

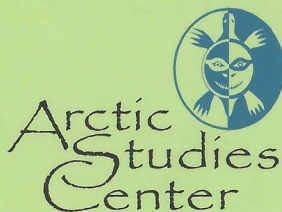
Mongolia Deer Stone Project: Field Report 2005

William Fitzhugh, Editor
George Michael Leader, Compiler/Producer



Arctic Studies Center
National Museum of Natural History
Smithsonian Institution
Washington, D.C.

National Museum of Mongolian History
Ulaanbaatar, Mongolia



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Northern Eurasia

Cover Photo: Project team at Maral Sculpture, a few miles south of Muron, 21 June 2005



Smithsonian Institution

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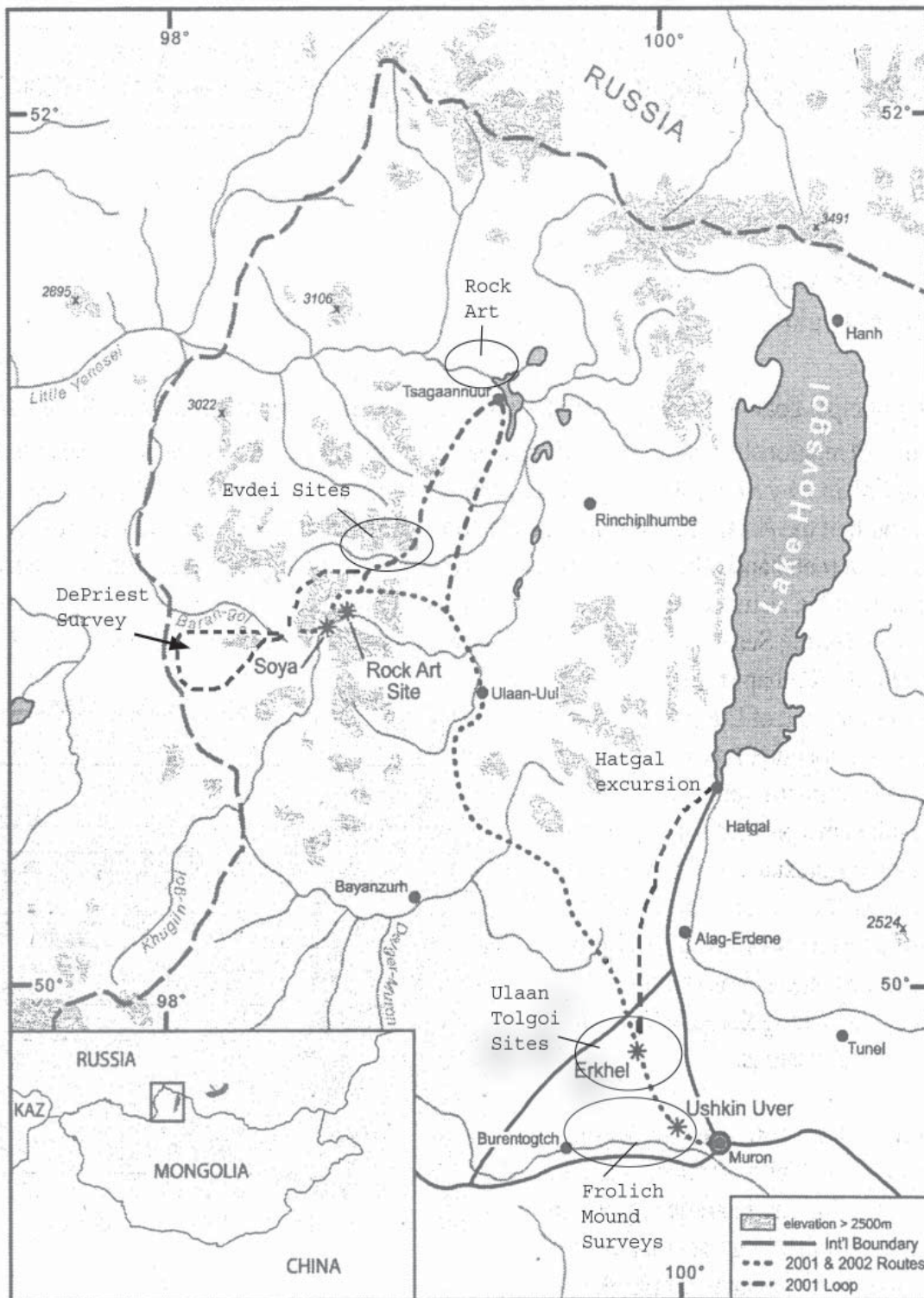


Figure 1: Sites and Routes of the 2005 expedition



Part I

Field Report to Museum: Mongolia 2005

William W. Fitzhugh

The 2005 Mongolia Deer Stone Project — a joint project of the Smithsonian’s Arctic Studies Center and the National Museum of Mongolian History and Institute of Archaeology has completed its fourth field season of education and research activities this. Like last year, our work included several days of research conferences and museum exhibits and conservation workshops in Ulaanbaatar as well as three weeks of field research in northern Mongolia. More than thirty people were involved this year, thirteen from the Smithsonian, representing NMNH Anthropology and Exhibits, SCMRE, and OEC. This years’ work involved projects in archaeology (Fitzhugh), physical anthropology (Frohlich), botany (DePriest), and remote sensing (Beaubien, Karas, Thome), conservation (Firnhaber), and exhibits mounting and production (Thome, Rhymer).

We were very pleased to have the participation of the U.S. Ambassador to Mongolia, Pamela Slutz, and her husband, Ronald Deutch, who joined us for a week of fieldwork among the Tsaatan reindeer herders in their summer tundra camps in the Sayan Mountains. The project has benefitted during the past year from an ambassador’s grant provided by the Department of State. The Ambassador has been especially helpful facilitating the project through donations of aid to the Tsaatan people, providing canvas for tents and educational assistance.

During the first few days in Ulaanbaatar we hosted a research symposium sponsored together with the American Center for Mongolian Research and the National Museum of Mongolian History. Now in its second year, this symposium is attracting considerable attention and was attended by more than one hundred scholars and students. This was followed by a day of museum exhibit and conservation workshops instructed by Carolyn Thome, Paul Rhymer, Natalie Firnhaber, Rae Beaubien, and Vicky Karas. The latter demonstrated applications of laser scanning technology to archaeological

and museum problems. Rhymer and Firnhaber remained in Ulaanbaatar for the following week, providing assistance and training to the museum community.

This year's field programs included deer stone analysis and excavations of associated Bronze Age sites and monuments ; applications of laser scanning of deer stone art to provide a new method for baseline conservation and interpretation; botanical surveys of the most inaccessible regions of northern Mongolia along the Russia-Tuva border; and detailed mapping of Bronze Age burial mounds and ceremonial sites. In addition to large amounts of new data from this year's fieldwork, Bruno Frohlich obtained permission to export a series of mummies from the southern Gobi for analysis and CT-scanning at NMNH. A book documenting our research to date has been published by the Arctic Studies Center and the NMMH, and an article has appeared in *Archaeology* the popular magazine (Appendix G).

The project is grateful to the many SI offices and units that assisted this year's program financially and by contributions of personnel. The Deer Stone Project demonstrates the value that can be added to coordinated research, conservation, and educational ventures through broad-based multi-unit SI collaboration. In the future we hope to expand the project by the addition of other biology, natural history, and art and history projects. Next year is the 800th anniversary of the Genghis Khan's formation of the Mongolian state, and the Smithsonian is committed to help the world learn more about Mongolia through the organization of a festival, "Genghis Khan's Mongolia: 800 Years of Nationhood," to be held at the National Museum of Natural History on October 6-8, 2006. We are off to a good start in taking advantage of the research and educational opportunities brought about by the opening of this formerly closed region of Central Asia, still so little known to science and to the rest of the world.



Part II

Mongolia Field Diary 2005: 15 June – 16 July

William W. Fitzhugh

American Team:

William Fitzhugh (archaeologist NMNH/SI), Harriet Beaubien (archaeological conservator CMI/SI), Paula DePriest (botanist CMI/SI), Elizabeth Eldredge (volunteer), Natalie Firnhaber (UB only, conservator NMNH/SI), Melanie Irvine (NMNH/SI intern), Basiliki Vicky Karas (scanning scientist CMI/SI), Thomas Kelly (photographer), Eric Powell (editor, *Archaeology Magazine*), Paul Rhymer (UB only, exhibits specialist NMNH/SI), Dennis Rydjeski (volunteer), Carolyn Thome (model-maker OEC/SI). Ambassador Pamela Slutz and her husband Ronald Deutsh accompanied the team from Muren to the Darkhat and participated in the visit to the Tsaatan/Dukha.

Mongolian Team:

Ts. Ayush (ethnologist, NMMH), J. Bayarsaikhan (archaeologist, NMMH), Adiabold Namkhai (translator, expediter), Jugii (archaeology student), Ts. Odbaatar (archaeologist, NMMH), Oyunbileg (botanist), T. Sanjmiatav (archaeologist, MAS), Oi. Sukhbaatar (geographer, Chinghis Khan College), Tunjii (archaeology student), Odga (cook), Uгна (student), and drivers Batbaatar, Khadbaatar, Tserenam, and Tsog.

15-16 June 2005 – Wednesday-Thursday: Airborne

Leave DC (Dulles International Airport) at 1:30 pm

We flew direct from DC to Seoul, Korea in 13 hours and met Dennis Ryjeski and Betsy Eldredge at the departure gate for the Korean Air flight to UB. Arrived in UB at 11:30 pm and were met by Adiya and Bayaraa in a bus that took us to the Zaluuchuud Hotel. All baggage arrived ok.

17-18 June 2005 – Friday-Saturday: UB

The Friday symposium workshop started at 10:00 am in the National Museum of Mongolian History with 50 people attending. Peter Marsh of the American Center for Mongolian Studies had organized the session with Bayaraa and Odbaatar. Natalie Firnhaber, Rae Beaubien, Paul Rhymer, and Carolyn Thome presented storage and conservation instruction in the morning and bracket-making in the afternoon, with sessions at both the Cultural History and Natural History museums. Peter Marsh gave me the “page proofs” for our book of 2004 conference papers, but I discovered many production problems, and so we will not get this printed in time for our departure in July. The conference was on Saturday and was attended by 100 people including Dr. Chadraa, President of the Mongolian Academy of Sciences, Dr. Enkhtuvshin, Assistant Director of MAS, and Ayudain Ochir, Director of the NMMH. We presented nine papers: five by US researchers and four by Mongolian researchers. The US side presented talks ranging beyond Mongolia while the Mongolians presented material related primarily to our Hovsgol research. Sukhbaatar gave a very nice presentation on Tsaatan animal conservation and ritual showing their careful use of resources. Ayush gave a paper on the use of skis in hunting by the Tsaatan. Rae Beaubien spoke about scanning techniques with examples from Mesoamerica, and her proposed use on the deer stones, and then did a demonstration, scanning a small animal mask from the museum’s collection. This worked out very well and demonstrated the relative ease of the technique if you have the right equipment.

Peter Marsh did a great job organizing the conference and workshop with Sukhbaatar and Bayaraa. It was well advertised and ran very smoothly. In the evening we held a reception with the museum for all participants, funded by the US Embassy. Peter had rounded up some musicians to give us some local Mongolian color. He has been using his time in Mongolia to record and interview Mongolian musicians, preparing publications for the future when he hopes to land a folklore position at a university in the States. Ambassador Slutz and her husband Ron Deutsh came and made some plans with us for their participation in our project. They are driving with an embassy driver in a red-license plate (diplomatic plate) Toyota to Muron and will meet us Tuesday evening.

19 June 2005 – Sunday

I had to spend most of the day working on the manuscript and realized that it will never be ready to print by our July departure. The crew went on a black market excursion, watching their valuables, but nothing got stolen or pockets slit like Paul Rhymer's last year. Peter and I went over the manuscript for an hour in the afternoon and we agree in terms of design and illustration requirements. In the afternoon Adiya, Paula and I went grocery shopping (Bayaraa had got the bulk materials at the black market earlier). We also changed money – about 1200 T to the dollar, up from 1100 T last year.

20 June 2005 – Monday: UB to Khoshoot

We got off at 9:30 am in a 4-van caravan, with lots of fueling and miscellaneous stops. We had to leave Bayaraa's van behind to deal with the archaeology permit, which had not yet been signed. There is a new archaeology law in force now administered by the Ministry of Education and it needs lots of signoffs, including at the Academy of Science. Bayaraa did not catch up with us until 2:00 am at our campsite at Khoshoot Village – without the permit, because they required a \$200 payment, which he did not have.

After about an hour of driving, we hit the new “millennium highway” which has been a huge government and external aid program to build an east-west highway across the entire country. Today it runs 250 km west of UB, and then ends abruptly, landing you in a deeply entrenched road, embedded between sand dunes – if you weren't careful you could literally shoot off the end of the highway into the bush as there is only a small pile of dirt to serve as a barrier. While on the highway it was quite amazing to ‘fly’ through this country at 120 km/hr after our customary ‘dirt road’ speed of 10-20km/hr. Also amazing was how few other vehicles we met on the road – only a handful in a couple of hours.

The weather was quite hot when you stop driving, and it hit us especially when we visited the archaeological site of Khar Buka Balgas, an 7-8th century ruin, which we toured for an hour with Sukhbaatar providing tour-guide instruction. Its construction has an interesting pattern of rock block and slate construction in alternate layers. The Japanese have been working here for several years, mostly conducting a settlement pattern study, but have finished now. Large sections of the mud-mortared walls (5-6' thick) are collapsing and need stabilization. This part of the country has

many ruins from different periods beginning with Xiongnu (ca. 200 BC-200 AD), and Kharakhorum is only a short distance to the south. It is a very rich agricultural and herding region – at least for Mongolia. The little one-room blockhouse of a museum had photos of most of the sites/ruins in the region and a few artifacts, including some birch bark manuscript fragments.

During the afternoon we traveled north overland toward the Khanuy River, but by evening we had only got as far as Khoshoot where there are three deer stones near the edge of town, presided over by a guy who gave us a drunken tour. All these stones had been raised and cemented into the ground by a Russian team in 1971 with Sanjmiatav participating. We saw some of our first kherigsuurs in the country south of Khoshoot. We camped north of the town bridge (which was manned by a lady toll-taker), after the Mongolians had been able to secure some khosuur meat pastries from the local restaurant. Here we met a very curious pig, and the girls pioneered a pit stop beneath the bridge, not yet having loosened their inhibitions, or their interest in using the local outhouse facilities (an old rusted out flatbed truck cab). Camp got set quickly along the river, which was pretty slimy with algae and scum from the millions of animals contributing to it. Nevertheless, at our lunch site along a similarly dirty river we saw a boy carrying home a rather large bass-like fish – so something survives in these waters, and is eaten. About 2:00 am with a near-full moon showing, I heard a ruckus, which turned out to be Bayaraa's arrival with the news of his failed permit attempt.

21 June 2005 – Tuesday:

Khoshoot to Muron

At breakfast we heard the details about the permit saga and how arrangements had been made to get it to us in Muron. Then we struck out on the road again northwards with me trying out the backwards seat. Not too nice seeing the country pass by backwards, and soon



Figure 1: Ferry crossing at Selenge River

it was dizzying. But soon I had a respite with the appearance of a large kherigsuur and deer stone site – in fact a slab burial that was built with deer stones as its corner posts – clearly a post-deer stone phenomenon that borrowed the spiritual power of deer stones. It seemed that Sasha may have

been present when this grave was excavated by Russians, maybe also in 1971. It would be great to see what they found and if anything could be dated. This was a good introduction for the crew and broke up the boring drive. A 22-year old herder rode up on his horse while we were there and said no one had ever worked on this site while he was alive. The hill to the north of the site is called “mustache hill,” or Sakhat, because of the thin fringe of trees showing along the crest of the hill. Burdnii Ekh (in Bulgan Saikhan Sum) is the name of the site, meaning “the source.” After passing through Khierkhan village and crossing a steep pass we emerged in a small valley that had a Turkish period site that consisted of a square structure with low foundation walls of cut rock (2-3 courses) which had a center passage through the middle of the structure that was aligned with a very well-carved Turkic figure



Figure 2: Turkic figure at Dalka Site



Figure 3: Central passage Turkic structure at Dalka

(Odbaatar thinks it might have been moved here from somewhere else). This is in the valley of Dalkha. The stone structure does not seem to have been excavated.

