important field of study within Indigenous knowledge (IK) and traditional land and resource management systems.

Plants connect people to place. The Tsaatan are migratory herders and hunters whose seasonal round encompasses a wide range of plant resources over several ecological zones. Plants mark places in the landscape where the spirits of ancestors are felt and communicated with – places where ancestors and their descendants are sensed to co-exist in the present. The relationship between the living and the dead is a reciprocal one. Spirits provide guidance about both spiritual and mundane matters; shamans, through ritual communication with their ancestors, interpret the landscape, including the botanical markers, for the benefit of their community and its surrounds.

In this paper, I investigate the relationship between shamanism and traditional plant knowledge among the Tsaatan within the context of the regional lifeways of Northern Mongolia. I provide geographic and cultural profiles of the Khovsgol Lake area. Within the context of TPK, I discuss the shamanist lifeway, comparing shamanism and Buddhism with respect to TPK. Tsaatan ethnobotany is then placed within a broader literature and detailed with a preliminary listing of plants and their uses.

The 2006 Field Season

In June of 2006, I accompanied William Fitzhugh and Paula DePriest and their teams of researchers of the Smithsonian's Deer Stone project in the Khovsgol Lake area of northern Mongolia. In small Russian Forgon vans, we drove from Ulaan Bataar, the capital city of Mongolia, to Muren, the regional seat of Khovsgol *Aimag*.

From Muren, we traveled for a full day up-country towards the mountain pass leading to the Darhat Valley. The summit of the pass is marked by prayer flags and shrines (*ovoos*) at each side. Here we stopped to walk three times clockwise around the *ovoos* and to place a few more stones and coins on the base, as is the Mongolian custom. Then we began our descent toward Ulan Uul (meaning 'Red Mountain'), the first town encountered upon entering the Darhat Valley. Another day's drive brought us to the town of Tsaagan Nuur, the northernmost *soum* or regional administrative centre for the Darhat Valley.

Here, I carried out interviews with Darhat people to supplement those I had undertaken in Ulaan Bataar and en route - with Mongolian students, researchers, herders, museum staff, shamans, hunters, government staff and others - about traditional plant knowledge, the relationship between Buddhism and shamanism, traditional land and resource management in Mongolia and inter-ethnic relations. These provided a background for understanding Darhat TPK and shamanism within Mongolia as well as providing a base for beginning my research with the Tsaatan.

Just outside of Tsaagan Nuur, I split off from the main group, and traveled by horseback up into the mountains to a Tsaatan spring camp. Here I spent a week with a small group of reindeer-herders learning about shamanism and traditional plant knowledge, about their relations with the neighbouring Darhat people, and about their ancestral homeland in Tuva in central south Siberia.

The author takes a ride on a reindeer.

Known as Tsaatan in Mongolia and Dukha in the anthropological literature, the reindeer-herders are Tuvan by ancestry. The closure of the Russian-Mongolia border after 1991 severed contact with their relatives in Tuva and Siberia, leaving the Tsaatan isolated linguistically and culturally from their Tuvan relatives.

The Khovsgol Lake Area – Geographically and Culturally

The Khovsgol Lake area, where my work was concentrated, is made up of 4 of the 6 natural botanical-geographical zones described by Jigjidsuren and Johnson (2003) as characterizing Mongolia. These are the alpine (where parts of the region lie above the treeline), taiga, forest steppe and steppe zones.

The alpine is the second smallest zone, next to the taiga. Of all the zones, it has the highest precipitation and the fewest number of growing days. It varies in elevation depending on the mountain range. In the Khovsgol Mountains, for example, its lowest elevation is @2000 – 2200 metres above sea level; its highest is @3500 metres. (Parts of these mountains connect with the Sayan Mountains along the Siberia-Mongolia border. The Altai Mountains to the west are Mongolia's highest. They mark Mongolia's western rim and retain permanent snow, ice and glaciers.) The alpine soils are a mixture of hummocky, forest-steppe and clumpy tundra soils that suit cold-tolerant plants including species that support summer transhumance grazing.

The taiga makes up the smallest land area of all the regions of Mongolia at less than 4%. The

taiga or boreal forest is a belt of primarily coniferous forest encircling the Northern hemisphere. It is made up of spruces, pines, firs and larches (the larch is coniferous but also deciduous in that it sheds its needles in winter). Mosses and lichens grow on the forest floor and on tree trunks and branches. Some species are endemic to this region; others are widespread across the north. The Mongolian taiga has slightly more growing days (5 to 20 more) than the alpine zone. Its soils, which include turf permafrost, support forage plants such as *Cladonia rangiferina* (L.) Web., the favored lichen of reindeer, as the name suggests. As well, the taiga's permafrost, higher humidity and cooler temperatures, provide optimum conditions for reindeer, including fewer midges.

Within the mountain valleys of the taiga zone, some steppe vegetation can be found, diversifying the plant resources utilized by animals and humans. Pockets of alpine vegetation are located in the Khovsgol Mountains within the taiga zone. In the mountain valleys, steppe vegetation may also be found. Forest steppe occupies the lower slopes of the Khovsgol Mountains. It is characterized by shrubs such as the very fragrant *Artemesia* and perennial grasses, making this zone suitable for intensive animal husbandry and for farming. Forest steppe extends down to, and in some places into, the steppe zone. The Mongolian steppe is characterized by shrubs such as *Caragana* and *Artemesia* and the grasses that support grazing by horses and small livestock, and cattle farming. In some areas, the soils are saline, especially in depressions.

The Khovsgol Lake area is unique in several ways. Khovsgol Lake is a mountain lake, the deepest in Central Asia with more than ninety rivers flowing into it. The ethnic and historic character also differs from the rest of Mongolia. Here, Siberian reindeer herders/hunters living in the taiga in the higher reaches of the mountains have co-existed and in some ways blended with Mongolian herders of yaks, sheep and goats in the grasslands For the Tsaatan, their ancestral home is Tuva, across the Mongolian/Siberian border.