The next interesting attraction was the side valley to the Selenge River through which we descended to reach the ferry. This valley was full of sand dunes and had none of the usual steppe-type vegetation, but lots of elm trees and disturbed ground. Patches of what seemed to be fire-cracked rock were everywhere, of different varieties of stone. I couldn't help thinking they were archaeological sites, but I could not find any flints or pottery, and the Mongolians said the Selenge Valley is like this everywhere – however, by this they meant the vegetation and sand, not the rocks,

so I think a closer look is needed.

The ferry across the Selenge is quite an elaborate affair using a wire and a pontoon 2-vehicle ferry that has a huge rudder on the down-stream side and winches at either upstream corner, with the pontoon upstream and shaped into bows made of sheet metal. When loaded, the ferry crew winched against the cable pulley to tip the craft to about 30 degrees to the current and another tied the rudder over and the current started ferrying the craft across. The ride took only 5 minutes, with a landing at a small dock. They even had a small restaurant at the high bank side on the north shore. Once ashore we sped over good roads to Muron in about one hour, passing large numbers of ger camps. We went directly to the Gobi Hotel, where we found Ambassador Slutz and husband Ron Deutsh.

22 June 2005 – Wednesday: Muron to Erkhel Lake

Half of the group spent the day shopping for supplies in Muron while the other half practiced laser-scanning at Ushkin Uver. In the evening we drove over to the Erkhel Lake (Ulaan Tolgoi) site and were there only a few minutes before we were visited by the tourist camp crew on a 3-wheeler. Prices were \$10 for a ger with 3 beds and \$15 for a ger with 4 beds. There were camels and cuckoos around our campsite at Erkhel, and we had a dinner of beef soup and great bread (we have bought 100 loaves in Muron!)



Figure 4: Bruno Frolich explains mound survey program to Ambassador Pamela Slutz, Ron Deutsh, and Eric Powell.

23 June 2005 – Thursday: Erkhel to Darkhat

Erkhel camp departure was at 8:15 am. We crossed Tom Pass at noon with great weather. Cuckoos in the woods. We had lunch along side the river south of Ulaan Uul at 2:30, paid our toll entering the Darkhat gate and gassed the vehicles at Ulaan Uul. The “good gas station” was out of fuel, and while we could fill at the station with less high quality gas, its octane was too low octane to be used in the

ambassador's car, so they were calculating where their half-way point would have to be.

24 June 2005 – Friday: Evdei

Stopped at the Evdei stone slab site and then visited Soye rock art site, which Tom Kelley photographed.

25 June – Saturday: Menge Bulag

In the early morning we heard lots of cuckoos in the woods around camp. Traveled to Tsaaganuur and met with Governor Gambaat (Davaanyam?), a former school teacher who grew up in T.N. and became governor in December, representing the democratic party majority in T.N. which is 70% Tsaatan. Then we proceeded to our meeting place with the Tsaatan in the valley west of Tsaaganuur (GPS station #17: N 51° 15.020; E 099° 11.657; 1653m elev.), arriving at 1:30. Several Tsaatan on horseback raced us to the meeting place, at times riding much faster than we could drive. Some of these people were Mongols who were helping the Tsaatan provide enough horse to accommodate our team for the ride in to Minge Bulag.



Figure 5: School underway in Tsaatan Tundra Camp

**26 June 2005 – Sunday:
Menge Bulag**

Delgar's home was our kitchen. In the morning we got horses and I went to search the site down river where Erden, Bayandalai's son, had found a stone end scraper, but we found nothing – no flakes or anything! I had visited this site previously in 2004 and had recorded it as an ethnographic Tsaatan camp.

Seventeen kids were taking part in a 'tundra' school in two tents donated by the British, and two Darkhat teachers were giving instruction. We provided lots of balloon gifts and gave away copies

of our 2004 photographs. Ed Nef and his elder daughter and a couple friends of theirs plus children were also in Minge Bulag during our visit. This daughter lives in Seattle, WA.

27 June 2005 – Monday: M. B. to Evdei

Overcast, rain showers. The Tsaatan had a big gathering for the Ambassador and

Ron's departure, and several others of us who were heading out to the steppe again. Tsetsegma was coming with us to get a ride in the ambassador's car to Ulaan Uul, where she needed to see about her daughter who was trying to get to Muron.



Figure 6: Menge Bulag Tsaatan tundra camp in Sayan Mountains.

Left Menge Bulag tundra camp at 10:30 am and found our drivers waiting at the usual spot at 2:30pm. A good ride down; cool and not many flies. My horse (Zorig's) was sure and steady and had a good gallop in the open steppe for the last few miles. Somewhere in that stretch my saddle cushion disappeared and I became aware of a much more painful situation, bouncing along on the hard wood slats of the saddle. I was mightily relieved to reach the end of the road, and when Ron (ambassador's husband) rode in with his guide waving the missing saddle cushion, everyone had a good laugh. There were no spills or upsets this time, and the trail was fairly dry. We passed over my spill site of last year (when my horse — Batsaya's — and I went thru the ice in the marsh near the end of the trail). This time the ice was mostly melted, but there were still big 2-3 ft thick ice wedges visible under some of the exposed peat.

After payments and goodbyes we returned to our Evdei River camp and had a quick lunch, and Dennis, Betsy, and I joined the Mongolians at the stone slab site (Evdei 1), which during our absence had begun to shape up, with 2 features about 80 cm below the surface east and west of the slab by 30 cm. During the next couple of hours we had sun, sleet, wind, and very much dust in the pits, and opened a 1x2m extension on the east side to follow the feature out away from the stone slab in that direction.

I looked like a sun-tanned Mongolian when I wandered into camp with my face caked with dust. During the afternoon while we were digging, Carolyn caught three grayling in our stream, and Tom roasted them up with onion stuffing, which tasted very good, although I am always amazed that few Mongolians eat fish due to Buddhist tradition. These grayling were 10-12 inches long.

We tried to work out the schedule for Rae's group since they won't have any scanning to do up in the Shishiged River north of Tsaaganuur; but if they go their own way to Erkhel or Ushkin Uver, they need a cook and interpreter, and we don't have extras of either. We'll see how things go tomorrow at our site, and then figure it out. The team had a great game of softball in the meadow with a sock taped up with duct tape and a stick for a bat. Hi-jinks all around, with Bayara the grand-slam homer hero. I washed pants and shirt in evening and as a result have no dry pants for tomorrow. It was stupid of me to bring only one long pair and pairs of shorts!

28 June 2005 – Tuesday: Evdei

This was a very cool day with periods of warmth when the lively cumulo-nimbus clouds passed by – sometimes dropping hail-stones on us. But the thunderstorms gave a dramatic touch – some spice for the day because they were raining elsewhere. We split into two groups, one to survey this area of the valley for mounds, led by Odbaatar, and the other working at the Evdei-1 site. By last night the structure began looking like a Turkish feature because of the alignment of small buried standing stone slabs that extended east and west from the large central standing slab. But, as there is little published information and little excavation no one has a good idea of what to expect. Sasha has excavated one and found a horse head near the slab. In our case, the E-W slabs have been buried by slope wash from the ravine above; normally in this type of Turkic site the small slabs extending out from the central slabs protrude from the surface. The site is placed in the center of an alluvial fan and the silt and rocks have added 20-30 cm of new deposits to the original ground surface when the feature was created. So far no artifacts have been found, and the few bones recovered could well be marmot-carried. Today we excavated to the base of the small slabs and still don't have much to show. Hopefully we are just not deep enough. Last year we found a Turkish stone alignment, whose stones were all visible on the surface and extended more than 100 meters, I think. There was a standing slab present in the center in that case also. By the end of the day we were able to trace the pit used to set the big slab, but could not define a pit or any trench for placing the small slabs. The eastern-most slab in the eastern line had been broken, and its top was 50 cm away, marking the ground surface of the day. The burial, if one is present, remains elusive, so we hope we can find it or

something tomorrow.

Meanwhile, the survey team (Odbaatar, Denis, and Betsy) mapped 30+ mounds along the base of the hills on the north side of the valley. Adiya made a very tasty lunch, and Tom Kelley caught four more grayling for dinner.

Tsog and Hatta came through during lunch on their way to meet Ed Nef who was coming down the mountain with the Tsaatan today. We saw them pass the site about 3:30, waving goodbye on their way home. He told me the other day when we chatted at Batsaya's camp that he might not be coming to Mongolia much more – or at least to visit the Tsaatan. I think he is planning to turn the school over to Orgilma, now that it is a going concern and in their new brick building.



Figure 7: Tom Kelley and his grayling catch.

Paula was to set off for Bus, this morning, a 7-day trip through much lower country than Menge Bulag, and much infested with mosquitoes which were likely to be a problem for the horses, whose eyes can become swollen shut by the bites. They have no defenses there. So Paula was going to try and see if they would tolerate spray repellent. The result will be interesting to hear about!

The “Korean” tent is back up again – and such a comfortable space, making a real camp out of a sleeping place.

I have my own bath spot in the stream near my tent, with some seclusion and a sandy bottom. The only problem is the water temperature. Yesterday we saw all the snow/ice banks up the mountain that feed it. You don't laze around in that water, but it does the trick, as does my 'Laundromat,' a rubber bag that I can fill, seal, and let the sun warm with a mess of dirty clothes and a dash of soap. In a day, like sourdough bread – it's done!

29 June 2005 – Wednesday: Evdei

Lots of showers last night, but they cleared by morning and we had another cool, clear day with only a few showers. The ‘scanners’ tried their equipment in the sheep shed nearby after sunset, but it did not work...too cold perhaps (at 50 degrees). Yesterday it had worked fine after a day of mysteriously reversed images. This morning they converted their black shade tent (for scanning) into a private shower stall, with the addition of the solar hot water shower bag of Carolyn’s – so far I haven’t seen it in use. It’s just high enough for our tallest lady – Carolyn. Site work did not produce any major advances by noon, although I found a charcoal sample on a 20x20 cm slab below what we think is in situ silt predating the stone. So we have to puzzle this out. Dennis seems much improved from his intestinal problems, which sound like my usual complaint, somehow avoided this year. The mapping team found a deer stone lying on the surface near the mouth of the valley – a new stone, with belt, chevron, disc, and knife. Perhaps we can scan this piece, which may be one of the northernmost deer stones in Mongolia.

30 June 2005 – Thursday: Evdei

We profiled Evdei-1 east side bulk.

Evdei-2. We found this site with its many rectangular enclosures at the northern entrance of the Evdei Valley. It’s the same location where the fallen deer stone was found. One of the enclosures had a looter’s pit where we found broken ceramic figurine fragments, glazed ceramics, a pot hoop handle of copper, in an enclosure measuring 50x25 paces. There were four small stone uprights midway in its south fence/wall.

1 July 2005 – Friday: Shishiged River day trip

After the scanners and Tom and Eric left about 9:30, the archaeology team departed for a day’s survey north of the Shishiged River, stopping at several locations en route, including the line of khirigsuurs on a hillside south of Tsaaganuur. This hill had lots of flinty stone and some pieces that seemed utilized or flaked, including a hand axe-like implement. The khirigsuur were large and mostly at the same elevation, halfway up the hill. Some time should be devoted to checking out the suspicious flints – all of a blue-black variety and slightly chalky, not of very high quality. We made a brief stop at the ‘supermarket’ in Tsaaganuur for snacks and sodas. We then proceeded north to

the one-car ferry which was in the same state – very basic! – as last year, but quite serviceable and hand-powered. The trick is getting your vehicle lined up properly on the ramp. We went directly to the chert site area (Khogorgo River 1) Bayaraa and Od had found last year, on a terrace overlooking a meander terrace near the mouth of the Khogorgo River. We found no significant material here, and after a



Figure 8: Mound site on terrace north of Shishiged River

picnic lunch, split into 3 groups to survey the region. Betsy and Dennis surveyed the south side of the hill on the east bank of the Khogorgo River and found 3 rock art sites. Bayara, Odd, and Adiya went around the hill the other way. Melanie, Sasha, and I went up the Khogorgo River and then crossed to survey a bit of the north bank, where we noted a series of small rock pavement features.

Crossing back toward the southwest and the north bank of the Shishiged, we found quite a few khirigsuur as well as a real surprise – Sasha found rock art pecked into the smooth unlichen-covered face of a basalt/lava block. The first location had some animals, and a second location pecked into the inward-slanting face of a basalt block partly covered with earth we found a grid pattern with a human male in the center. There were also some locations with modern graffiti. This country is quite interesting, with level ground broken up by low ridges of east-west oriented lava and basalt outcrops, whose smooth lichen-free exposures were used for the art. When we rejoined the group, we found that Dennis and Betsy had also found some rock art on the lava outcrops on the south side of the hill west of the Khogorgo River facing the Shishiged River. Bayara, Od, and Sasha went to make a tracing of the images, which included some deer, ibex, and mountain sheep. Sasha said all this material was Bronze Age material. There was some modern graffiti present indicating some local knowledge of the art, and the ferry operator said there were more images for 20 km to the east along the river. This is all new material not previously reported. Sasha knows of one other instance of a man in a grid, but only a simple square arrangement. The ferry this year was in very decrepit condition, with ramps in bad shape, and the “hitching post” to which the cable harness attaches was fastened very poorly to the pontoon raft platform. In a storm or heavy current it might pull out, and the ferry and vehicle would be history. The ferry is under private control now, and that seems to be

the problem according to our drivers – no investment or maintenance is taking place.

Very few people (herders) live north of the river. It's mostly empty land, with large steppe pastures, but few animals. We had a bumpy ride home. My foot has been difficult today and I fell once because it collapsed.

There was one terrace about 1.5 km up the Khogorgo River where we found 8-9 small stone rings on the bank by the river, a nice campsite with old larch trees and some campfires. It might be an interesting site, though there were no other indications. The stream nearby was drying up and isolated in the pools were quite a lot of minnows. We saved a few from their shrinking cupfuls of water, but all seemed doomed unless there is a lot of rainfall soon. It's been a very dry summer so far for this part of Mongolia. Fishing is big here on the Shishiged, and we saw some local people out fishing in boats. This is the only time I've ever seen Mongolians in boats.

There are 3-4 tourist camps on the Shishiged on the south side of the river, downstream from the ferry.

2 July 2005 – Saturday: Evdei

A full digging day out at the Evdei-2 site where we had found some looted pits inside large enclosures marked by 5-10 cm deep trenches which probably were foundations for fences with slotted log base-boards into which upright planks or logs thinned to 'screw-driver' ends fit. Similar constructions are still used today in Tsaaganuur as property boundary fences. The pits inside some of the enclosures, which measured up to 50-60 m x 45 m and were strictly measured rectangles, had all been dug into a depth of 2-3 feet. One contained very interesting ceramics including Buddhist relics (miniature hands, feet, torsos, etc) and many other artifact fragments overlooked by the looters. It was not clear whether these pits were trash pits or wells later used for trash, or were inside structures, etc. We collected from 2 of these pits, and Melanie and I excavated another that seemed to be a well that had been re-used as a trash pit and contained few artifacts and many food bones, from which we collected a full trash bag. We surmised that those enclosures were animal pens, but why the trash pits? And in some cases there seemed to be indications of structures or dwelling foundations. Od, Dennis, and Betsy mapped 8-10 of these enclosures over 2-3 days. Dates seem to have been early in the 20th century. Some local people here report there was a monastery established in the valley north of Evdei, but after one of the monks died in the first year, they decided that the location was

not favored and moved out to the opening of the valley at our site. Later this monastery was burned, perhaps during the purges in the 1930s. There should be good records of this in UB.

Earlier, Od had found a fallen deer stone lying on the surface in the midst of the enclosure site north of another “Turkish” standing stone like that at Evdei 1. The girls had scanned this deer stone under their “black tent” before they left, with Tom Kelley jinxing their efforts by photographing and bringing metal into the scanning environment – or so the girls surmised – for they lost their entire file about that time. Who knows? The scanner seems very fickle and sensitive to low temperatures, light, and who knows what else. They finally did get a good record of the stone’s simple engraving: belt, dagger, ring, and chevron.