Prior to the early 20th century, Mongolia had been ruled by China for about 200 years. Mongolia declared its independence in 1921 and joined the emerging socialist system under the influence of the Soviet Union. While some Mongolians criticize the Russian treatment of Mongolia, others say that the alliance helped them to maintain their independence from China which, after its revolution, assumed control of Inner Mongolia and Tibet. Today, Mongolia is distinct from Inner Mongolia, a province of China. The influence of the Russians waned upon the demise of the Soviet system in 1991 when the border between Siberia and Mongolia was closed by the Russians.

In the Khovsgol Lake area, the Darhat Mongols are the dominant ethnic group. They are ethnic Mongolians who trace their ancestry back to the time of Chinggis Khaan. Their migratory range spans the Darhat Valley in summer to the margins of the Khovsgol Lake in winter. The Tsaatan, by comparison, occupy the marginal northern reaches of the Darhat Valley. They are Tuvan culturally and linguistically but were separated from their relatives with the closure of the border by the Russians in 1991. They interact with the Darhat along the lower slopes of the Altai-Sayan mountain range and the shores of the Tenggis and the Shishgid Rivers.

Today, the Tsaatan seasonal round takes them into Tsaagan Nuur where some families maintain year-round or seasonal homes; or they may store their belongings in "town" while they are with their reindeer on the taiga. If family members are living in town, short or long term, others may look after their reindeer for them. Some people go back and forth between town and taiga, or

the husband may stay in the taiga taking care of the reindeer while the women remain in town. During the school year, the children have to be in town to go to school. Some Tsaatan, if they are really poor, may go to live in town and earn whatever they can, though sometimes they can't find any work at all.

Between the Darhat peoples and the Tsaatan, interaction takes place on several levels, including ethnobotany and shamanism, the foci of this paper. Darhat and Tsaatan have intermarried – the couples I spoke to said they had met at school; thus some Tsaatan live more or less permanently in Tsaagan Nuur; while some Darhat live in the mountains with their Tsaatan partners and families. They maintain other ties as well. The Tsaatan pack out various plant and animal products for their family's use or for exchange or sale in Tsaagan Nuur and Muren. On my trip "out", the Tsaatan packed, on their horses and reindeer, hand-sawn cutting boards, branches of juniper bundled in plastic sheeting, and reindeer milk in plastic bottles left behind by tourists. Tsaatan hunters provide skins for the Darhat shaman's drums and wood to be made into the frame of the drum, as well as hides and furs for clothing.

In the market in Muren, we identified plants for sale at a vendor's stall, among them *Ribes croesula, Rhodiola rosea, Gentiana macrophyllum, Plantago, Rosa acicularis, Adonis mongolica, Cypripedium gutlatum, Gentiana algida,* White mushroom, *Salix*, and *Thymus* (documented with DePriest, Oyuuma, Oyunbileg June 27, 2006). Some of these plants came from the Tsaatan. Juniper, for example, had been ground into a fine powder and was for sale in little plastic packets. The Tsaatan have access to plants not available in the other zones; these plants are preferred for medicine and ritual. They are said to be "stronger" because they come from the higher reaches of the mountains.

The spring camp I arrived at was the seasonal home of a small group of families. Unlike the ethnic Mongolians whose traditional dwelling is the circular yurt or *ger* as it is called in Mongolia, the Tsaatan live in tipis year round. (A few families live in more permanent log cabins.) As the weather was getting warmer, the Tsaatan were in the process of moving to their summer camp higher in the mountains above the treeline. Only occasionally will Tsaatan take their reindeer down into the warmer areas, along with their horses, to pack out goods or people, or perhaps to make income from tourists who pay for reindeer rides. One man mentioned that he made around @$800 during one summer doing this "but it was very hard on my reindeer." Chulu, a Tsaatan elder, related the good health of her reindeer to her family's seasonal nomadism in this way:

Reindeer loaded with goods for the summer migration.

"Recently people are having problems with their reindeer because their legs are sort of bent. They have little bumps on

> their legs and lose their stability. For families that have a lot of reindeer, it can be a problem. Back in the old days, we never had a problem like this. I understand it's because people stay in camp for years and this causes the problem. The animals are healthier if they move around a lot. So every year, I move. My father used to move every twenty days, winter and summer. I don't know how to cure the problem because my reindeer never had a problem like that." (Chulu in Field notes June 18, 2006)

While Tsaatan may not take their animals to the highest reaches of the mountains, these areas are important for ritual purposes and for Tsaatan identity. This is where Tsaatan ancestral spirits reside. These places are difficult to reach for ceremonies, especially in the winter. Further, increasing sedentarism affects their seasonal round and traditional herding/hunting lifeways. The closing of the Russian border has also divided Tsaatan from sites of spiritual importance which means that the Tsaatan have "fewer spirits" in the Khovsgol region than the Darhat people.

The bodies of deceased shamans, and more importantly, his/her paraphernalia especially the dress and drum, are placed in these high places. Visits are made to these ancestral sites, sometimes annually. On these visits, plants are gathered for food, medicine and for spiritual use. Thus place, the seasonal round, subsistence activities of herding, hunting and plant gathering are all interwoven in defining and maintaining Tsaatan identity as shamanist, Tuvan, and also, now, as Mongolian. Place shapes all aspects of Tsaatan lifeways – morality, community and identity. It is also both parochial and specific, as Keith Basso notes in his study of place amongst the Apache:

> "Locked with in the mental horizons of those who give it life, sense of place issues in a stream of symbolically drawn particulars – the visible particulars of local topographies, the personal particulars of biographical associations, and the notional particulars of socially given systems of thought. It is the latter, of course, that are least available to conscious awareness…" (Wisdom Sits in Places 1996:144)

Further, he provides a basis for interpreting the relationship between place and a shamanic world view:

> "In this way, or something roughly like it, the ethnographer comes to appreciate that features of the local landscape, no less than utterances exchanged in forms of daily discourse, acquire value and significance by virtue of the ideational systems with which they are apprehended and construed." (ibid: 72)

Shamanism and Traditional Plant Knowledge

I view TPK as a field of IK and as framed within a shamanic world view and lifeways. In shamanist cultures, this world and the spirit world are interpenetrating – an imbalance in one has repercussions in the other. Since well-being is dependent on a harmonizing of mind, body, emotions, and spirit, an imbalance in one part of this world or in one part of an individual's system has implications for another. For example, a disrespectful treatment of plants - taking "too much" or not following gathering protocol - can cause difficult times such as the loss of

game animals or even the death of a loved one. On the other hand, plants can be used to restore a severed or compromised relationship or to maintain a mutual and reciprocal one, a relationship that may exist on the mundane and the metaphysical levels simultaneously.