Figure 9: Evedi-3 Deer Stone 1 when we turned it after excavation.

At lunch time, Ayush arrived with one of the Tsaatan, having spent most of the past week doing a general ethnographic survey in the Tsaatan village at Menge Bulag. Everything went well. He commissioned a pair of skis, and bow-trap, and a few other traditional items and we may be able to buy duplicates. During the afternoon we expanded the excavations around the deer stone (which we decided to give a new name – Evdei 3 – to distinguish it from the Buddhist village), focusing on features that might give us C14 dates, since we guessed that some of the round cobble pavements or oval features might give us horse heads or food remains. Od found a small bit of charcoal 30 cm deep in the center of an oval ring, but our hopes for a horse head vanished as we removed the capstone of rocks from the pavement feature and found only sterile gravel below. We



Figure 10: Scanning team - working on Evdei Deer Stone 1 in make shift tent to control light.

also had suspicions about the original location of the deer stone, which was lying on the surface, not even partly buried. Later we found buried just below it an undecorated slab like those from Evdei-1. This was possibly a Turkish slab – it was broken in half. Another standing slab, more square than slab-like, is 18 m south of DS-1 and the buried slab and still stands. I can't help wonder if the Buddhist monastery – if it stood here somewhere – had something to do with toppling all these stones at this site (including the one we had not yet found: DS 2).

Quitting time was 8:30-9:00 pm or even later some evenings. You crawl (bounce by van) back to camp, eat, and pile into bed. No time for other chores, like the diary or clothes washing, and it was usually too cold by then to wash in the frigid stream. At least the weather has been very cooperative with scattered clouds to provide some shield from the sun, which is very hot when direct. One night the temp fell to -1 C, but mostly it dropped to 3-4 C.

3 July 2005 – Sunday: Evdei

This was the last day at the site and in the Darkhat Valley and we still had so much to learn – we had no artifacts or horse heads and no certain info about the deer stone we've found. Mel and I profiled the enclosure pit we had excavated and bagged all the bones – a good student project to identify them and figure out use/breakage patterns. Betsy and Denis finished surveying and mapping the enclosure sites, and while we were clearing the upper rocks and subsoil at DS-1, Bayara came back from a walk around the area and said he may have found another deer stone only 50 meters west of the first. We checked it out and it did indeed have a belt groove like DS-1, but none of the other motifs. We found many circular stone features around the new stone, and decided to excavate some of this set in the afternoon. This stone setting had no rock pavements like DS-1, and when I mapped it out, there were 9 features in a ring around the stone, more or less like the horse head features around the Erkhel DS-4. So we had a chain of similarities and links: two deer stones with single groove belts. The first with disc, circle, pits, and a knife, and chevron; and circular features and rock pavements; the other had only simple stone circular rings. Both occurred in a ritual complex and were near the northern limit (for Mongolia, tho not for Russia) of deer stones. When we excavated the rest of DS-1 and DS-2, we found nothing to date, no horse heads or artifacts, and only a single charcoal sample from an oval feature in DS-1. The dark black earth in the DS-1 area seems to be sterile and a result of lake sediments and earthworm activity. No charcoal or cultural material was present. About 8:30 pm a thunderstorm struck and we rushed back to camp for dinner, and afterwards returned to finish work and backfill.

During the morning Adiya and Od went to Rinchinulhumbe to get gas and see the governor of the sum we were now working in (Governor Davaanyam), because the new archaeological law required us to report our activities at this level. The governor wondered why we had been working in his sum for five years without meeting him previously! Good question! We didn't realize we needed to and we were working on the other side of the sum with Tsaaganuur as our local administrative base. But now it is obviously important, especially as the Tsaaganuur mayor gets his support for the Tsaatan from Rinchin. The new archaeology law requires reporting on archaeological activity and proof of back filling, etc. One hopes it may deter looters and help enforcement.

After dinner at 10:00, we returned to finish DS-1, 2 and backfill. Bayara wanted to dig one more oval feature in DS-2 and soon after removing the turf shouted out a find. A beautiful small end-scraper on a blade – something rarely found after 4000 BP. Therefore perhaps 1000 years earlier than our Erkhel deer stone dates. This is a great find that – if confirmed by the small charcoal sample from DS-1 would make our single groove deer stones prototypes of the classical forms. [IT was not confirmed: the DS 1 sample dated ca 2500 BP like our Erkhel dates.]



Figure 11: A big dinner at Evdei camp.

We returned to camp at 11:45 pm pretty tired and chilled but excited and thinking of more work here next year. A classic “final moment” find! Cold night, no bath, and looking forward to some clean clothes.

4 July 2005 – Monday: Evdei to Erkhel

The front of last evening blew through with a few serious gusts but no problem for our Korean-made tent (the Mongolian Museum's tent – now scarred from battle which includes a piece that caught fire over the dung smudge a few days ago). We packed camp and got off by 9:00 am, took a few last shots of the newly erected deer stone and headed south over the terrible bumpy road to Ulaan Uul. The other van got totally “seasick” in the process and stopped and everyone piled out in a stupor and lay about on the ground like they'd been ambushed! The rivers were all very low and were nearly just gravel beds. Ulaan Uul was in the midst of its Naadam with everyone in the market stalls. It seemed like nearly 20 of those small block houses were busy with sales. We bought 3 cases of beer in honor/anticipation of 4th of July celebration in camp at Erkhel in the evening, rendezvousing with the scanners and Bruno's group, and bread, lunchmeat, water, and a few other goods. Lots of ladies in beautiful, individualized dels. Lunch at the river south of town was the most picturesque ever, with the Hovsgol range – Suridag Hovidad – looming up above the river and forest edge... a very “Teton-esque” view of Mongolia. The trip south went quickly – 9 hours to Erkhel because we did not stop at all the usual passes and rivers, and because everything has been so dry – almost no rain at all, and then only showers. All the ground is parched except for the river bottoms where all the animals are concentrated. In most other years we were wallowing in mud holes and barely surviving the river crossings.

We arrived at the Erkhel camp about 7:00 pm and, finding no sign of either Bruno's team or Rae's, we continued to the site where we found a note from Rae left at 3:15 saying they were staying at the ger camp SE of Erkhel lake. And that's where we found them, drinking beer and luxuriating in the new camp's facilities – hot showers, plenty of water, and low prices. We soon decided to follow suit and booked in the whole group at \$15 for foreigners and \$5 for Mongolians. Extra for archery and volleyball, which we enjoyed very much after the toughest lamb for dinner I've ever had. Otherwise, the food was tasty, and the cook quite good. The entire staff is youngsters enrolled in tourist management programs working here as summer interns for experience. According to the girls who have been here 3 nights they all got drunk and were up half the night. The cook appeared with a black eye the next morning. Our archery exercise was enjoyed by all and I was surprised to see that the Mongolian men had little training in this national recreation.

Did all my dirty clothes and showered. Luxury. Dennis, Betsy, Mel and I slept in one ger, in sheets no less. But the downside was the protective envelope which was not as secure as my tent, and I had to flush a bug from my bed and a beetle that started to crawl in my ear in the middle of the night.

Rain patters were part of the pleasant excursion from our normal routine, and everyone appreciated it, plus of course the beer we had brought in honor of the 4th. The camp allowed us to bring in one can each to the dinner table. Others had to be bought there!

Bruno, rumor has it from the proprietor at Ushkin Uver site, has gone to Darkhat!

6 July 2005 – Tuesday: Hatgal Trip

Cool morning after a warm night. We decided to try to find Brian Long in Hatgal and check the site he's found. One driver stayed with camp to watch over things and the rest of us piled into two vans.

Going around the north side of Lake Erkhel we found a new deer stone site on a small knoll with one roughly finished stone with rudimentary carvings, looking at first like a Turkic stone. But, on closer inspection, we found circles and deer shapes. So now we have two new deer stone sites, one north and one east of Lake Erkhel. And this one may be an early one based on the roughly finished slab and lack of many symbol elements. An interesting feature of the site is the lack of external rock structures, which leads to the question of how we could date it.

The Hatgal road was in good shape for about half the way, but overall was much better than 4 years ago. In Hatgal we failed to find Brian, who may not have got the message we left for him at the post office through Adiya yesterday. He'd gone off in a black jeep at 9:00 am. So we played tourist and climbed around the Hovsgol slip "Sukhbaatar" which was tied up at the "town dock," a loose assemblage of planks and timbers, and had its 2 diesel engines disassembled. Had it been working you can have an excursion for 180,000T an hour. Externally, she seemed in pretty good condition. Nicely painted and kept up. The lake water here is a milky Caribbean blue. We had a lunch of khoshur meat pastries and the smoked fish a couple of ladies had sold us at the dock: trout-like fish without scales and very tasty, even though being smoked black. We dropped by the hospital which looked neat and well kept from the outside, to get advice about Odga's toothache. She had a tooth pulled before the expedition but it was acting up and by this morning was very painful. The dentist in Hatgal found that a piece of the root had remained un-pulled and more work is needed, but he gave here some pain killers.

Brian Long had not returned by 3:00, so we left a message about our camp location and invited him to drop in. He had been expecting us but had to be on a survey today. On the way out of town we

checked a few site locations but found nothing early. The terrace and bluffs where the river forms up south of town is a good spot for sites, but erosion has been removing the west bank. The stone front part of town is very interesting, with groceries (“supermarket”), a restaurant/bar, and other shops and brightly-painted signs. Looks like Mongolian cross between a Maine state Route 1 tourist trap and a late 19th century wild western frontier cow town! There is a big impact of tourism here now – with two tourist operations: Nature’s Door and Nomadic Expeditions (which I think is also in Hatgal).

Quite a few westerners are wandering about town and the countryside now. The locals all know Brian (“the American”) who is now married to a Mongolian and is working on contract for some wildlife programs. Apparently, we just missed seeing Clyde Goulden, who has just returned to UB.

7 July 2005 – Wednesday: Ulaan Tolgoi site

We had an early start today to beat the heat, so we were in the pits by 8:00 am. Bayara had turfed the isolated “square burial” west of the deer stones, hoping to find something of interest and Od and our gang laid out a 4x4 m grid over the NE corner mound of the “big” square khirigsuur, with the hope of dating this construction and figuring its relationship to the deer stones. Off and on again sun and clouds and a breeze helped us, but complicated the scanners, who had to fight the wind against the huge ‘tent’ they erected over the big deer stone. Eventually with the drivers’ assistance they got the rig up and were able to start scanning, with good results. But without Carolyn’s height they would have had trouble getting to the top of this 3.5 m high stone, even with the ladder. We found some sheep/goat bone and charcoal in the upper layers of the northeast corner mound; its construction on the upper (surface) and second layer of stones to the base of the turf and windblown sand is just a mass of boulders with no internal structure.

After lunch we returned for a hot afternoon, broken up only by a few thunder showers and a couple of herder visitors – good looking young men who work the winter place overlooking the site. They stayed for about 20 minutes asking few questions and unfortunately, not getting much information from us as we did not have a very responsive PR agent. However, afterwards we talked about the need to provide information to the local people, who tend to think we must be finding valuable things or we would not be able to be working at such expensive undertakings. But after they visited Bayara’s dig, we heard where they lived and that they were keeping a watch over the site for plunderers. We’ve been freely borrowing poles from their sheds for our photo platforms and tent poles for years.

I felt really grubby by dinnertime, and managed to sponge off a bit, but decided we must get over to the ger camp for showers and clothes washing tomorrow night. I've been reading Judith Lindberg's 'Viking Thrall Saga' in pre-publication format; it's quite good but with a strange language style.

8 July 2005 – Thursday: Ulaan Tolgoi

No word from Brian Long in Hatgal. We got another early start and finished both the “square burial” and the NE corner mound of the big mound. We decided in the 3 days remaining to excavate two horse burial mounds at the big mound (Mound 1), to expand our dating sample in comparison with the deer stone complex, and to see if the early horse sacrifices in the inner row of horse mounds at Mound 1 date to the same time as the outer row of less prestigious sacrifice locations – this in reference to whether khirigsuur are



Figure 12: Scanning deer stone 2 at Ulaan Tolgoi.

utilized for long periods of time after their construction (Allard's argument) as sacred or sacrifice sites. If we have any more time we might try to test the new Erkhel Lake North deer stone site whose stone is quite crudely made and not engraved deeply.

Hot again, but a few clouds showed up in the afternoon, as well as a jeep with an old Mongolian woman, in her eighties and elegantly dressed, a middle aged lady, and a Russian man, also middle aged, who said he was a shaman and wanted the girls to remove the light shroud/tent from the big stone so he could pray to it. They were doing so anyway, so that worked out! Then two vans pulled up and out poured Tom Kelley and his family and friends, headed to Hovsgol and then Darkhat and a horse trip with the Tsaatan. We gave them a tour; Tom got 'sidetracked' when a herd of camels showed up moving fast toward their watering place on the west shore of Erkhel Lake. A large camel was in the lead, and they moved incredibly fast (7-8 mph) it seemed. By 6:00, we were ready to call it a day, had dinner, and piled into the vans and raced across the plain to the ger camp which had been expecting us since we had a driver alert them in the afternoon. The showers were great, beers too, and the small handyman was his cheery best, speaking Russian to me about the “Kolodny voda”

which was warming up. Most people of his age worked with the Russians in the field and expect us to be or speak Russian. The young cook was not at his best and had a major stomach problem (belly ache) and was casting about in a chef's apron and no shirt, making him seem mostly naked. Everyone but the Mongolians were back in camp by 11:30 with the Mongolians returning at 12:30 am.

Adiya made a grocery run to Muron that afternoon, and returned with tasty watermelons.

9 July 2005 – Friday: Erkhel

Second to last day of the project, and another hot one. We've finished early at 6:30 and are all sitting around camp re-hydrating in the shade of the lumpy rock outcrops, all of which have special erosional features that we interpret as iguanas, turtles, and many other forms. It's still too hot to be in the sun, but in the shade the midges are swarming about in between puffs of wind. At least now they don't raise big centimeter-sized red welts like my first encounters in Ushkin Uver. Still they itch! And like to bite in your hair and ears! DEET seems to have no effect – only smoke works. In an hour the temperature will drop and they'll go into the sand.

Bayara found a horse head just under the surface in his well-defined satellite mound, but its skull had been crushed by a rock placed on top. Vicky and Rae demonstrated how to reinforce it with Japanese paper applied with a water-soluble adhesive, and they showed how to make a block removal with a plaster jacket. This, after I had taken the upper left tooth row for a C14 sample.

By mid afternoon, the old green van with Paula's crew rolled up in a screech of brakes, and a big reunion and story-telling got underway. They had had a great trip – for a second year in a row. Paula was proud to say she didn't fall off her horse! They got to Bus and Jamts and were within 1 km of the Russian Tuva border and discovered the Tsaatan and Mongols are there panning for gold and finding small amounts. They were eaten by mosquitoes, ran out of food and generally had a great time. She already has a plan for next year. She wonders about Sanjim's health though, as he was not so spry this year. Our excavation at the inner gateway horse mound began to produce bone fragments and at the end of the day with 2 levels of rocks removed, a cow or ungulate leg joint bone appeared in good sealed context. We have one more day to finish it and hope for a special horse burial, so close to the most sacred area of the mound's gateway. But at least now we have dating samples for 3 mounds in the big Mound 1 complex.

Our campsite looks like a major tent city now! The effect of last evening's showers is also gone!

10 July 2005 – Saturday: Ulaan Tolgoi

The last day at Erkhel was another scorcher and at one point about noon, Adiya's GPS indicated 38 degrees Celsius, which Mel translated into more than 100 degrees Fahrenheit; hard to believe and I wonder how his GPS reads temps. But it was warm enough for digging, and we took our time once we realized that we had come down upon a horse head in the north gateway mound. The head



Figure 13: Ulaan Tolgoi Mound 1, satellite mound A

was at the base of a dark soil level that had been at the center of the mound – a kind of core of soil with high carbon content and no rocks, but only a few pieces of cracked marrow bone, and a cow (?) limb joint. So maybe this was all part of a ritual deposit. The horse head was an unusual one in having been previously exposed so that the distal mandible on one side was charred or eroded away and only a small fragment of the left mandible was present. Further, these mandible fragments were not aligned to the

east, lay on their sides, and were accompanied by a single hoof (with an unusual cut) and a fragment of a socket like a humerus/scapula joint. It seemed this deposit had come from an earlier horse death re-cycled here with a different ritual than seen in other horse head mounds. There also were no vertebral elements present.