This relationship is most apparent in the use of plants for burning or "smudging." The smoke of certain plants is said to be one of the elements of a shaman's toolkit that can permeate the thin membrane between this world and the spirit world. Through such offerings, and the right intent on the part of the petitioner, spirits may be entreated to assist with worldly problems.

It is very common in all the areas I visited (and in all the shamanic cultures I have worked in world-wide) for plants to be burned for their smoke. By tradition, the ritual of burning offerings appeals to the spirits and also purifies and cleanses the ritual space – whether outdoors or within a Buddhist monastery, Mongolian *ger* or Tsaatan tipi. Whole plants (such as thyme or artemesia) or branches (of juniper) may be burned, or the plant may be ground into a powder or shaped into incense (commercially made or otherwise). Some Mongolians scatter a little of the powder onto the hot stove that heats both *gers* and tipis; the powder catches fire and smolders. If they have a whole plant, they may touch it to the stove top or lay it there and just let it burn. Or they may ignite it, then blow out the flame and wave it around gently to distribute the smoke. Sometimes a plant is used this way simply for its fragrance, or because someone wants to clear away a bad odor but it also has a spiritual connotation.

The smoke is used for ritual cleansing, to please the good spirits and draw them near, and to dispel bad spirits or negative influences. In shamanic ritual, it cleanses the space, the shaman, the other participants in the ritual, and the shaman's paraphernalia. Very often the shaman's drum is held directly over the smoke to purify and cleanse it before it is played (and also so that the heat of the fire will tighten the drum skin and produce greater resonance.) The preferred plant for burning in the Khovsgol Lake area is juniper which is scarce in the Darhat Valley. People there ask Tsaatan to bring it down from the taiga where it is plentiful.

There are differences of opinion as to whether shamans use or used plants, apart from the smudge plants, for healing. The Tsaatan shaman, Gosta, said, no, they are not used, meaning, presumably, that he does not use them. In comparison, Suyan, the Tsaatan shaman who died in 2006 at 102 years of age, was known for her "reindeer medicine," especially her use of plants. Khalzanool (his Tuvan name), the son of Chulu (his mother) and Sanjim (his father) is a shaman who also works with plants:

Making a shaman's drum-an essential part of the "tool kit".

"Gosta is my teacher and Ganzerig's too because Gosta is the oldest shaman now that Suyan has died. Suyan was my female teacher. Suyan helped me a lot. I have collected many, many plants and dried them and given them to people. My grandmother and other people taught me about plants. Some plants are for people who are sick – just the smell can help. Other plants are for luck. My grandfather, when he went to the countryside to collect plants would go for a long time, 10-20 days. I also go for 10-20 days."

(Field notes June 30, 2006) Whether a shaman uses plants in his/her work seems to depend on the personal qualities and interests of the shaman and of their family members. It also seems to depend on the shamans who are their teachers as well as on their own ancestral spirits, spirit helpers and guides, and the kind of knowledge these spirits had when they were living.

Chulu, a Tsaatan elder.

Shamanic peoples say their well-being depends on a reciprocal and connective relationship with nature. The relations amongst place, animals and people are mediated by a shamanic world view and sometimes directly by shamans. A shaman ensures people's livelihood through ceremonies that bring the rain and other benefits "that make the plants and animals happy." If the beings on which people rely are "happy," I was told, they will be vital and can be generous to the people whose livelihood is interdependent with theirs.

Certainly plant use is not solely the prerogative of shamans. Many people, shamans and non-shamans, spoke to me about the plants they gather and use for their spirits, their families, and their animals. Chulu provided details of about a dozen plants in our discussions. She said she is not really knowledgeable about plants, but her husband, Sanjim is. Sanjim is well known for his plant knowledge and has accompanied Paula DePriest on her field studies over several seasons. Working with Chulu, Sanjim, and their son and daughter more intensively as I hope to do in the coming summer, would provide information about Tsaatan traditional plant knowledge, but also about how this kind of information is shared between men and women and passed on inter-generationally.

Shamanism and Buddhism in Mongolia

Within Mongolia itself, the ethnobotanical and ethnomedical traditions are both literate and oral. While the shamanic traditions are oral, Tibetan Buddhism (considered officially to be the traditional religion of Mongolia), textualized its knowledge of plants. It also drew on the TPK of shamanic peoples. Plant medicine has been taught in the monasteries as a specialized field and passed down through many generations. In the old days, I was told, there were schools in the monasteries in Mongolia at which plant studies would go on for fifteen years or more. These studies relied on texts about medicinal plants in the Tibetan and Mongolian languages, and in Sanskrit in the written form.

Tibetan medicine originated with the Bön tradition, the indigenous shamanic tradition of Tibet that predates Buddhism. (It later incorporated traditional Chinese and Indian/Ayurvedic medicine.) It makes particular use of high altitude plants, especially those growing in dry, rocky or sandy areas. These make up about one-third of its medicinal plants.

Rosa acicularis

When the monks collected plants for medicinal use, they used complex methods, one of which was taste, to determine the quality of the medicines and to ascertain what combination should be used. There were six different tastes (sweet, sour, salty, bitter, acrid and astringent) which involved the combination of the five elements: earth, water, air, fire and space. *Gentiana*, for example (see Table 1), is classified as "bitter." Plants were combined to make medicines, but they were also mixed with metal, minerals and animal products such as urine. Monks brought medicines and plants from Tibet when they couldn't find what they needed locally; or they would taste local plants to find a substitute.