Finishing this mound before lunch, we drove over to see if we could help Bayara with the Erkhel Lake North deer stone site, and found him beginning a 2x2 in an oval feature. They had already excavated the north stone that was lying on the surface and found it's "down" side heavily salt-encrusted. There was a fine-line incision on its side in a chevron



Figure 14: Erkhel Lake East Deer Stone site. View northwest

form and several sets of deer images, a circle, etc., but much eroded and spalled in this irregularly shaped monument. The oval feature was empty but we got good scans of both stones, and also of the Erkhel Lake East D.S. site. Betsy did a few drawings of the images as well. She has a good eye for the forms and has done some nice details of several stones that we can use in our forthcoming book.

After lunch we backfilled the two Mound 1 features and packed camp while waiting for the girls, who had not got the word that we planned to leave Erkhel this afternoon to get a head start on the drive to Khanuy and Francis Allard's dig. Also, the drivers wanted a night home in Muren before our trip to UB.

We camped at the usual site on the rover south of Ushkin Uver with its sand flies, but we could not care less as we needed the river for swimming and washing. Naadam is tomorrow and the horse race will pass through Ushkin Uver at halfway.

11 July 2005 – Sunday: Ushkin Uver to Gol Mod 2

Packed up and met the drivers, three of whom had spent the night in Muren with their families. We got into town at 10:00 am for some communications and supplies. We were able to reach Francis Allard on his sat phone at 7:30 ("Hello, Camp Mongolia," he answered! He has his phone on for an hour a day in the morning breakfast hour. He was expecting us in a few days, but only Vicky and Rae, not 20 others! But he welcomes all. A few complications have arisen with our group over the route to take to Khanuy and home, with some of the group wanting to drop by and visit relatives, show us volcanoes, and other sites. Fact is, we don't have much time except to travel and see Allard's dig.

Some fleeting images of Muren: horse-drawn lorries and internet bars. Naadam festival, a few English-speaking tourists; 2 Mormon missionaries in white shirts, ties, and knapsacks; a smiling ger herder and wife leaving gas station market for the country; white haze and fenced enclosures; a few 2-story houses to catch the breeze, up-scale; "supermarkets," and mini-bars.

The drive to Allard's camp was a very interesting one, mostly because it was occurring on Naadam day and we encountered two horse races en route. The first was at the first sum center south of Muren (Toson). We stopped here for about an hour while the horse-races came in. I was invited to film from the finish line tower. Just at the crucial moment the lead horse stopped running when

he reached the crowd lined up in the final 100 meters, thinking that the race was over, causing an outburst from the crowd and frantic efforts by the rider, for he was only a few lengths ahead of the second place horse. He managed to win nevertheless. As each horse and rider finished the families raced off to offer praise and support. Later, there will be a parade for the winners, probably at the beginning of the wrestling matches, as was done at the Soyo Naadam we saw a couple years ago. We became caught up in a second race as we crossed the pass (at Rashaant sum) above the Turkic site we visited on the way north, and found ourselves in the middle of the race, catching up with the front-runner just at the finish-line. It gave you a very different feel to be in the race seeing the horses and riders struggling, gaining, or losing ground, seeing the efforts or some riders pay off. After this race we turned west and traveled along a ridge/plateau for a couple hours before dropping into the Khanuy Valley, which by contrast with everything else we've seen till now looked very green and lush, with grass some inches high and not crowded with animals. We stopped in the sum center, Erden Mandal, that had a large number of concrete buildings – remnants of the socialist days, but which now cannot be heated, and so have been left to fall to ruin. Some of the buildings were once quite attractive but now are literally crumbling.

We had good instructions on how to find Francis' camp and had no trouble once we located the huge khirigsuur he has been working on in the middle of the valley. It is a true monster of a mound. His camp is up in a small pasture-basin near the south side of the valley, near some herder camps. They were in the middle of dinner when we arrived and were not expecting us until tomorrow, but we were quickly accommodated with facilities for our cooks and soon had a meal of our own, tent sites, and joined them around the campfire where they were beginning a two-day Naadam holiday. Spirits were high – partly because local entrepreneurs had discovered how to be an obliging market for craft sales, vodka, and other goods which they offered from “happy cars” (as Francis called them) that drove into camp.

We had bought some refreshments at the sum center – on Od's advice – as a hospitality gift , so the evening was quite interesting with the crowd of young US students trading songs to guitar accompaniment as the communal vodka cup was passed around by a self-appointed pourer who had to judge each individual's sobriety before pouring. Francis had a large crew, nearly 30, and we added our 24 or so, making quite a convocation. Francis had two gers – one for a lab and another for the Mongolians while most of the Americans were sleeping in small tents. He also has a battered cook tent, and outdoor solar warmed shower, outhouse, and several vehicles and a wagon for transporting gear from UB. His project is a joint one with the Institute of History and National University, through co-director Erdenbaatar. The director of the Institute was in residence with his wife for a few

days visiting the dig.

Our crowd hit the sack when the college age crowd got into their dance party with music from cassettes on a car system, and more wood was piled on the fire. I got a moment of bacchanalian display around the fire on my video.

12 July 2005 – Monday: Gol

Mod 2 Cemetery

It was a very silent camp at 7:00 am with the Allard group snoring soundly after the night's party, but the sky to the west was dark and rumblings of thunder gave an ominous cast to the morning. We snuck into the kitchen and made up our simple breakfast before anyone but Francis was up. By 8:00 am it was clear we



Figure 15: Gol Mod 2 Xiongnu cemetery site.

were in for a good storm, so we packed our camp into the vans. After the storm, most of which missed us, Francis and his leaders (Brian Miller, – U Penn, Christine Lee – Phys. Anth.) and some others took us for a tour of the Gol Mod 2 cemetery up in the hills south of his camp. This is a truly spectacular site up in a high valley that had been filled with sand blown up against the hills – huge amounts of sand, hundreds of feet thick. Blown to where it could blow no further, it packed a small pocket valley full, creating the preferred cemetery situation for the Xiongnu. Brian thinks this is the northern branch of this culture that formed under Chinese influence, separate from the southern group that became the population of modern inner-Mongolia. The site is fantastic! Not only is there one huge ramped mound at the entrance of the valley, but there are several more ramped mounds of slightly smaller size and scores of smaller ramped mounds – all oriented north with square stone-walled foundations, a site plan ultimately of Chinese derivation. Allard's and Erdenebaatar's groups have mapped the entire valley, but so far have excavated only the arc of burials that lies east of the large mound. These graves are probably the remains of court princes and retainers to the local kings buried in the large mound. A mound similar to Gol Mod 1, located not far from our campsite, has been excavated by the French. I saw an exhibit of some of the finds in the art museum in UB last

year. There were some very nice bronzes, silks, and other material. The Russians have excavated a similar mound south of Lake Baikal. The burial chambers of these Xiongnu mounds are as much as 8-16 meters deep, with layers of rocks and timbers, and are very dangerous to excavate without stepping the excavation back for a hundred meters to protect against collapsing sand walls. It seems they chose such sandy sites for ease of excavation and to deter looters of antiquity – some of whose remains have been found buried in their collapsed looting attempts. Francis and Erdenbaatar hope to start the mound excavation in two years, and are contemplating the engineering problems. However, there is a small problem of money to be solved first as the Mongolians can't contribute much other



Figure 16: Allard/Erdenbaatar dig camp at Gol Mod 2 area in Khanuy Valley.

than students, permits, and some equipment.

After lunch back at Francis' camp (while the Mongolian students were setting up their Naadam wrestling match grounds and determining who will wrestle whom the first round), Francis took us for a tour of the large (huge!) khirigsuur he worked at down in the valley, and explained his theories about kheriksuur. The big mound has almost 3000 stone features surrounding the fence – horse head mounds, and small oval or round rings – about 1700 horse heads, and the rest, ovals.

The pattern is almost the same as our Erkhel and Darkhat finds: East-facing skulls, but with 30 degrees of variance in direction, which he attributes to later seasons when the sun rises further to the south, and then back north. He finds some small mounds linked to larger ones – perhaps a young nursing colt with its mother. He's inclined toward a non-hierarchical model with horse mounds being added over many years, and he thinks variation in the east and west wall lengths relate to the “keystone” effect of an observer placing the square corners by sight direction of 4 people lined up by lines of sight some distance to the west of the mound. The east wall is on average 13% longer than the west wall. There



Figure 17: Banks of Satellite mounds seen from Ust Balagyn Khirigsuur in Khanuy Valley.

are a number of slab graves along the east side of the mound outside the horse head mounds and both Francis and Erdenbaatar think this is a late sycretism added to a khirigsuur religious base – this is seen also with the re-use of deer stones in slab graves at the nearby deer stone site that Sasha worked on with the Russians. The amazing thing about these sites is the large number of horse head mounds organized in ranks of hundreds, even at the deer stone site, which we have not seen to this extent in the northern sites. We saw some very beautifully carved deer stones here, a few of basalt that had remarkably and somewhat abstract deer carvings. This site's destruction is a real tragedy and should become the subject of major research and reconstruction.



Figure 18: Remains of a previously excavated square burial at KYR 119 deer stone site in Khanuy Valley

After viewing the sites, we said goodbye to Rae, Vicky, and Carolyn who were to remain several days to help Francis' with excavation and preservation of some fragile artifacts from the Gol Mod 2 graves and would return to the US later on. Turning south into the hills, we made about three hours headway south before camping near a herder's place where we were served some of the best airag and mare's milk vodka I've ever had. Big thunderstorms were growling about, and after I had got into bed, a couple of young boys I had befriended woke me with their whispering in the ante-chamber of my tent, wanting to play and look at pictures in my camera. Many beetles about and even in my sleeping bag! Another great sunset.

13 July 2005 – Tuesday: Kharkhorin and UB

Enroute to Kharkhorin we visited a Turkic site having an original stelae with a long inscription inscribed in Chinese characters and in 'runes' nearly identical to those used by the Vikings! We skirted the large lake north of Kharkhorin and visited its tourist camp on the south side and found a few worked flints on the bluff at the east end of the lake. We had a fine tour of Kharkhorin and a great meal at a tourist restaurant, and just as we returned to pile into the vans discovered car parts strewn all over the ground and drivers scrounging about in their used part bin. It seems one of the vans' had a wheel bearing that had cracked and almost gave out, which could have sent us all off the

road or worse yet into an oncoming vehicle. Fortunately a suitable part was found and in an hour we were hurtling eastward along the most heavily traveled road in Mongolia, and as night progressed we found ourselves lurching back and forth as the driver tried to avoid potholes and on-coming cars that were similarly engaged in this desperate enterprise. These were actually the worse few hours of the entire trip, and we were relieved to arrive safe (but stunned) back at our hotel in UB at 2am.

The next few days were spent in cleaning up gear and processing collections and photographs. We had a large farewell dinner and on the 16th left UB and arrived back in Washington late in the afternoon of the same day, gaining a day in crossing the dateline.

Although the field season was relatively short, we accomplished all our major goals. About 12 deer stones were successfully laser-scanned by Rae, Vicky, and Carolyn; we obtained many new dating samples from deer stone sites which not only will provide better chronological control for deer stone chronology, but will also begin the task of discerning the relationship between deer stone and khirigsuur monuments. We excavated a Turkic stelae site and mapped others. We surveyed Evdei Valley and located, mapped, and sampled a Buddhist monastery site dating to the late 19th/early 20th century. We located a new rock art complex north of the Shishiged River, found several new deer



Figure 19: Group shot at Turkic monument site, north of Kharkhorin.

stone sites, and expanded our knowledge of regional relationships through a visit to the Khanuy River sites. Finally, our symposium and workshop programs in UB attracted large audiences, and the post-conference consultations in UB by Paul Rhymer and Natalie Firnhaber provided important training and assistance to Mongolian museums and archives.

Acknowledgments: We thank all who contributed to the project from both American and Mongolian teams; extend appreciation to Drs. Erdenebaatar and Allard and their teams for hosting our visit to their site area; and greatly appreciate the assistance of the Institute of Archaeology, the Mongolian

Academy of Science, and especially our partner institution, the National Museum of Mongolian History and its director and senior staff, Dr. Ochir, and Bumaa, for their support and continued contributions to our joint Deer Stone Project. I especially wish to thank Melanie Irvine for transcribing my field journal, which appears in nearly verbatim form here.



Tsaatan group at the Evdei pick-up spot



Scanner beginning work on Deer Stone 2 at Ulaan Tolgoi



Part III

DRAFT FOR EURASIAN STEPPE SYMPOSIUM—

(illustrations not included)

Deer Stones and Khirigsuurs :

A Bronze Age Ceremonial Complex in Hovsgol, Mongolia

William W. Fitzhugh¹

Abstract

This paper describes a highly visible cultural emergence that occurred in northern Mongolia during the Late Bronze Age: the appearance of a distinctive ceremonial complex found throughout the northern Mongolia steppe dating to ca. 3000-2000 B.P. This complex has been defined differently by different authors, but its core consists of architecturally formalized stone mounds known as khirigsuur, frequently found associated with standing stone plinths or stelae known as ‘deer stones,’ carved to represent humans with tools, abstract symbols, and elegant stylized engravings of deer. Recent excavations at deer stone sites in Hovsgol Aimag, northern Mongolia, reveal that deer stones date as early as cal. 3000 B.P. and are comparable in age to khirigsuur. Their similar dates and shared feature types suggest both are expressions of a single socio-religious system and cosmology. The Mongolian Deer Stone Complex appears to be a Scythian pre-cursor associated with the early phase of animal-style art.

The opening of Mongolia to western science and the creation of opportunities for a new generation of Mongolian

archaeologists has resulted in rapid advances in understanding the early history of Inner Asia. Mongolia did not have a tradition of archaeological scholarship prior to the Soviet era, and its era of Soviet-collaborative research left few research collections, archives, and few scientific reports. As Western collaborations with Mongolian archaeologists began in the mid-1990s, interest focused on Paleolithic, rock art, and empire period studies. By contrast, less attention has been given to studies of the Mongolian Bronze and Iron Age, for reasons seemingly hard to explain, considering the prominence of stone mounds and monuments. Many of these sites had been studied during the Soviet period following discovery of the archaeological treasures of the Pazyryk mounds in the Altai (Rudenko 1970), and more recently from Arzhan; but the scant findings and poor preservation at Mongolian mound sites caused interest to wane, and even sites that had been excavated were poorly documented and are mostly unpublished.

The result has been a surprising dearth of information on the most conspicuous, widespread archaeological horizon in Mongolia, a Bronze and Early Iron Age presence marked by thousands upon thousands of mounds, large and small, accompanied by an array of exquisitely carved stone monuments that despite their basic anthropomorphism have become known as ‘deer stones.’ Representing human figures with bows, swords, and belts hung with daggers, axes, and other articles of male ‘materiality,’ and displaying torsos carved with images of abstract, stylized cervids, these deer stones and the khirigsuur mound complexes frequently associated with them extend across the entire ‘watered steppe’ and southern Sayan Mountain foothills for hundreds of kilometers, from the Altai of northwestern Mongolia and nearby Russia nearly to Baikal and Manchuria. Deer stone studies have been conducted by Russian archaeologists for more than one hundred years, but the resulting interpretations have been based more on historical literature and speculative studies of deer stone art. Few excavations have been conducted at deer stone sites to determine archaeological context, relationship to khirigsuur complexes, or their absolute age and chronological development. This paper reports on progress on these subjects made by the Smithsonian-Mongolian Deer Stone Project.