The Darhat people spoke about how they used to gather plants, years ago, for the monks' use in herbal preparations which included the burning of incense. Plants were particularly sought from the higher reaches of the mountains in Tsaatan country - the air on the higher reaches is said to be purer and freer from human subtle energies and thus stronger medicine. This may relate to an understanding that plants in difficult or marginal environments, or under stress from environmental factors, are hardier and may produce, as a survival technique, greater concentrations of the desirable constituents for human and animal use. Plants gathered by the Tsaatan are still viewed as more valuable for medicinal and ritual purposes because they come from remote areas.

In Mongolia, shamanism and Buddhism have blended in other ways, for instance, some shamans are also lamas. In other aspects, the two traditions have been antagonistic. Buddhists outlawed shamanism in Mongolia at one time. Then Buddhism was all but eliminated under Stalinist influence, as shamanism was suppressed also. Today, Buddhism is undergoing a recovery as the traditional religion of Mongolia. In 2006, the Dalai Lama was allowed into Mongolia to visit its main Buddhist monastery though it was an unofficial visit in consideration of neighboring China's policy on Tibet.

Although Buddhism is said, now, to be the traditional religion of Mongolia, shamanism retains a strong presence and a growing vitality. In 2006 Mongolia celebrated the 800th anniversary of the unification of the Mongol tribes into a single state by Chinggis Khaan (the current Mongolian spelling of Genghis Khan). This became the largest empire the world has ever known, encompassing a huge territory from the Balkans to Beijing. He has become a symbol of the "new" Mongolia. (It is significant that he is also being claimed by China as an honorary Chinese emperor). Some people say Chinggis Khaan relied on a shaman as an advisor; some Mongolians suggest that he was a shaman himself. Thus shamanism is being incorporated into Mongolian's views of its future, viewed from the perspective of a deep-seated and independent (shamanist) past.

Buddhist influences are evident in the altars of homes I visited between Ulaan Bataar and Tsaagan Nuur. At the rear of the *ger*, opposite the east facing entrance, all the homes I visited had a Buddhist or Buddhist-influenced altar. These appear very similar to altars in other shamanist-Buddhist areas I have worked in such as Southeast Asia with the Hill Tribes and northern India with the Tibetan Bön tradition. The Mongolian altars all contained a sprig of juniper or an incense burner for powdered incense. In the Darhat, Buddhist altars are sometimes combined with shamanist elements, and certainly in the homes of Darhat shamans.

The Tsaatan are the least influenced by Buddhism of any of the Mongolians - in their material culture, their rituals and their relationship with the land. Darhats, as their immediate neighbours, say the Tsaatan are "different." The Tsaatan live in tipis rather than *gers*. They rely heavily on reindeer milk products (yogurt, milk and cheese), herding their reindeer in the highest reaches of the mountains where the Darhats do not generally go. They describe themselves as Tuvan and their shamans are said to speak the Tuvan language, rather than Mongolian, when they are in trance. The Tsaatan are seen as "the most shamanist" of any of the groups in Mongolia, meaning, among other factors, that they rely more on hunting and the gathering of wild plants than their pastoral neighbors.

Ethnic Mongolian views about the Tsaatan may be in a process of revision within a revivalist history. In some ways, these views are contradictory. The Tsaatan are "outsiders" and marginalized from the development that Mongolia is promoting, but their "traditionalism" may come to be viewed positively as representing the independent way of life of a people less influenced by, or dependant on, outside forces than their neighbors.

Relevant Literature

In 2006, I identified work in English that has been carried out on the botany and ecology of Mongolia, and particularly works relevant to the Khovsgol region. These include DePriest 2005, Oyumaa 2001, Neuffer et al 2003, Grubov 2001, Hilbig (1995), Jigjidsuren and Johnson (2003), and the Ministry for Nature and the Environment for Mongolia (1997). In April 2006, the *Mongolia-800th Anniversary Symposium: Traditional Mongolian Medicine* was held in Vienna, involving European and Mongolian scientists. BioRegions International publishes a newsletter and bulletin on related topics.

Oyumaa's small handbook, *Rare and Endangered Plants of Hovsgol National Park,* was translated in the field from Mongolian into English by my translator Amara. DePriest made several invaluable suggestions for sources. Oyumaa, Oyunbileg, and Badma provided botanical information extracted from their scientific studies in Mongolian. About the Tsaatan particularly, the literature is limited (National Human Rights Commission of Mongolia 2005:6), including on traditional plant knowledge.

Prior to working in Mongolia, I had carried out research on shamanism and ethnobotany over several summers in Siberia, including Tuva. In this paper, I have not included data I collected because of space limitations; however, I do mention relevant points in Sevyan Vainshtein's *Nomads of South Siberia* (1980) and in Humphrey's introduction.

Vainshtein provides, in English translation from the Russian, an historical overview of Tuva with some specifics about Tuvan traditional plant use. He provides an invaluable historical context for my ethnobotanical work amongst the Tsaatan, and for making comparisons between the Tsaatan and the ethnic Mongolians about shamanism and traditional plant knowledge. Vainshtein draws on historical sources from Russian, Chinese and other sources not available in English (Vainshtein 1980:194-5) to compile a listing of plants used by the Tuvans. These include Yuan'-shi (1936, Shanghai) in Chinese, which provides some information on types of plants used for feeding reindeer by the Khan'khen, a taiga people of eastern Tuva in the 13th century (Vainshtein 1980:132).

The peoples of Tuva are generally divided into "Western" and "Eastern." Western refers to the majority who are steppe and mountain-steppe pastoralists. The Eastern Tuvinians are hunter-pastoralists and reindeer-herding hunters inhabiting the taiga-steppes of Eastern Tuva (also known as Todja). These are the people to whom the Tsaatan are related. The Eastern Tuvinians are also known as the Todja-Tuvans.

In Eastern Tuva, the dominant vegetation is highland forest comprised of Siberian larch, cedar, birch and firs. The non-forested belt is dominated by lichens, the favourite food of reindeer. As in Mongolia, the reindeer-herders/ hunters of the taiga of Eastern Tuva were a very small percentage of Tuva's population. Vainshtein (1980:49) gives the figure of 3% at the beginning of the 20th century. In comparison, for the pastoralists of the steppe zone who made up @95%, their mainstay was cattle, sheep, goats, horses and camels. The pastoralist hunters of the taiga-steppe zone made up the remaining @ 2%, relying primarily on horses and cattle.

For the reindeer-herders, their mainstay was hunting and reindeer (for transport, load carrying, milk and occasionally meat). Though it was not confined to the taiga peoples, plant gathering was especially important to them. Vainshtein (1980:194) writes that from the 18th to the early 20th century:

> "Every observer of Tuvinian life in the period from the eighteenth to the early twentieth century has commented on the great importance of gathering as an economic activity. Pallas says [in Russian] of the eastern Tuvinians, 'they have no cornfields and not much livestock, and so they live on roots" (1788, pt I, bk 3, 529). The eighteenth-century expert on Tuva, Pesterev, wrote, 'right from the middle of August they migrate across the mountains to hunt and gather lily bulbs' (1793, pt 80, 54). Saf'yanov wrote in 1879 that in the spring months the food that is gathered is the only food a poor Tuvinian has (see Katanov, 1903, 407). The importance of gathering is mentioned also by Radloff (1893, vol. 1, 175), Yakovlev (1900, 42) and Ostrovskikh (1927, 85-6). Grumm-Grzhimailo agreed with his predecessors that gathering was more important for the Tuvinians than for other nomadic peoples (1926, vol. 3, pt 1, 90)." (Vainshtein 1980:194)

Thus nomadic reindeer pasturing patterns appear to have been interwoven with ecological factors such as weather conditions, temperatures, as well as cultural concerns such as the importance of maintaining sites of spiritual and ancestral importance, and the availability of wild plants especially lily bulbs [*Lilium martagon*]. Among the Tsaatan, *Lilium* remains an important plant, as identified in Table 1 below.


Coming down from the taiga.

Table 1 below is a compilation of plants identified by the Tsaatan in 2006. I have included the Latin name (provided by Oyumaa and Oyunbileg in the field 2006; and from published sources), common English name/s, local name, and a summary of its use according to the peoples I interviewed. This material will be confirmed and expanded upon in 2007 to correct any omissions or errors. It is presented here as preliminary only to invite discussion and further study.

To further the dialogue between Indigenous knowledge and scientific knowledge, I have begun to identify scientific studies carried out on specific plants. Brown et al (2002), for example, refer to the publication since 1960 of more than 180 pharmacological, phytochemical, and clinical studies on *Rhodiola rosea*. This information is outside the scope of this paper, however.

The following quotes reveal important information about Tsaatan uses of plants for medicine, and also about the "ideational system" (Basso 1996:72) that underlies TPK. The collection, availability and preparation of *Saussurea* (vansemberuu) is described here by a Darhat who considers himself a shamanist:

> "Vansemberuu grows up on the mountain. It's really rare up on this mountain. It grows a lot up on the east taiga. It's used for chest and lung problems, coughing. Put it in warm water after it's boiled and cooled. Add some sugar; let it sit for awhile, for 4 or 5 days. And just drink it by the bowlful – 1 bowl a day. In the morning is better. Drink it for awhile, until the coughing is gone. I drank about 4 liters of it to get rid of my coughing earlier.
>
> We dry the flowers out. We usually collect them after the 25 of June before the flowers are blooming fully and before the petals open. They open fully by July." (Field notes June 20, 2006)

This next quote points out the value of narrative accounts in indigenous studies. Chulu, a Tsaatan elder, describes how she took the sick person to the plant. Here, she is describing the importance of "the land" to well-being. She also points out how both plants and animals are utilized as medicine. And she describes how the whole animal is used to make "strong" medicine. Similarly, people emphasize that the plant should be considered holistically. They conceptualize a plant as an entity, not as made up of separate constituents, as western science does:

> "There is a flower called vansemberuu. We use the flower in many ways… I only collect from June 20- July 5. So during this period, the flower hasn't fully bloomed – it's still closed. I don't collect the flower but I bring people who are sick to the flower. On top of it are drops of dew, drops of moisture. My father used to tell me, don't use all the dew, just one drop. The first time, I used a spoon and

> it was difficult. The second time, I drew the water up with a syringe and gave it to my son – not even 1 year old. That winter my son got cold and his lungs were bad and his voice sounded bad.
>
> I took him to the flower for 3 days at the end of June. I had to climb up to the mountain because the plant grows in the higher areas of the mountain. I took my son three times to that flower.
>
> After three visits, my father told me, now your son's going to be good. My father killed a reindeer and made fresh soup for my son. When my father killed the reindeer, he took a bit of every part of the reindeer, put it into the intestines and boiled them. My father told me, you've got to give him this. I gave him soup, to my son, and little bits of meat. I cut it up really small and gave it to him off a spoon. My son got better and is grown." (Chulu, Field notes June 18, 2006)

In addition to plants in the Tsaatan pharmacopoeia, I mention the importance of animals from two perspectives. Plants useful for people are also used for animals, as would be expected with herders, for example, ganga [*Thymus*], vanchingaraw [*Gentiana algida*], and degd [*Gentian*], although ethnoveterinary medicine is a less documented aspect of Indigenous knowledge.