A Review of Deer Stones and Khirigsuurs

Khirigsuur Mounds

Of the two – mounds and deer stones – mounds are far more numerous and are the most ubiquitous archaeological monument of the northern Mongolian steppe. Unlike simple mounds dating to other periods, Bronze Age khirigsuur mounds in northern Mongolia have elaborate architectural structure that implies complex ceremony and deep social investment in their construction and use (Allard and Erdenbaatar 2005; Frohlich et al. 2005). Khirigsuurs feature a hierarchical arrangement of structural components based around a mound of boulders or a simple circular

pavement of flat slabs or rocks. Mound sizes may range from a few meters in diameter to other as large as 50-100 m in diameter and 10-20 m high. What distinguishes khirigsuurs from other types of mounds is the presence of additional components, most important being an open inner space delimited by a circular or square enclosure of closely-spaced rocks some meters away from the base of the mound, creating a sacred-secular distinction between the mound plaza and the world outside. At large khirigsuurs like Urt Bulagyn in Arkhangai Aimag, these inner plaza can be several thousands of square meters in area. Circular fences have no other distinguishing features, but square fences have slightly asymmetric proportions (Allard and Erdenebaatar 2005: fig. 5) and frequently have small rock piles at each corner, sometimes with a vertical slab erected in their centers. Round- or square-fenced mounds may exist without other architectural elements, but next in the construction hierarchy, and correspondingly more distant from the mound center, are two types of satellite features. A meter or so outside the fence line one frequently finds an arrangement of small rock mounds 2-3 m in diameter, spaced 2-4 m apart, numbering from one to scores or even hundreds or thousands, concentrated on the southeast side of the mound and, when numerous, expanding around the northeast and southwest sides of the mound, always outside the fence. When the first rank of mounds fills the available space on the southeast side, a second rank is begun outside the first, and mounds also begin to expand in a first rank from east to west along the southwest and northeast sides. A large khirigsuur such as Urt Bulagyn had more than 1700 satellite mounds arranged in geometric rows along its southeast and southwest fence walls. The largest khirigsuur at Ulaan Tolgoi has xxx satellite mounds arranged in xx rows with ca. xxx mounds in each row.

The fourth nearly universal component of the complex consists of small boulder ovals or circles measuring 1-1.5 m, with an open center. These satellite features may be scattered without obvious geometric arrangement, but they can also be found in regular lines and ranks, always beyond the small stone mounds, but with the same distribution pattern, i.e. outward expanding ranks at large mound sites, with overflow around the northeast and southwest walls. They are more likely to be found than small mounds outside the 'back' (northwest) fence wall and at Urt Bulagyn the largest concentration of more than 1000 oval rings is located here. They may also be present in the open space between the central mound and the fence, but the small stone mounds around the outside of the fence are rarely seen in the inner plaza. Between the fence and the central mound there may be a pavement or a broad apron of boulder pavements extending from the southeast side of the mound to the fence. Sometimes the mound plaza has other types of boulder lines or features that resemble 'horns' expanding from the base of the core mound (Allard and Erdenebaatar 2005: fig. 3), or radiating lines of stones or other types of rock features that are not easily codified and appear less spatially controlled or standardized than the satellite mounds and ovals. Sometimes individual stones or stone features are found beyond the ovals, and sometimes they appear to be aligned with a specific eastern

orientation of the khirigsuur complex, perhaps in alignment with a rising star or the sun, or with a significant geographical feature like a prominent hill or peak (Allard and Erdenebaatar 2005:554). Khirigsuurs from northern Mongolia, although displaying variation, follow a definite typological pattern somewhat different from khirigsuurs in Tuva and the Altai.

Some northern Mongolian khirigsuurs that have been excavated, and others that have been observed after being looted, have a box-like crypt 1-1.5 m below ground level at the center of the mound. Human and animal bones have been found in these tombs (Frohlich et al. 2005). However, many mounds excavated seem to lack obvious burial features and human remains. Sometimes a few personal artifacts are found – small bronze buckles or horse gear ornaments, a bronze knife, or a few fragments of ceramic, but little else. The impoverished remains recovered from most mounds excavated in the past has discouraged archaeologists from excavating khirigsuurs, particularly large ones. Some mounds have flat tops, but most are conical unless they have been robbed for stones to build other structures, a practice largely confined to recent times. The absence of human remains has resulted in the idea reported by Jacobson (1993:146) that mounds were not burial structures but altars or platforms for rituals and ceremony. However, in Hovsgol, most mounds that had been opened had distinct burial chambers and human remains that were generally very poorly preserved. These burials are shallow and above the permafrost zone, even where this condition is present at greater depth. Hence the absence of human remains from most Mongolian mounds may simply be due to preservation.

Until recently, khirigsuurs have not been mapped carefully, either individually or as part of site complexes, and have not been the subject of research with modern methods. Since the satellite mounds and ovals yielded few artifacts, they have been ignored in favor of excavating trenches in the central mounds, and most of these have also been relatively unproductive. New studies like those of Allard and Erdenebaatar (2005) in the Khanuy Valley have explored a variety of long-standing questions, like the celestial alignment hypothesis, by observing mound and horse head burial orientations (both of which orient to the east/southeast, with about 45 degrees variation); the dimensions and shapes of ‘square’ fences (wider on the east sides than on the west sides); and the distribution of mounds over a regional landscape. Radiocarbon dates from horse remains excavated from two satellite mounds at Urt Bulagyn have been dated at cal. 1040-850 BC and 975-680 BC (Allard and Erdenebaatar 2005:551), suggesting the possibility of continued use at least of khirigsuurs over hundreds of years.

Similar approaches have been initiated by Bruno Frohlich using exhaustive regional surveys and GPS mapping of mounds from selected regions near Muren and in the Darkhat valley (Frohlich et al. 2005; Wallace and Frohlich

2005). The questions addressed emphasize settlement patterns and demography, relating mounds to landscapes; investigating relationships of size and types of mounds with landforms and orientations to landforms; using mounds as proxy indicators of local population size; and investigating mound types as indicators of social structure and hierarchy. Future work will explore issues of dating, gender, and age of interments with large samples of mounds using statistical methods to resolve various questions, including the hypothesis that squared vs. round khirigsuur reflect the gender of the person memorialized, an idea supported by preliminary statistics that for a 1:1 ratio of squared to circular mounds in different Hovsgol survey regions (Frohlich et al. 2005:70-71).

Deer Stones

In the Hovsgol region khirigsuurs are often found by themselves and not associated with other structures; however, most are associated with khirigsuur and some are found within khirigsuur mounds (Allard and Erdenebaater 2005: fig. 9) or as part of rectangular or square slab graves. While the latter have often claimed the third element of the Late Bronze Age ceremonial complex with khirigsuurs and deer stones, in the Hovsgol sites we have seen, slab graves are intrusive and the deer stones used in their construction have been taken from their original contexts and re-purposed for ornamental or structural uses. For this reason I do not consider slab graves as part of the Mongolian deer stone complex.

When found in small isolated groups, deer stones often are set in seemingly shapeless clusters, but when present in larger numbers, as at Ulaan Tolgoi (5 stones) or Ushkin Over (15 stones) they occur in north-south alignments (Volkov 2001:78). Size can vary from broad, low stones a meter high to slender stones 2-3.5m in height. As Jacobson (2001:33) has noted, research on deer stones is been complicated by long-standing problems of classification and terminology which has resulted in widespread confusion, especially in discussions of geographic distribution and cultural affiliation: for instance, it has been claimed that deer stones are found as far west as the Black Sea, Georgia, and even the Elbe (Chlenova 1962; Savinov and Chlenova 1978, cited in Jacobson 1993:142). These stones, however, have little resemblance to classic Mongolian deer stones. Even in the more restricted region of Mongolia, Tuva, and Altai, deer stones have various styles and exist in different cultural contexts and probably different chronological periods. Volkov, in his descriptive inventory of Mongolian deer stone sites, identified 600 deer stones. However, Jacobson notes that Kubarev (1979) reported more than 500 in Mongolia, 30 in Tuva, and 50 in the Russian Altai, and that Schul'ts (1976) estimated "there were 42 known images from the Scythian world" (Jacobson 1993:142). Undoubtedly the number of Mongolian stones is higher, as our surveys discovered several unreported partially buried stones in Hovsgol, and undoubtedly many more fallen examples will be found. Moreover, many stones were removed from their original settings in antiquity for use in slab burials and remain to

be discovered. The problems complicating contextual, spatial, and art historical study have been compounded by researchers of recent decades who conducted careless excavations, moved and re-erected stones, and even extracted and dumped them in heaps – all without documentation.

While there are three or four regional deer stone variants present in the core area of Mongolia, Tuva, and Altai, we are concerned here with the so-called ‘classic’ deer stone described by Volkov (1981, 2002), called the ‘Mongolian’ or ‘Type I’ deer stone by Jacobson (2001:34) found in northern Mongolia and Transbaikial. In its most characteristic form, the Mongolian deer stone is a square or rectangular slab of hard rock – usually granitic and often having an angled top – with carvings frequently wrapping around the entire body of the stone. These carvings have been the subject of intense scholarly scrutiny and interest with regard to their ‘semantics’ and interpretation.

Deer stones typically have three ornamented areas or panels, each covering about a quarter of the stone’s length, with the fourth quarter embedded in the ground. The top panel often has a set of large round rings with dangling ornaments carved into opposite sides of the stela. When occurring with the carving of a human face on one of the other sides, as in the famous Ushkin Uver Deer Stone 14 (Volkov 2002:Pl. 79), these rings are easily interpreted as Bronze Age earrings consisting of large open hoops with pendants dangling from the bottom of the hoop. Much more common are stones without faces, and these stones often have similar rings, with or without the dangling ornaments. Large rings may also be found with an adjacent smaller ring, leading some to see these motifs as sun and moon (UU#4). This identification is plausible for the large and small discs sometimes engraved into the central panel area among images of deer (UU#2, 8). Shamanistic elements are also present in these carvings. The UU#14 stone face has an intense searching look and a rounded mouth that suggests enactment of a shamanic breath ritual, a common feature of Siberian and North American shamanism. This other-worldly, upper part of the stone is often set off from the middle panel by a line of engraved pits or cup-like indentations.

The lower part of the stone invariably deals with a more mundane subject: personal power and status, and is represented by a textured male warrior’s belt with hanging weapons and implements (daggers, axes, swords, etc.), whose inventory is variable and typologically-specific, creating the effect of personalizing individual deer stones, which in the other two panels essentially generic and stylized. There may also be tools and implements floating above the belt in the lower part of the middle panel.

The main body of the middle panel carries images of abstract, stylized, elongated deer with a highly distinctive peaked withers and antlers that flow along the back in a series of wave-like curls. The most prominent deer figures

are positioned singly or stacked in tightly-nested ranks, usually shown in a slanted, ascending attitude, with smaller figures added into the tableau to fill in blank space, as though it was important to include as many of these images as possible on one stone. While the antler form is that of the large roe deer (Asian maral / American wapiti; *Cervus elaphus sibiricus*), the slender, elongated, slightly-opened snout, shown in calling mode, is anything but deer-like and appears like the bill of a large water bird. Quite likely, the image depicts a transformed spirit, a shamanic bird-like cervid that is usually positioned as though ascending into the sky.

In addition to the 'standard' elements, including the tri-partite structure (top/head, torso with deer motifs, and warrior's tool belt) other motifs are commonly seen. In addition to 'sun' and 'moon' discs, re-curved bows and quivers and other implements, the central part of the 'body' may include an image of a special chevron or shield- or palate-shaped emblem resembling military 'sargeant stripes' positioned on one of the thinner sides of the stone. Bayarsaikhan (2005) has noted its similarity to skeleton motif found on most Siberian-Mongolian ethnographic shaman's drum handles and drum-beaters. This motif has also been recognized as a widespread theme in prehistoric and historic circumpolar art.

The structure of deer stone art embodies a stylized anthropomorphic reference whose variable belt style, chevron motif, and tool kit assemblage suggest reference to a particular individual, almost certainly a warrior or chief. This treatment is set against a torso tableau dominated by highly styled, repetitive deer-bird images whose essential features and style of rendition never changes, and whose only variation is the number and placement of iconic deer on the stone. That this exact image also occurs on rock art in western Mongolia (Jacobson 2001:50) and elsewhere suggests the existence of a widespread, formalized deer cult central to the cosmology and belief system of this period and culture. Early in the discussion, Dikov (1958:46, cited in Jacobson 2001:35) offered the opinion that deer stones were erected in commemoration for powerful warriors and chiefs and that the three panels reflect cosmology of heavens, earth, and underworld, and this idea has evolved through the writings of Novgorodova and Savinov (Jacobson 2001:38). Given the ancient practice of tattooing known archaeologically from Pazyryk, and inferred from Asian rock art, Jomon figurines, and ethnographic clothing from ancient to modern times, I believe the cultic deer image served as 'magical armor' to protect the wearer's body and soul. I would not be surprised if the very same deer images found on deer stones were tattooed on the bodies of important leaders and warriors at this time, possibly even mirroring these exact forms. And in its deer stone context, given its co-occurrence with shamanic elements and absence of human remains, I imagine deer stones standing in place of specific fallen heroes who died elsewhere, whose spirits were dispatched to the upper world in deer stone ceremonies including shamanic ritual, drumming, and flights of majestic deer-bird spirit-helps.

Previous Research

This review reveals a welter of research problems related to deer stones, khirigsuur, and Late Bronze Age ceremonial life and belief systems. What was the function of the mounds? — was it for human burials, altars for sacrifices or offerings, or some other purpose? Was the elaborate mound architecture and its satellite features based on celestial or solar models, chariot wheel images, or something else? Was the purpose of the fence to create a separate sacred space for the mound and its contents and ceremony from the worldly matters of horses and feasting? What was the significance of the square vs. round enclosures? – did they signify the gender of the deceased, or lineages, clans, or some other concept? What were their dating ranges, and how did this relate to demography, regional variation, and settlement patterns? There are also a host of questions about the relationship between khirigsuurs and deer stones, if they were related at all. Even less information is available on the deer stones themselves. What did the stones commemorate? What was the meaning of their human form, symbols, and deer images? What was their origin and how long did they last? What was their distribution and geographic variation? What is the age of slab burials and how to they related to the deer stone complex?

These types of questions began to be explored as early as the late 19th century by Russians scholars like G. N. Potanin and V.V. Radlov (Jacobson 1993: 142, 2001:34; Savinov 1994). Archaeological inquiry beginning with seminal work by A. P. Okladnikov (1954) and Dikov (1958), followed by a host of studies (see Jacobson 2001:34-38) by Russian scholars including most prominently V. V. Volkov, who compiled an inventory and illustrated catalog of Mongolia's deer stones in 1981 [re-printed with better illustrations in 2002]; V. D. Kubarev's 1979 study of the deer stone and khirigsuur complex in the Kazakhstan Altai; and D.G. Savinov's (1994) study of deer stones of the Kochevnikov culture. Many others have made important contributions as well, including Chlenova, Kyzlasov, Gryaznov, Novgorodova, and others. This tradition has considered almost every possible hypothesis regarding the 'deer stone problem'.

In a penetrating and useful review, especially for those not reading Russian, Jacobson (2001) has documented this long history of petroglyphic, art historical, and archaeological study by Russian scholars centered in the Altai and western Mongolia. Together with her work, *The Deer Goddess of Eurasia* (1993), which includes a chapter on khirigsuur and deer stones, and several other papers (Jacobson 2002; Jacobson, Kubarev, and Tseveendorj 2001), Jacobson provides an indispensable corpus of information crucial to a new assessment [included here for background, not for publication].

This brief overview...can only suggest how varied and problematic have been the approaches of the last century or so. The complexities involved in the study of deer stones, however, are rooted in a number of

methodological issues that cut across almost all the scholarship on the subject. In too many studies to date, researchers appear to have worked on the topic without viewing the deer stones in their original locations, or without consideration of the context beyond the immediate precincts of the stones. Possible exceptions to this rule in Mongolia seem to have been Volkov and Novgorodova [1975], but even they ignored the surface archaeology beyond the immediate setting of the stones they recorded. In other cases there is inadequate consideration of the fact that the stones have clearly been reused: the nature of their original location and function remains uncertain and even unquestioned. In yet other situations (e.g., the stones from the Chuya steppe), we are dealing at best with fragmentary evidence found originally in damaged settings and, since then, too often moved; such conditions hamper a reliable consideration of function and meaning. Finally, as attractive as are the many strategies used in the interpretation of the stone's meaning, or what are usually referred to as their semantics, none can be said to be based on anything more than speculation. We are, after all, considering a prehistoric period from where there are no texts to support an interpretation of the stones in terms of solar cults, as heroized ancestors, indicators of fertility, clan leaders, or even officiants of cult sacrifices. Moreover, there is nothing in the archaeology of related burial mounds or altars in support any of these meanings. Using mythic traditions from other regions (e.g. the Caucasus and the Near East) or from much later cultures (e.g., that of the Turks) to interpret anthropomorphic stones from prehistoric North Asia can only be deemed speculative at best. It is easy to understand how stones enwrapped with elegant deer imagery could encourage romanticized interpretations, but there has to be some more solid basis for these interpretations than wishful mythologizing. (Jacobson 2001:38)

This trenchant assessment of a century of deer stone studies is relevant not only to deer stone research but to the study of kherigsurs, both of which I argue are closely-related components of a single 'Deer Stone Ceremonial Complex'. The Smithsonian-Mongolian Deer Stone Project set out to establish a foundation for studying this complex and to determine its relationship to Scythian culture and art. Part of our work has been oriented at the kherigsuur studies described above. The other focus has been on deer stones. Here, our first objective has been to establish a radiocarbon chronology, since until now their dating has been based on typological comparisons of weapons and implement. A second goal has been to systematically explore one particular deer stone site, Ulaan Tolgoi, to determine spatial relationships, identify associated features, and learn about its long-term history and duration of use. A third goal has been to examine the relationship between deer stones and kherigsuur mounds at the study site. Along the way we also hope to learn something about deer stone carvings, their semantics and form, dating, variety and symbolism, and the role they play in Mongolian Bronze Age life and cosmology. This paper presents preliminary results in several of these areas.

Archaeological Research

Landscape and Cosmological Models

Thirty kilometers north of Muren, a 500m ?? high conical hill, rises in the middle of a former lake bed whose remnant water body, Lake Erkhel, is eight km to the east. The large archaeological site named for this hill, Ulaan Tolgoi, stretches for two km around the south and east side of the hill. The site has five ornamented stones and includes one of the largest and most beautifully-carved deer stone monuments in Mongolia. This stone is made of a slab of granite standing almost 3.5 m above ground at the south end of a north-south alignment of four other slabs of different shapes and degrees of decoration. In 2002, Esther Jacobson visited the site with Gary Tepfer, who photographed its stones. We visited the site for a few hours in 2001 and returned in 2002 to do some exploratory work. During this visit we found large khirigsuur on the valley floor and lower flanks of the hill with huge mounds with large enclosures. We were surprised to discover that khirigsuur extended beyond the grassy steppe up the steep rocky slope of the hill onto the summit. Throughout their range, khirigsuur maintained the core mound and fence structure, diminishing only in size and number of satellite mounds and ovals. One sensed a palpable crowding effect; more people were buried on the hill than in the valley below, which was reserved for those who commanded huge structures. All wanted to be buried on the east and south sides of the hill, perhaps to receive power from the first rays of the rising sun.

Frohlich's on-going surveys in the Soya region of the Darkhat Valley and near Ushkin Uver are testing these preliminary observations in other locations and setting. Our working hypothesis is that correlations may exist between mound density and local population size; that mound and khirigsuur size and geographic placement reflects the power of an eastern and probably solar reference; that the clumping of mound concentrations can be related to social units on the ground; and that inter-regional comparisons of mound sizes and densities will reveal social and political hierarchies at increasingly higher scales; and there such hierarchies have some variations in economy, demography, and political geography.

The arrangement that we are beginning to see from distribution studies suggests a model that might be considered for understanding individual, local, and regional social and spiritual obligations within a single cosmological framework. Frohlich's extensive GPS surveys reveal a pattern of khirigsuur placement and density in the geographic scale around Ulaan Tolgoi that closely parallels the structure of *individual* khirigsuurs. It seems likely that Ulaan Tolgoi is a sacred hill or eminence that is the community or societal equivalent of the khirigsuur's central stone mound, and that the east-facing khirigsuurs on Ulaan Tolgoi's slopes are the community's equivalent

of the placement of satellite mounds and ovals around the east side of kherigsuurs. Further, the concentration of hillside kherigsuurs, like kherigsuur satellite mounds and ovals, diminish in numbers toward the south and north sides of the hill and are nearly absent to the west and northwest. Replication of the kherigsuur pattern at the local geographic scale suggests the existence of a ‘unified field’ cosmology at the heart of the culture’s belief system. This arrangement suggests a hierarchy of relationships in which an individual’s relations with society – in this case the spiritual society that exists after death – are structurally mapped out from the center of the kherigsuur as in a kinship chart, with ‘ego’ – the deceased – at the center, with those having reciprocal social obligations with that individual represented by horses offered in the satellite mounds, and of families or other social groups consuming animal offerings represented in the ovals. At the local geographic level the central hill, in this case Ulaan Tolgoi, and its universe of kherigsuurs represents the spiritual death community of ancestors bound to the spirit of the hill itself, acting as the collective ancestral spirit of the entire local community. We may expect that higher levels of social integration through the celebration of death and renewal ritual may follow the pattern of political hierarchy above the local level at some regional scale. We might then expect larger ceremonial sites to be represented by places like Ushkin Uver or other locations where the scale of kherigsuur monuments increase by a significant factor, as clearly seen in the huge monument of Urt Bulagyn and others in the Khanuy Valley. In this way the material features of the Bronze Age belief system may replicate a shared cosmological model at the full range of social and political scales – individual, community, regional, and macro-social scales, all of which may have separate geographic orientations to deities, spirits, or ancestors residing in appropriately hierarchical cosmological levels with equivalently structured topographical levels.

Deer Stone Excavations at Ulaan Tolgoi

Turning to deer stones, we spent a week each season from 2002-2005 mapping and excavating portions of the Ulaan Tolgoi deer stone site. This site has five deer stones positioned in north-south alignment in the midst of a jumbled field of rocks slabs protruding from the grassy steppe. Four of the stones are ca. 1-1.5 m tall and are boldly ornamented, while the fifth, the imposing DS-2 measures 3.5 m in height and is covered with exceptionally fine but lightly-excavated engraving. For some reason, this site was not included in Volkov’s inventory and its art has not to my knowledge been published. DS-2 has a diagonal zone of differential weathering that suggests it had fallen over and remained for many years with its base buried and its upper end protruding from the ground at a 20-30 degree angle. Local people told us it was pulled upright by a tractor and re-set several decades ago. DS-1 a few meters to the south had also been moved and re-set in concrete by a Russian team that included our partner, T. Sanjiamatav. No records of this work have been found to date. A slab grave a few meters west of DS-2 also seems to have been excavated or heavily disturbed, but the area at the north end of the deer stone alignment appeared undisturbed, and

so we decided to excavate in this area.

When we began work in 2002 we had little knowledge of the structure of a deer stone site. Although human bones and large artifact deposits had not been reported by other excavators, deer stones had been found associated with horse remains. We suspected that deer stones would not have been erected and dedicated without some type of ceremony, be it animal sacrifice, caching, fire, feasting, or other activity that could provide clues about ritual practices and could help date the event. Such features were known to occur at khirigsuur sites, whose small satellite mounds contained horse head burials. Unlike Scythian burials of whole (or multiple) horses, khirigsuur satellite mounds contained only single horse heads. Usually the skull and mandible, oriented facing east, were placed in a shallow pit, with the hooves and cervical vertebra nested so closely alongside that the flesh must have been removed before burial, either by exposure or more likely following ceremonies and a ritual meal accompanying the sacrifice of the horse. Excavators had also noted that the small open-centered round or oval boulder rings contained deposits of highly fired, fragmented bone, usually of sheep and goat, and sometimes of larger animals. These features strongly suggested these rings had been used as feasting hearths, or as repositories for the remains of feasts.

During our first season in 2002 we mapped Deer Stone-5 and its surroundings, excavated a 1x2m trench 50cm south of the deer stone, and excavated a small oval ring feature 50m east of DS-5 (Fitzhugh 2002). The purpose of the trench was to obtain a dating sample associated with the erection of Deer Stone-5 (for details see Fitzhugh 2004:14-19). The trench was laid out E-W with the center of its north wall 75cm south of DS-5 to avoid undermining the setting. Our excavation reached undisturbed hard plan at a depth of 40cm without encountering a pit associated with the erection of the stone. We found four stratigraphic levels beneath a thin turf zone and from the lowest of these levels we recovered two AMS charcoal samples from beneath a 25cm diameter cobble, in undisturbed context, one of which was dated with results of cal. 2150-1960 BP. Immediately adjacent to the deer stone and clearly defined in the north wall was a marmot burrow that terminated on top of a small slab lying on sterile gravel 35cm below the ground, 50cm north of the rock and charcoal find. The rock and the slab, both in Level IV were culturally-placed, but their stratigraphic connection with DS-5 could not be determined. Since we were unable to find evidence of a pit associated with the monument, it appears that the stone was placed in a narrow vertical hole just large enough for its base. Not only was there no human interment; there were also no other bone deposits, no charcoal or evidence of fire, and in addition to evidence of a larger pit of sub-surface disturbance. DS-5 seemed to have been stuck into a shallow, narrow hole in the ground. If there was evidence of ritual, it was not evidence yet.

We also excavated one of the small open-center oval features located around the outskirts of Deer Stones-4 and -5. This feature was located 47.5m east (100 degrees mag.) of DS-5. and was identical to oval features described above found in the outer tier of kherisuur complexes, but in this case the oval appeared associated with the northern group of deer stones rather than with the small khirigsuur adjacent to DS-2. In the center of the feature we found two soil levels and in the lower level, charcoal stains and calcined bone fragments of otherwise unidentifiable small and large mammals. Our Mongolian colleagues noted that such ovals frequently contain remains of sheep, goats, and horses (Sanjmiatav, pers. comm. 2002).

In 2003 and 2004 we made preliminary GPS-based maps of site in the vicinity of the deer stones and nearby mounds and began excavating DS-4 and its surroundings (Fitzhugh 2004, 2005b; Frohlich et al. 2004, 2005). Although we were again unsuccessful in finding datable materials or artifacts at the base of the deer stone, this time DS 4, excavation revealed that the surface rocks embedded in the earth around the stone sorted into discrete 1-1.5 meter diameter rock piles or pavements that at resolved into heavy boulder rings or walled chambers, each of which contained a horse head burial. Continued work through 2005 revealed a total of seven of these features positioned in a circular arrangement 3-4 meters from the base of DS-4. Six of the features contained horse skulls and mandibles, most of which were buried facing east with the cervical vertebrae column along the south side of the skull and hooves placed along the north side, but one heads was upside-down and some had different placements or numbers of hooves and cervical vertebrae. A few intrusive sherds of Iron Age ceramic and one stone vessel fragment were found in upper levels of the excavation outside the features, but the features themselves did not include any artifacts or other remains except for a few hand-sized pecking stones. One feature (F4) outside the ring of horse head burials had no horse bones but contained charcoal stains and fragments of calcined bone.

Excavations at the base of DS-4 failed to produce charcoal or other datable materials, but a charcoal sample (S7) found a few centimeters from a pecking stone and a small piece of burned ceramic at the base of the cultural deposit west of DS-4, but not inside a horse head feature, produced a date of cal. 3220-2950 BP. This pecking stone had been used around its entire surface; several other pecking stones recovered around the base of the deer stone, mostly in and between F1 and F3, were made of hard 'greenstone' and had battered working edges that matched the shape of the grooves carved into the stone. The presence of pecking stones within the horse burial features and in the lower cultural level suggest a direct link between the horse sacrifices and the production of deer stone art, probably at the time of the stone's dedication. Radiocarbon dating of horse bone and teeth from several of the skulls found in the features surrounding DS4 cluster between cal. 2800-3200 B.P. (Table 1; Fig. x).

Table 1. Radiocarbon Dates from Deer Stone sites in Hovsgol Aimag, 2002-2004. (Note: See updated date list in Appendix I.)

site / feature	location/year	sample no.	material	uncorrected	calib (2-sig)
Ulaan Tolgoi DS5	Erkhel / 2002	B-169296 AMS	charcoal	2090 ± 40 BP	BP 2150-1960
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 / 2003	B-193738 AMS	bone coll.	2530 ± 40 BP	BP 2750-2470
Ulaan Tolgoi DS4 F2	Erkhel / 2003	B-193739 AMS	bone coll.	2950 ± 40 BP	BP 3240-2970
Ulaan Tolgoi DS4 F3	Erkhel / 2003	B-193740 AMS	bone coll.	2810 ± 40 BP	BP 2990-2800
Ulaan Tolgoi DS4, F5	Erkhel / 2004	B-207205 RAD	bone coll.	2790 ± 70 BP	BP 3220-2800
Ulaan Tolgoi DS4, F6	Erlhel / 2004	B-207206 RAD	bone coll.	2740 ± 70 BP	BP 3150-2780
Tsatstain Khosuu	Tsatst. /2004	B-207207 AMS	tooth coll.	2920 ± 40 BP	BP 3330-3060

The placement of these features in a circle around DS-4 suggests they were part of a single ceremony that took place when the stone was erected. At least, they do not give the impression of an unplanned or haphazard arrangement as might happen if the features were prepared at different times, and certainly not over a long period of time, judging from the similar dates. Date reliability is considered high because most are collagen AMS dates from dense horse tooth. We therefore have some confidence that these dates provide a reliable statement about the age of DS-4 and the manner in which it was dedicated. I believe these are the earliest reliable dates on a Mongolian-type deer stone. Previously there has only been general agreement based on typological and associated materials of a Late Bronze-Early Iron Age attribution (Jacobson 1993:146). A slightly earlier date has been obtained from a horse head burial at the Tsatstain Khoshuu deer stone site south of Tsaaganuur, with a result of cal. 3330-3060 BP, described below. It is interesting that one of the horse tooth dates from a satellite mound at Urt Bulagyn were also in the cal. 3000 B.P. range. These dates are consistently a century or two earlier than dates from a large suite of early Scythian sites in southern Siberia and Central Asia (Sementsov et al. 1998)

These data are relevant to a long-standing question about dating khirigsuur and deer stone sites: whether these features were created in single or short-term events, or accumulated boulders, satellite mounds and ovals over decades or even hundreds or thousands of years. While it is certain that such notable landscape features have continued to play a role in the spiritual lives of successive generations, even to the present (herders frequently deposit the remains of deceased animals inside khirigsuur fence lines), the data from Ulaan Tolgoi DS 4 lean

toward a single event interpretation for deer stone dedication and rituals featuring the sacrifice of horses and burial of their heads in crypts surrounding the stone.

Khirigsuur and Deer Stones

Archaeological verification of the presence of horse head mounds and feasting ovals at deer stone sites provides the strongest evidence to date that deer stones and khirigsuur are part of a single cultural complex, not just palimpsests of different cultures and times, as has sometimes been suggested. In order to investigate the relationship between the two types of sites we began preliminary work in 2005 at a large square khirigsuur 100 m south of the Ulaan Tolgoi deer stones, searching for clues about its construction and dating. This khirigsuur is the largest in the Ulaan Tolgoi region (figure x). The central mound has a diameter of xx and height of xx. A large bowl-shaped depression in the east side of the mound resulted from local herdsman who used the site as a quarry to build a sheep corral a kilometer north of the site. An unusual feature of the mound is the steep-sided wall of coursed boulders along the north side of the mound. An apron of small cobbles extends from the east side of the mound to the fence wall, and there are a number of other small architectural rock features inside the fence area. Four lines of small mounds are found outside the east fence, and beyond, a series of oval features. The mounds and ovals extend in attenuating numbers along the southwest and northeast sides of the fence, and a few of both are found outside the northwest wall.

In 2005 we excavated three features here: a small stone mound at the corner where the east and north fence intersect; a small mound in the middle of the first row outside the east fence; and an oval feature at the outer margin of the complex. Our strategy was to obtain artifacts and dating samples to determine the when the fence and its corner mound was constructed, which we presumed would also date the central mound. The small mound near the middle of the east fence should date a horse sacrifice associated with the early dedication of the mound. The outer oval [??] should date one of the last events associated with construction of the khirigsuur. Following what one would imagine to be the logical rules, the construction plan and or ritual associated with it required horse mounds and ovals to 'grow' away from the fence line, making the outermost features either the youngest in the complex, if they were accretional and sequential, or if the khirigsuur originated as a single staged ceremonial event, its position had to be marked as part of a master plan. In either case these scenarios could be test by excavating and dating enough horse heads and feasting deposits.