Animals are also used as medicine. Wolf meat is believed to be especially good for lung problems (Field notes June 17, 2006). I was told how marmot (a wild animal) is used medicinally, in this case to treat a horse (a domesticated animal):

> "If a horse is coughing, use marmot, that white thing close to the kidney that sticks to the liver [gall bladder]. It's really liquid. Fill a cup with water and put a small amount of liquid in, stir it up and give it to the animals." (Field notes June 20, 2006)

The use of animals – domesticated or wild - illustrates the blurring of boundaries in indigenous cultures between food and medicine. Plants may be selected for both their medicinal and their nutritive qualities, in line with emerging interests in western science and medicine in nutraceuticals and functional foods. A healer, sometimes a shaman, may prescribe changes in diet to heal a health problem, for example, telling a client to "eat wild meat" or "eat more reindeer milk products" if someone is living in town. "Country" foods are central to people's ideas about well-being in the broadest sense. Just being "on the land" is medicinal.

Milking reindeer at camp.

Table 1: Listing of Plants Used by the Tsaatan Reindeer Herders

Scientific / Latin Name	***Common name(s) in English***	***Local Name***	***Uses***
Abies sibirica	Fir (tree); Siberian fir	Joogon; Jodor	For high blood pressure.
Bergenia crassifolia	Bergenia; Siberian tea; Red star; Winter-blooming bergenia	Badaa; Badaanii nawch	To treat puking for people and reindeer.
Betula	Birch	Khus	Forage for reindeer.
Caragana	Pea shrub		Broom/ sweeper.
Dianthus superbus	Pink		Kidneys; fevers; bacterial infections
Gentiana algida	Gentian	Tsagaa tash; also spelled Tsaagan tash	For cold, coughing.
Gentiana algida	Arctic gentian	Vanchingaraw	
Gentiana grandiflora	Gentian	Khokh tash	For cold, coughing; for liver problems.
Gentiana macrophylla	Gentian; bitter root; bitterwort; gallweed.	Choniin ous	To relieve pain; for cold; for injury.
Juniper	juniper	Artsiin ous; also spelled artsan ous	Burned as incense for its scent and for spiritual purposes; Hung in tipis and cabins; Given to children for colds; Sniffed for congestion; Used to make shaman's drum beater.
Larix *[Larix sibirica* is very rare.*]*	Larch		Carved into drinking bowls.
Ledum palustre	Labrador tea	Oykhemj	For wound; for cold sore on face and in mouth; for rash on baby's thighs from pee.

Lilium pumilum DC.	Turk's Cap Lily White potato	Odoi Saraan Tsaagan Nuur Toms	"Roots" eaten raw in the field; Boiled in reindeer milk or steamed and eaten.
Pinus	Pine		Rim of shaman's drum made from strips of the fresh cut wood.
Plantago major L.	Common Plantain	Tawan salaa	As poultice for wounds and swellings; used internally and externally.
Potentilla	Cinquefoil	Borolzgono	Used to press through the pith of *Salix* to make pipe stem hollow.
Pulsatilla patens Or *P. bungeana*	Pasqueflower		
Rhododendron aureum (yellow)	Rose bay	Gawsrai	For high blood pressure
Rhodiola rosea	Goldenroot; Roseroot; Arctic root	Altan gagnuur	For injury; Extract used to treat bone fractures in humans and livestock.
Ribes	Currant	Tekhiin sheeg	Berries eaten
Rosa species	Rose	Nokhoin khushuu	The hips are used for high blood pressure and stress; hips contain high concentration of Vitamin C
Salix	Willow	Khagsurga	Section is used to make a 1-piece smoking pipe; the pipe stem is hollowed out with a piece of *Potentilla*
Sambucus	Elder; Elderberry		Various uses depending on plants it is combined with
Saussurea	Snow lotus	Vansemberuu / Wansemberuu	For "illness"; For cold and bad lungs and bad voice; to treat respiratory problems (FP:101)
Thymus	Thyme	Ganga	For animal's fever
Vaccinium vitis-idaea	Cowberry; Foxberry; Mountain cranberry; Red whortleberry; lingonberry	Anirsnii nawch	For cold and coughing

Ethnobotany and Traditional Plant Knowledge in a Global Setting

Since the 1970s, interest in ethnobotany has been increasing, especially with respect to ethnomedical medicines found within the traditional pharmacopoeia of Indigenous Peoples

Making the trek from the taiga.

world-wide. This interest has led to the laboratory testing of many plants or plant extracts and to the publication of many books and articles in academic journals. Some of the relevant English language journals include *Herbalgram*, the *Journal of Ethnopharmacology*, *Alternative Medicine*, *Planta Medica*, and the *Journal of Ethnobiology*. Data is also available on the Medline CD-ROM database which includes biochemistry and medical journals in all languages from all countries. And Mongolian researchers are developing databases in botany and ethnobotany.

While comprehensive studies of traditional plant knowledge have not been compiled for Mongolia, especially on the Lake Khovsgol region, there is much that can be drawn on from the broader scientific and ethnographic literature in English and Mongolian. Many of the same or similar species of plants grow in Central Asia as in other parts of the world. Plants migrated into the Americas as did people. As with people, this area may be the "motherland" of plants that are now familiar to us in the Old World and the New. Further, there are many similarities around TPK between Indigenous Peoples of Central Asia and the Americas.

Ethnobotanical studies have focused, in many parts of the world, on the medicinal uses of plants, but a more holistic approach is needed in Mongolia. The Mongolians are traditionally pastoralists; thus, studies of TPK should include ethnoveterinary knowledge. They should also recognize that animals do self-medicate and that "foods" may be used medicinally by animals and people. Nutritional studies of plants could be enhanced by an understanding of how the nutritional components vary at different times of the year and under different growing conditions. Technological studies of plants (for shelter, tools, and other uses) may reveal a wealth of information about seasonality, quality variability, and sustainable harvesting practices, among other aspects of a community's TPK.

Ethnobotanical studies should be viewed within the broader field of Indigenous knowledge. Studies worldwide are focusing on environmental issues such as habitat loss and degradation, and on ecological restoration. Plants should also be viewed within the broader context of a holistic land and resource management system, which for the Tsaatan, is based in shamanism. We also need to consider how scientific knowledge may be effectively integrated with indigenous knowledge for mutual benefit. Such issues are pressing amongst the Tsaatan since the taiga zone comprises less than 4% of the total land area of Mongolia and is under particular threat from global warming.