Although we have not yet made much progress in this direction, and dates are not yet available for the horse mound and the oval ring, some results may be noted. The northeast fence corner mound produced a few intrusive artifacts

and a piece of bone dating to ca. 1000 BP, but since the structure here was more in the nature of a rock pavement than a mound, and the cultural deposit beneath was nil, we have little confidence in the artifact associations and data, neither of which was Bronze or Iron Age. This mound had no horse head burial or subsurface pit. The satellite mound beside the east fence, on the other hand, was one of the larger features of this type. (All the larger satellite mounds were in the first row outside the eastern wall and became progressively smaller as the distance from the fence line increased.) Excavation produced no artifacts of note, but we found part of a very old, eroded horse skull and mandible buried in a central pit in the center of the mound. The horse was old and it appeared to have died long before it had been buried here, judging from missing parts and fragmentation. This did not look like the fresh sacrifice burials noted above. We do not yet have a date from this specimen. The outer oval produced a horse head burial, facing east like those found around DS 4, but no deposits of calcined bone. This specimen also awaits dating.

Tsatstain Khoshuu

Part of our field program involves surveys in the Darkhat Valley, between Lake Hovsgol and the Sayan Mountains. A few deer stones have been reported for this region, although they do not occur in the numbers or large clusters known from the Muren region to the South. This area of Mongolia is physiographically, geographically, and ethnically somewhat distinct from the Mongolia, partly due to the presence of a range of high hills separating the Darkhat from the Mongolian steppes to the south. Physically it is the bed of a large sister lake to Hovsgol that drained in the early Holocene, leaving extremely flat terrain with many marshes and lakes underlain by permafrost (which is rapidly melting today). The region lake floor pasture lands provide highly productive grazing, but the region is somewhat isolated, surrounded by mountains, larch forests, and Siberian taiga. This may explain the lower frequency of deer stones and the smaller number of large khirigsuur compared with the southern part of the Hovsgol region.

Tsatstain Khosuu has only one deer stone and is not associated directly with khirigsuur, although they are present in small numbers nearby. This deer stone measured a bit over a meter tall and had a square cross-section of 33cm x 38cm. It did not carry any design of the typical deer stone designs except for an engraved circular ring near the peaked top of the south ?? side. Rocks were protruding from the ground to the east and south of the stone, and upon excavating these areas we found a fragment of a deer antler. The stones formed a rocky pavement, making it difficult to identify if individual rock features were present. Upon removing the upper stones, three horseheads were found, about 3-4 meters apart, buried in shallow pits between 10-65cm deep. The first was located near the east side of the deer stone, buried under a thin layer of soil, and was incomplete, consisting of small pieces of

broken occiput and mandible such that its orientation could not be determined. The second was southeast of the deer stone with its head turned to the east. The neck vertebrae were placed to the south of the head and the four hooves were placed under the chin. The third was located several meters east of the stone, its head also facing east and the neck placed along the north side of the head. No artifacts were recovered. The horse remains from F1 produced a date of cal. 3160-2920 B.P., making it the earliest of our deer stone dates. Whether the rudimentary nature of the deer stone engraving has any relationship to this early date or is simply a reflection of an attenuated ritual form in a more marginal geographic region, remains to be explored when we obtain more data from the Darkhat.

Evd Valley

The final data on deer stones obtained during 2005 was discovery of a small cluster of stones at Evd-3. At the mouth of the Evd River valley on the western side of the Darkhat lowlands. In addition to finding several standing stones dating to the Turkic period (7-8th C AD), one of which we excavated, we found two and possibly a third deer stone that had fallen and been partially buried. Cleaning the first stone produced tell-tale deer stone features: a belt, dagger, ring, and chevron on DS 1. Excavation at the base of this stone and at several rock features near its base failed to produce any artifacts, bone, or evidence of horse heads but a charcoal sample dating ca 2800 BP was found in an associated ring feature. However, a second stone, found nearly covered in the ground and having only a rudimentary belt groove, was surrounded by a series of small open ovals, and in one of these we found a stone endscraper made of dark flint. This find, made on a thick prismatic blade, gives every indication of direct association with the feature and cannot be a chance or stray find, as we found no other flint materials in excavations in this area. Whether part of an offering deposit or an implement lost during the construction or ritual activities, this find is the only stone tool we have found associated with a deer stone or khirigsuur site in the Hovsgol region. Once again, this raises an interesting question regarding the chronology of rudimentary style deer stones and whether this stone dates earlier than Ulaan Tolgoi, or reflects the persistence of chipped stone technology in the Early Bronze Age.

Looted Mounds and Deer Stone Quarries

In 2002, while surveying on the southwest flank of Ulaan Tolgoi about 1km west of the deer stone site, we found a circular khirigsuur with a central boulder mound that had been excavated by looters only a few days earlier. The looters had dug into the central mound, ca. 10m in diameter wide and 2m high, to a depth of about 1.75m, encountering a burial about 1.5 m below the ground surface. We found a human skull in the bottom of the pit and collected it and a small bag of bones, including human remains, marmot, mouse, and goat or sheep. No

horse or cattle bones were present. In this instance and others where we have encountered looted khirigsuur, human remains are common and burial chamber structures are evident. Other looted mounds do not have remains visible, but this is generally in cases where the burials were made close to the surface and have not been preserved. These observations suggest that similar conditions may explain the lack of human remains in mound sites in Western Mongolia and the Altai where it is frequently reported that khirigsuur mounds were used for ceremony and rituals, but not for burial.

Our work in the Lake Erkhel region provides information on the possible source of granite blocks used in the Ulaan Tolgoi site. The majority of deer stones at this site are made of high-quality granite that was not available on site or elsewhere in the western Erkhel basin. However, the hill rising on the south side of Erkhel Lake has abundant outcrops of excellent granite, and inspection revealed evidence of recent quarrying for architectural building stone. Modern extraction was by the plug-and-feather technique, and in one instance a single rectangular block of granite 15m long and 3m high had been cleanly split out of the hillside. Scattered down the hillside were many blocks of the same thickness as deer stones. Some of these slabs had weathered out of the bedrock and had parallel cleavages with the same deep red staining from iron deposits seen on some of the deer stone surfaces. Quite likely Erkhel hill is the source of the Ulaan Tolgoi monument slabs.

Conclusion

At this point it is too early to offer generalizations about deer stones and khirigsuur, although some significant progress has been made. Neither we nor others to my knowledge have found human remains associated directly with deer stones, suggesting that these monuments served a different function, more likely as cenotaphs memorializing dead warrior, chiefs, or heroes. The presence of horse head burials and oval feasting rings, and similar radiocarbon ages is strong indication that both deer stones and khirigsuurs are related parts of a single Late Bronze Age cultural system that may be called the “Mongolian Deer Stone Ceremonial Complex.” More work is needed to clarify the different beliefs and rituals, but it appears likely that archaeology can provide many insights into what has previously been a highly speculative and relatively uninformed discussion. We have found one deer stone at Ulaan Tolgoi to be ringed by at least six horse head burials containing east-facing heads packaged with the cervical vertebrae and one or more hooves. These features are placed in a circular arrangement around the deer stone, arguing strongly for synchronous, planned placement ca. cal. 2900 BP. The presence of fist-sized pecking stones among the horse head features provides evidence of contemporaneity between the horse head burials and the carving of the stone. It appears that in this case the erection, carving, and horse sacrifices were conducted in a single ceremony. Further, it seems likely that stone features located outside the horse burials we excavated may have been part of the dedication ritual. Parallels in the structure of khirigsuurs and the pattern of khirigsuur

locations around and on Ulaan Tolgoi hill suggest parallels in hierarchical systems of social, political, and cosmological organization with various scales of geographic models, from mounds to hills and mountains.

Given the variation in deer stone styles, and regional variation in those styles, further dating combined with careful stylistic studies will probably reveal where deer stones first appear and how the concept spreads and develops into the formal Mongolian style. If the Ulaan Tolgoi and Darkhat dates hold up, it is reasonable to expect a rapid expansion of this expression wherever the 'Mongolian style' deer appears. Other western styles appear derivative. I believe that we probably will find that the Altai deer stone, with its looser structure and different artistic rules is most likely derived from the Mongolian form, reflecting the western movement of ideas and culture that eventually developed into the Scythian culture group, carrying its animal-style art along in the process. As has been noted by many Russian and Soviet scholars, the roots of Scythian art seem present in the form of the Mongolian deer, and with such concepts and skills, we can easily imagine what the perishable wood, textile, and felt applications might have been like based on Pazyryk. We may also wonder about the eastern ramifications of such a cultural system and whether a connection may be found for such art through the Amur and Siberia, or Korea and the Okhotsk, to the coasts of the North Pacific and Bering Sea.

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Contact address: Arctic Studies Center, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560; www://mnh.si.edu/arctic; e-mail: fitzhugh@si.edu

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(Footnotes)

1 Arctic Studies Center, Department of Anthropology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20013-7012. Fitzhugh@si.edu / www.mnh.si.edu This paper DRAFT has been prepared for the Eurasian Steppe Archaeology symposium, Feb 10-11, 2006, organized by Bryan Hanks, University of Pittsburgh.



Tsaatan women farewell



Tsaatan men depart for Evdei



Scan team at work at Evdei 2



Part IV

Joint Mongolian-Smithsonian Deer Stone Project Hovsgol Aimag, Mongolia

CONSERVATION REPORT **2005 Field Season** SCMRE Report 5974

Submitted by

Harriet F. (Rae) Beaubien
SCMRE Senior Objects Conservator
Archaeological Conservation Program manager

and

Basiliki Vicky Karas
SCMRE / ACP Conservation Fellow

25 January 2006

SMITHSONIAN INSTITUTION
Museum Support Center Room F2002
4210 Silver Hill Road
Suitland MD 20746-2863
301.238.1235 Telephone
301.238.3709 Fax
beaubienh@si.edu E-mail
www.si.edu/scmre/ Web address

OVERVIEW OF THE 2005 FIELD SEASON

The 2005 field season was the first year of conservators' involvement in the field activities of the Joint Mongolian-Smithsonian Deer Stone Project [DSP], expanding a collaboration which began in June 2004, with Beaubien's participation as a workshop organizer/presenter in the DSP's first annual symposium, held in Ulaanbaatar. Field participation in 2005 was arranged through SCMRE's Archaeological Conservation Program [ACP].¹ The ACP group consisted of Basiliki Vicky Karas (SCMRE/ACP conservation fellow and report co-author) and Carolyn Thome (modelmaker from the Smithsonian's Office of Exhibits Central [OEC]), in addition to Beaubien (Fig.1). The ACP group's primary goal during the field season was to carry out a documentation program of selected deer stones in Hovsgol Aimag, with a focus on testing the 3D scanner as a field documentation tool. The conservators also came prepared to provide assistance should any artifact conservation challenges be encountered during the project team's excavation activities.

The entire DSP team arrived in Mongolia on 16 June 2005, and launched the field season by co-hosting the 2nd Annual Symposium of the Joint Mongolian-Smithsonian Deer Stone Project in Ulaanbaatar (17-18 June). What the ACP group hoped to accomplish during the field season was outlined in Beaubien's presentation, entitled *Digital scanning in an archaeological context: creative applications in Mesoamerica and Mongolia*, and demonstrated by Karas' scanning of a wooden mask, using the portable handheld 3D laser scanner recently acquired by SCMRE. Beaubien additionally co-presented (with NMNH conservator Natalie Firnhaber) a symposium workshop on *Exhibits and storage: conservation issues*. The session included a demonstration of tests for selecting good mount-making materials, and hands-on practice making protective storage and exhibit mounts for a variety of objects. Thome also co-presented (with NMNH exhibits specialist Paul Rhymer) a workshop on mount-making for taxidermy specimens.

After provisioning for the field, the DSP team left Ulaanbaatar for Hovsgol Aimag on 20 June; at the conclusion of the field season, the majority of the team returned to the United States on 16 July. Beaubien and Karas remained an additional week (returning on 23 July) in order to carry out archaeological conservation work with the Khanuy Valley Project on Early Nomadic Pastoralism [KVP] in Arkhangai Aimag.

All ACP work activities were recorded in a hardbound conservation notebook, supplemented with worksheets, digital photographs and digital scan files. The original documents and additional reports are archived at SCMRE, in Suitland, Maryland, under the following SCMRE #s: 5945 (3D laser scanning), 5974 (DSP on-site conservation), and 5999 (KVP on-site conservation). The documentation and field conservation activities carried out with the Deer Stone

Project are summarized below, with selected illustrations provided in the Illustrations section (p.7 ff).

DEER STONE DOCUMENTATION

The study of deer stone art and cultural context is a research focus of the DSP, and includes mapping and selected archaeological investigation of Bronze Age *khirigsuur* sites in Hovsgol Aimag. The documentation of individual monuments, carried out by the ACP group in 2005, consisted of the following: photography of all sides with dimension and color scales; annotated sketches with measurements and condition notes; and 3D scan data files. Samples were also collected for identification of stone type, lichen accretions and, in one case, organic residue likely from a ritual application. GPS information was supplied by Denis R. Rydjeski. Other documentation, including location data collected by the archaeological team, and drawings made by Elizabeth (Betsy) Eldredge, are on file with the DSP project; a specific listing was not available for inclusion here.

3D laser scanning

Scanning was considered a promising documentation approach, particularly as an alternative to the only other 3D recording method used on a deer stone – direct molding of deer stone #14 at the Ushkiin Uver site in 2002 (see Fig.6).² This method produces accurate documentation-to-scale of topographic and dimensional aspects, and is generally considered a relatively safe, simple and inexpensive procedure. However, all materials had to be imported into Mongolia, the molding stage took two days, and best results required experienced personnel (including Thome) at both molding and casting stages. Of more serious consequence is the likelihood of damaging sensitive object surfaces, such as those of weathered deer stones, during the application and removal of mold materials. 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 CNC milling machines to create high-resolution 3D 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 mold's limited reusability.

For the 2005 field tests, a Polhemus FastSCAN Cobra™ laser system, in conjunction with a lap-top computer and small gas-powered generator, was used for scanning (Fig.2). Its portability and compactness were ideal for use in the field, but its light sensitivity and inability to be used in the vicinity of metal objects posed challenges in creating a suitable scanning environment for each deer stone. The solution the ACP group developed was to construct a temporary shelter 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 (Fig.3). This provided sufficient shade for

scanning and accommodated people and equipment involved in the process (Fig.4).

Over a three-week period, scanning tests were conducted on twelve deer stones at six sites: Ushkiin Uver (#1), Tsatstain Khoshun (#1), Efd Valley (#1), Erkhel/Ulaan Tolgoi (#1-#5), Erkhel East (#1-#2) and Erkhel North (#1-#2) (Figs.5-14). The process typically included mechanical removal of dimensional accretions (mostly bird droppings and bulky lichen) and intrusive grass or stones around the base, prior to scanning (Fig.10). Once the logistics of operating the instrument in the field had been worked out, the ACP group succeeded in producing complete raw data files for the ten deer stones from the Efd and three Erkhel sites.³ The data post-processing steps are currently underway at SCMRE, and further collaboration with OEC and other providers is anticipated in the graphic modeling and milling stages of the project.

Documentation summary

The documentation generated by the ACP group is summarized in the chart below.