Information is lacking on detailed harvesting practices, on plant preparations, extractions and combinations, on the relationship between healer and client in indigenous cultures, and on the prescription and dosage of plant remedies for plants and animals. Small and medium dosages of *Rhodiola rosea*, for example, have a stimulating effect, whereas larger doses have more sedative

effects (Brown et al 2002:5). What Barsh wrote in 1997 about traditional healing systems still holds true: “there is little ethnographic information on the preparation of specific extracts” (ibid:31). Further, “researchers rarely study an indigenous pharmacopoeia as an integrated system of diagnosis and prescription” (ibid:32).

Botanist, Oyumaa, and her family.

Barsh points out that a primary factor in why laboratory studies do not conform to the claims of traditional healers “may simply reflect failure to prepare extracts properly… they may be testing the wrong part of the plant, or collecting the plant under the wrong conditions” (Barsh 1997:29). In situ plant studies in the field over several seasons will provide the necessary detailed knowledge. Documentation needs to include collecting protocols; the ecological context of individual species to further understanding of how medicines are compounded and the effects of compounding; the synergistic effects of plants in the environment and in use; preparation methods; storage criteria; the prescription of plant medicine; consequences of improper use and contraindications; whether possible toxic side effects can be controlled through the use of antagonists as neutralizers or facilitators of plant properties; and how different bioactive compounds are distributed throughout different parts of the plant.

Ethnomedicine considers the relationship between patient and healer. Such a relationship recognizes the individualistic rather than generic effects of prescriptions and how these interact with a patient’s physiology. It will be interesting to compare the TPK of Tuvans in Tuva with the Tsaatan in Mongolia. What comparisons can be made between remedies that are endemic to the region and those developed in their new homeland? What knowledge has been formed in relation to their neighbours (shamanist and Buddhist) and perhaps exchanged? It will also be valuable to consider the dispersal of TPK amongst the Tsaatan. Do all practitioners use the same plant in the same way? If so, this might suggest conservatism and a distributive system of knowledge. Or, are medicinal toolkits individualistic, explorative, experimental and even competitive? To what degree do people self-medicate and under what circumstances do they seek specialized help – traditional or allopathic? Finally, are traditional healers finding, within their familiar *materia medica*, approaches to newly developing health and environmental problems? These approaches will provide insights about the flexibility of traditional knowledge systems and may suggest areas for integration of allopathic and traditional medicine.

Notes:
1. The transcription of Mongolian into English is not standardized. I have used the spelling provided by interviewees and translators.
2. Table I is a preliminary listing of plants and their uses. The content will be confirmed and expanded in 2007. Comments are welcomed.

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PART VII

BRONZE AGE MOUND BURIALS: 2006 FIELD SEASON

By Bruno Frohlich and Amgalantugs Tsend

The 2006 season in Hovsgol aimag focused on the excavations of a selected number of burial mounds in the southern distribution of the field of 1400 mounds surveyed in 2004 and 2005. We had several objectives, including verifying the on-going dispute about whether the mounds were used for burial or other functions, as well as questions about the meaning of round vs. square khirigsuurs, the location of burials in the mound, and the age of the deceased.

Our excavation season was sponsored and funded by a NSF grant with George Mason University, National Geographic Society, the Department of Anthropology, and private donors. The field season was co-organized with the Institute of Archaeology at the Mongolian Academy of Sciences, and we enjoyed having many Mongolian participants from the Institute, the National Museum of Mongolian History, and the University of Ulaanbaatar.

2006 Joint American Mongolian field crew for investigations of burial mounds in Hovsgol aimag, Mongolia.

Our team included **Bruno Frohlich** (Smithsonian Institution), **Eliza Wallace** (Boston University), **Evan Garofalo** (Johns Hopkins University), **Thomas Frohlich** (Hobart and William Smith Colleges), **William Offenheiser** (Smithsonian Institution), **Laura Short** (Indiana University), **Gordon Wiltsie** (National Geographic Society), **Nicholas Wiltsie**, **Manlaibaatar Sundev** (National Museum of Mongolian History), **Amgalantugs Tsend** (Mongolian Academy of Sciences), **Batshatar Erdene** (Mongolian Academy of Sciences), **Batsuch Lhagvajav** (University of Ulaanbaatar), **Bolormaa Lumben** (Muron), **Bat-Erdene Tsetsegee** (University of Ulaanbaatar), **Uuriintuya Choisuren** (University of Ulaanbaatar), **Tomor Gurdorj** (Ulaanbaatar), and **Sukhbaatar Ganjuur** (Ulaanbaatar).

We selected seven mounds in the southwestern part of our survey area located 10-15 km west of the Ushkiin Uver deer stone complex west of Muron. Six mounds were completed and one large mound was partly completed whose burial chamber still remains to be excavated. We obtained excellent human skeletal remains from all the central mounds strongly supporting our hypothesis that they are indeed human burial features. The bodies included children and adults of both sexes, and apparently the smaller mounds include sub-adults, with the size of the mound correlating with the age of death of the sub-adult. When larger mounds were excavated, they yielded adult human remains with no correlation with the size and shape of the mounds. Thus variation in size and shape of the larger mounds may primarily be a function of some other factor, for example social status. We did not find any burial objects. Bone samples have been selected from all six skeletons for dating at the AMS laboratory at the University of Arizona. We have not yet received the results.

In 2007 we plan to complete the excavation of the medium size mound begun in 2006. Also, new remote sensing data has been received from Google Earth, and some of our research areas

in northern Mongolia can now be displayed on line with a pixel resolution between 0.5 meter and one meter. This allows for the display of between 30 and 40 percent of known mounds, thus becoming a fascinating new tool for exploring and mapping other mound structures in unknown areas. Using these files we found such two areas south and west of our present survey area which we plan to explore in 2007.

The burial mound research, our ongoing research on the Gobi mummies found in 2004 and the mass burials excavated in 2003, and now the new Khentii find are all results of the excellent collaboration between the Mongolian Academy of Sciences and the Smithsonian. As usual, we will bring updates on both the scientific and the logistic front in up-coming reports.

PART VIII

BOTANY TEAM TRAVELS NORTH OF THE SHISHGED GOL IN EAST TAIGA

Paula DePriest, Museum Conservation Institute, Smithsonian Institution

Botany Team, Oyunbileg, Olzii, Paula, Bayanaa, Sanjim, and Tsogt-Ochir examines carved Tibetan Buddhist plaques at the ovoo on the south peak of Renchinlkhumbe Mountain.

In June 2006 the botany team led by **Paula T. DePriest**, and including Mongolian botanists **J. Oyumaa** and **Oyunbileg**, and cook **Olzii**, traveled with Dukha guides **Sanjim**, **Bayanaa**, **Batmunkh**, **Enkhbat**, **Lhagvasuren**, **Tataar**, and **Tsogt-Ochir**, on a 100 km horse-back circuit starting from the Shishged Gol ferry crossing of north of Tsaagannur (N51°24.600' E 099°17.603'), June 15-24. The goals of the trip were to examine pastures and natural areas of the Dukha's traditional reindeer-herding territory north of the Shishged Gol—called the East Taiga, to compare these areas to reindeer-herding territories south of the Shishged, and to estimate the reindeer capacity of the combined areas.

The Shishged is a tributary of the Yenesei River draining through Tuva and Siberia into the Arctic Ocean and divides the current East and West Taiga territories, north and south respectively. From the ferry crossing we traveled west along the north shore of the Shishged Gol to the mouth of Tengis Gol (N51°28.926' E 099°03.007'). Passing through this area we saw a Bronze Age khirigsuur (N52°26.493' E 099°12.357'), and Chinggis Rock and Fence (N51°28.808¢ E 099°03.050¢), a rock dome and line of rocks with surrounding circular rock features reported to have been constructed during the Chinggis Khan period. Chinggis Khan (more likely his son Joci) is reported to have visited the confluence of the Tengis and Shishged Rivers to accept the peaceful surrender of the People of the Forest in 1207/08, leaving footprints and a fence of stacked stones. The Tengis Gol is a doubly important site for Mongolians as legend dictates that the Mongol clan originated from a blue-grey wolf and a fallow doe along a body of water named 'Tenggis.'

The Tengis valley is broad and glacier-carved. Ice dams extending from the Tengis glaciers blocked the Shishged d River during the Last Glacial Maximum, making a proglacial lake of the Darkhat Valley. Continuing north and up along this Valley (N51°50.972' E 099°08.093'), and northeast along an ice-filled tributary, we reached the Ulaankhad Gol (Red Rocks River; N51°51.460' E 099°21.951'), and turned north to an unused reindeer summer pasture along the Russian border (N51°55.873' E 099°23.482'). The nearby summer camp was adjacent to a 30 m waterfall (N51°54.229' E 099°21.685') with deep river gorges above and below, demonstrating the glacier formation of these valleys. From the border we turned south, passing through the East Taiga spring pastures (N51°46.568' E 099°25.965'), and visited the 10 ortzes (tents) of the East Taiga's early summer camp (N51°39.237' E 099°22.703'). At this camp, we were the first to use the two new guest ortzes established to minimize the impact of increasingly frequent tourist guests on fragile pastures. After leaving the East Taiga camp, we traveled to south sacred Tibetan Buddhist sites on Renchinlkhumbe Mountain. Two ovoos, one

the ridgeline (N51°31.571' E 099°14.111') and one summit of the south peak (N51°32.575' E 099°12.270') were used for worship by ethnic Darkhats during the two hundred years of the Buddhist ecclesiastical estate, Darhad Ih Shav'. The ovoo on the lower ridge was the site of annual readings of sacred texts until its suppression in the 1930s . Since the 1990s, the site is being restored with new ovoos and carved plaques with Tibetan writing. Ten days after our departure we returned to the Shishged Gol ferry crossing and to Tsaagannur.

Dukha guide Bayanaa collects flowering plant along the Ulaankhad Gol in June 2006.

Our route along the Tengis and its tributaries was a major herding area for Dukha until resettlement of the herders closer to the supply sites at Tsaagannur. Traditionally, the area was connected to the reindeer herding area of northern Tuva by a major trail, with the seasonal migrations crossing today's border. Lead guide Sanjim's family escaped from Tuva in 1946 to settle in this area; we visited the camp of his relatives at the confluence of the Shishged and Tengis and in the East Taiga camps. Also, Sanjim located the poles of the ortz in the last fall camp his family used along a tributary of the Tengis Gol. Today both Dukha and Darkhat use this area for hunting and fishing, especially in the winter when the rivers are frozen making travel by reindeer easy. The only wild game that we saw was two prong-horn deer along the Tengis Gol; however, it is reported that the river valley to the west of Tengis Gol supports a herd of wild reindeer.

In comparison to the reindeer herding territories south of the Shishged Gol, the East Taiga offers a number of underutilized pastures that are easy to access. The glacial history of the area produces broad valleys excellent for seasonal pastures, low passes easily crossed, and deeply carved river gorges and waterfalls with abundant water to support camps and herding. Because of an unseasonably cool June 2006, the vegetation in this area was delayed in both germination and flowering by comparison to the more southern West Taiga. Additional collecting later in the season would be required to compare two floras, although some rare plants were documented and collected on Renchinlkhumbe Mountain and near the Russian border. Use of the pastures along the Tengis Gol would significantly increase the carrying capacity of reindeer for the Sayan Mountains, but this would require protection of the area with control of hunting to increase the wild game, herd-building support such as importing appropriate Sayan breeding stock from Tuva, and infrastructure development to support year-round habitation by herding families.