	Photography	Condition Record	Scanning Record	Sampling
<i>USHKIIN UVER</i>				
DS #1	<ul style="list-style-type: none"> ▪ scan set-up (22vi05 HFB) ▪ 4 sides (2vii05 HFB) 		partial scan of above-ground portion (22vi05)	
DS #2	<ul style="list-style-type: none"> ▪ 4 sides, details (2vii05 HFB) 			
DS #3	<ul style="list-style-type: none"> ▪ 4 sides (2vii05 HFB) 			
DS #4	<ul style="list-style-type: none"> ▪ 4 sides, details (2vii05 HFB) 			
DS #5	<ul style="list-style-type: none"> ▪ group FrgA, FrgB, FrgC (2vii05 HFB) ▪ FrgA: 4 sides, top ▪ FrgB: 4 sides, top ▪ FrgC: 4 sides, top 			
DS #6	<ul style="list-style-type: none"> ▪ 4 sides, details (2vii05 HFB) 			
DS #7	<ul style="list-style-type: none"> ▪ 4 sides, top (2vii05 HFB) 			
DS #8	<ul style="list-style-type: none"> ▪ 4 sides (2vii05 HFB) <i>plus</i> ▪ FrgA to W: 4 sides, top ▪ FrgB to W: 4 sides 			
DS #9	<ul style="list-style-type: none"> ▪ 4 sides, details (2vii05 HFB) 			
DS #10	<ul style="list-style-type: none"> ▪ 4 sides (2vii05 HFB) 			
DS #11	<ul style="list-style-type: none"> ▪ 4 sides, details (2vii05 HFB) 			
DS #12	<ul style="list-style-type: none"> ▪ 4 sides, details (2vii05 HFB) 			
DS #13	<ul style="list-style-type: none"> ▪ 4 sides, details (2vii05 HFB) 			
DS #14	<ul style="list-style-type: none"> ▪ 4 sides, details (2vii05 HFB) 			
<i>TSATSTAIN KHOSHUN</i>				
DS #1	<ul style="list-style-type: none"> ▪ views, scan set-up (24vi05 HFB) ▪ 4 sides, details (24vi05 CPT) 	measurements, condition features (24vi05)	partial scan of above-ground portion (24vi05)	
<i>KHOG VALLEY</i>				
Standing	<ul style="list-style-type: none"> ▪ views (24vi05 HFB) 	measurements, condition		

stone	▪ 4 sides, top (24vi05 CPT)	features (24vi05)		
<i>EFD VALLEY 3</i>				
DS #1	▪ views before moving, tipped up, after lichen removal (29vi05 HFB) ▪ returned to original position (30vi05 HFB) ▪ 3 sides, top, bottom returned (30vi05 CPT)	GPS location and elevation (DRR); measurements, condition features (29-30vi05); cleaning notes (29vi05)	complete scan (29-30vi05)	
<i>ERKHEL/ULAAN TOLGOI</i>				
DS #1	▪ views, scan set-up (3vii05 HFB) ▪ 4 sides, top (9-10vii05 CPT)	measurements, orientation angles of sides (9vii05); condition features (7vii05); cleaning notes (3vii05)	complete scan of above-ground portion (3vii05)	▪ comparative stone (similar also to DS #3) (9/10vii05 HFB)
DS #2	▪ views, scan set-up (3vii05 HFB?) ▪ 4 sides (9vii05 CPT)	GPS location, elevation, distance #2-#4 (DRR), measurements (except height), orientation angles of sides, condition features (9-10vii05); cleaning notes (7vii05)	complete scan of above-ground portion (7-8vii05)	▪ waxy deposit removed from side 1 (S) above belt (7vii05 HFB) ▪ stone spall with salts removed from side 1 (S) (9vii05 HFB) ▪ comparative stone with lichen (more grey) (9vii05 HFB) ▪ comparative stone (similar color) (9vii05 HFB)
DS #3	▪ views, scan set-up (4vii05 HFB) ▪ 4 sides, top (9-10vii05 CPT)	measurements, orientation angles of sides, condition features (9-10vii05); cleaning notes (4vii05)	complete scan of above-ground portion (4vii05)	see DS #1
DS #4	▪ views, scan set-up (4vii05 HFB) ▪ 4 sides, top (9-10vii05 CPT)	GPS location, elevation, distance #4-#5 and #2-#4 (DRR); measurements, orientation angles of sides (9-10vii05), condition features (7vii05); cleaning notes (4vii05)	complete scan of above-ground portion (4vii05)	
DS #5	▪ views, scan set-up, before/after cleaning (3vii05 HFB) ▪ 4 sides, top (9-10vii05 CPT)	GPS location, elevation, distance #4-#5 (DRR); measurements, orientation angles of sides (9-10vii05); condition features (7vii05); cleaning notes (3vii05)	complete scan of above-ground portion (3vii05)	▪ lichen removed from side 2 (N) top third (3vii05 HFB)
<i>ERKHEL EAST 1</i>				
DS #1	▪ views, scan set-up (9-10vii05 HFB) ▪ 4 sides, top (9-10vii05 CPT)	GPS location, elevation, alignment with DS #2 (DRR); measurements, orientation angles of sides, condition features (9-10vii05); cleaning notes (10vii05)	complete scan of above-ground portion (10vii05)	▪ comparative stone (similar also to DS #2) (10vii05 HFB)
DS #2	▪ views, scan set-up (9-10vii05 HFB) ▪ 4 sides, top (9-10vii05 CPT)	GPS location, elevation, alignment with DS #1 (DRR); measurements, orientation angles of sides, condition	complete scan of above-ground portion (10vii05)	see DS #1

		features (9-10vii05); cleaning notes (10vii05)		
ERKHEL NORTH 1				
DS #1	<ul style="list-style-type: none"> ▪ horizontal as found: views (6vii05 HFB) ▪ after erecting: views, scan set-up (10vii05 HFB) ▪ 4 sides, top (10vii05 CPT) 	GPS location, elevation, alignment with DS #2 (DRR); measurements, orientation angles of sides, condition features, cleaning notes [including mechanical removal of graffiti outlines around images] (10vii05)	complete scan of above-ground portion (10vii05)	<ul style="list-style-type: none"> ▪ stone spall removed from side 3 (N) lower left (10vii05 HFB)
DS #2	<ul style="list-style-type: none"> ▪ views (6vii05 HFB) ▪ views, scan set-up (10vii05 HFB) ▪ 4 sides (10vii05 CPT) 	GPS location, elevation, alignment with DS #1 (DRR); measurements, orientation angles of sides, condition features, cleaning notes (10vii05)	complete scan of above-ground portion (10vii05)	<ul style="list-style-type: none"> ▪ stone fragment of DS, located nearby and sampled (10vii05 HFB)

General photographic views were taken at the sites listed above: Ushkiin Uver (22 June, 2 July), Tsatstain Khoshun and Khog Valley (24 June), Efd Valley (29-30 June), Erkhel/Ulaan Tolgoi (23 June, 2-9 July), Erkhel East 1 (9-10 July), and Erkhel North 1 (6, 10 July). In addition, photographs were also taken of deer stones at sites visited en route: Khosshoot (20 June) and Burdni Ekh (21 June), between Ulaanbaatar and Selenge; and at *khirigsuur* site KYR119 near Khanuy Valley in Arkhangai Aimag (12vii05).

Stone samples representative of the red and yellow outcrops at Erkhel/Ulaan Tolgoi were also collected on 9 July. Various types of lichen were photographed at Ushkiin Uver on 2 July.

FIELD CONSERVATION

Erkhel/Ulaan Tolgoi, Satellite Mound B

Karas and Beaubien provided conservation assistance to the archaeological team, when a horse head deposit was discovered on 9 July in a small mound associated with the big *khirigsuur* at the Ulaan Tolgoi site (Fig.15). The deposit contained a careful arrangement of skull, cervical vertebrae and hooves. Because the skull was somewhat crushed, it was not considered an exhibit-worthy example of such a deposit. However, it did provide an excellent opportunity for demonstrating several techniques for stabilizing fragile finds, or removing complex deposits so that they could be excavated and analyzed more carefully in a laboratory setting.

Fragile areas of the bone were stabilized by carefully attaching small pieces of a very fine but strong tissue⁴ with an easy-to-remove adhesive⁵ (Fig.16). This facing held bone fragments together and protected the vulnerable portions as cleaning progressed. Once the surrounding soil was cleared from around the sides, the conservators then demonstrated the process of jacketing the deposit, to hold it securely together for lifting. With their assistance, several of the

archaeologists shaped a protective layer of plastic wrap and then aluminum foil closely around the deposit. Several layers of plaster-coated gauze bandage were applied, which dried to form a rigid shell (Fig.17). A board was slid underneath and the whole deposit was safely lifted. It was labeled and secured to a wooden plank for transport (Fig.18).

(Footnotes)

1 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 ACP 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.

2 The mold was produced over a two-day period, using silicone rubber for the primary mold and expanding polyurethane foam for the mother mold, with a soap solution as a parting layer. The mold components were later used to create lightweight casts at OEC, using synthetic resins that carefully reproduced the surface texture and color of the original. One cast was given to the National Museum of Mongolian History in Ulaanbaatar for permanent display; another was included in the 2002 exhibition *Modern Mongolia-Reclaiming Genghis Khan* at the Smithsonian's National Museum of Natural History and is now in the collection.

3 Procedures and results are described more fully in the following publications:

Beaubien, Harriet F., Basiliki Vicky Karas, and William W. Fitzhugh (forthcoming), 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); and

Karas, Basiliki Vicky, Harriet F. Beaubien, and William W. 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).

4 Japanese *tengujo* tissue, a cellulose paper made of Kozo fibers [supplier: Talas]

5 Methocel™ a methylcellulose (cellulose ether) powder, mixed with water to form a gel; thinned for use as an adhesive [manufacturer: Dow; supplier: Talas]



Figure 1: The scan team: Karas, Thome and Beaubien [vii06, PTD]



Figure 2: Shelter set-up, seen here with Erkhel Ulaan Tolgoi DS #5 [3vii05 HFB]



Figure 3: Ushkiin Uver DS #1 with scan set-up (early version) [22vi05 PTD]



Figure 4: Scanner components (from left): processing unit with want on top, reference receiver and transmitter



Figure 5: Scanning set-up, seen here with Erkhel East 1 DS #2 [10vii05 HFB]



Figure 6: Some of the deer stones at Ushkiin Uver, including DS #14 in foreground [2vii05 HFB]



Figure 7: Tsatstain Khoshun DS #1 with scan set-up (early) [24vi05 HFB]



Figure 8: Erkhel/Ulaan Tolgoi, with deer stones (left to right) #4, #5, #3, #2, #1. [xxxvii05 HFB]

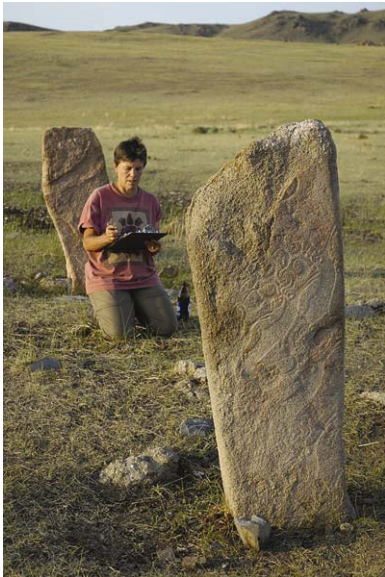


Figure 9: Erkhel East 1, with deers #1 (foreground) and #2 [9vii05 CPT]



Figure 10: Efd Valley 3 DS #1, tipped up in preparation for scanning [29vi05 HFB]



Figure 11: Erkhel North 1 DS #1, in as-found position [6vii05 HFB]



Figure 12: Erkhel/Ulaan Tolgoi DS #2 being groomed for scanning [7vii05 CPT]



Figure 13: Erkhel North DS #1, positioned after excavation [10vii05 HFB]



Figure 14: Erkhel/Ulaan Tolgoi khirigsuur, with small mound during excavation (foreground) [pvii05 HFB]



Figure 15: Erkhel North 1 DS #2 [10vii 05HFB]



Figure 16: Foil Covered horse head deposit, being jacked with plaster for block lifting. [9vii05 HFB]



Figure 17: Horse head deposit in situ, with fragile bone being stabilized with tissue patches [9vii05 HFB]



Figure 18: Labeling the block-lifted horse head deposit. [9vii05 HFB]



Part V

2005 Burial Mound Survey in Hovsgol Aimag, Mongolia

Bruno Frohlich
Department of Anthropology
Smithsonian Institution

Introduction

During the summer of 2005 we focused on the surveying of burial mounds, also known as kherigsuur in the southern Hovsgol aimag. In 2003 and 2004 we explored several areas of interest (Ushkiin Uuver, Ulaan Tolgoi, and Soyo) all with high concentrations of mounds. We also tested various recording procedures including advanced GPS and GIS mapping and succeeded in combining different recording methods that allowed us to enhance our data collection while adjusting to different logistic situations and changing recording objectives as our knowledge of mound distributions improved (Frohlich et al 2004; Frohlich and Bazarsad 2005). Our surveys at Soyo, Ulaan Tolgoi (Lake Erkhel), and Ushkin Uuver have shown certain consistent and well-defined patterns: preference for locating mounds on the southern hill sides; a division of mounds into three major classes dependent on location; and mounds nearly equally divided into two architectural expressions — mounds with either circular or square stone fences, respectively (Frohlich et al 2004; Frohlich and Bazarsad 2005).

During our surveys we developed many questions. For example, researchers have suggested that the mounds are not burials but large ritual monuments related to spiritual beliefs. This hypothesis has been asserted by Esther Jacobsen and further supported by some excavations, including research by William Honeychurch at the Baga Gazaryn Chuluu site (Jacobson 1993, 2002; Honeychurch and Armartuvshin 2002). After extensive excavations Honeychurch did not find any human remains in the central kherigsuur mounds. This is in part contradicted by our finds of human remains in robbed and disturbed kherigsuur mounds explored by our survey teams in 2003 and 2004. Most likely the answer is much more complicated. At this time we argue that the majority of smaller and middle size mounds are constructed for the purpose of burials of human bodies, and larger structures and especially mounds located in close vicinity to deer stone complexes could be ritual monuments. However, before we can answer these questions we need to develop a comprehensive and high-quality burial mound database including survey data, excavation data, ethnographical data,

and associated information related to the finds of human and animal remains, as well as information on sex and age distribution, demography, radiometric/AMS dating of biological material, and the correlation between biological information and architectural expression.

We have divided our khirigsuur project into three principal phases: (1) mapping mound structures in well-defined geographical areas; (2) excavations

of selected mounds; and (3) data analysis. The first phase was initiated in 2003 and 2004 with surveys at Soyo and Ulaan Tolgoi (Frohlich et al 2004; Frohlich and Bazarsad 2005) and in part completed in 2005 with a major survey of mounds between Ulaan Tolgoi and Ushkiin Uuver. The second phase is scheduled to commence in the summer of 2006. Depending on logistics, we plan to excavate between five and eight small or medium size mounds in the Ulaan Tolgoi and Soyo areas. Phase 3, the analytical phase, began concurrent with the first two phases; however, the major emphasis on analysis will take place after the 2006 season, when survey and excavation data can be integrated to support the testing of various hypotheses.

Logistics

The 2005 survey team included members of the Institute of Archaeology at the Mongolian Academy of Sciences: N. Bazarsad, B. Erdene, T. Amgalantugs, D. Adara, and D. Tumer (driver), and of the Smithsonian Institution: B. Frohlich (Figure 1). An area between the two deer stone complexes at Ulaan Tolgoi (Lake Erkhel) and Ushkiin Uuver (the Delger Muron River) was selected (Figure 2). The reported presence of more than 400 mounds west and north of the Ushkiin Uuver deer stone complex and the known number of 118 mounds west of the Ulaan Tolgoi deer stone complex strongly suggested that this specific area could include a large number of mounds (Frohlich and Bazarsad 2005). The result was a trapezoidal area with two parallel east - west sides north of Lake Erkhel and along the Delger Moron River to the south and two non-parallel north - south sides between Lake Erkhel and Ushkiin Uuver on the east side, and between 21 and 27 km on the west side. The lengths of the sides range from 21 km for the northern side to 38 km for the eastern side. The total area surveyed is approximately 850 km² (Figure2).

In planning our survey we relied on experiences gained during the 2003 and 2004 pilot surveys at Soyo and Ulaan Tolgoi. We succeeded in defining criteria for the geographical location of mounds and as well as criteria that suggested the possibility of finding mounds should be very limited. This included the most likely location of mounds



Figure 1: 2005 Survey Team. From left: T. Amgalantugs, B. Erdene, D Tumer, and D. Adara.

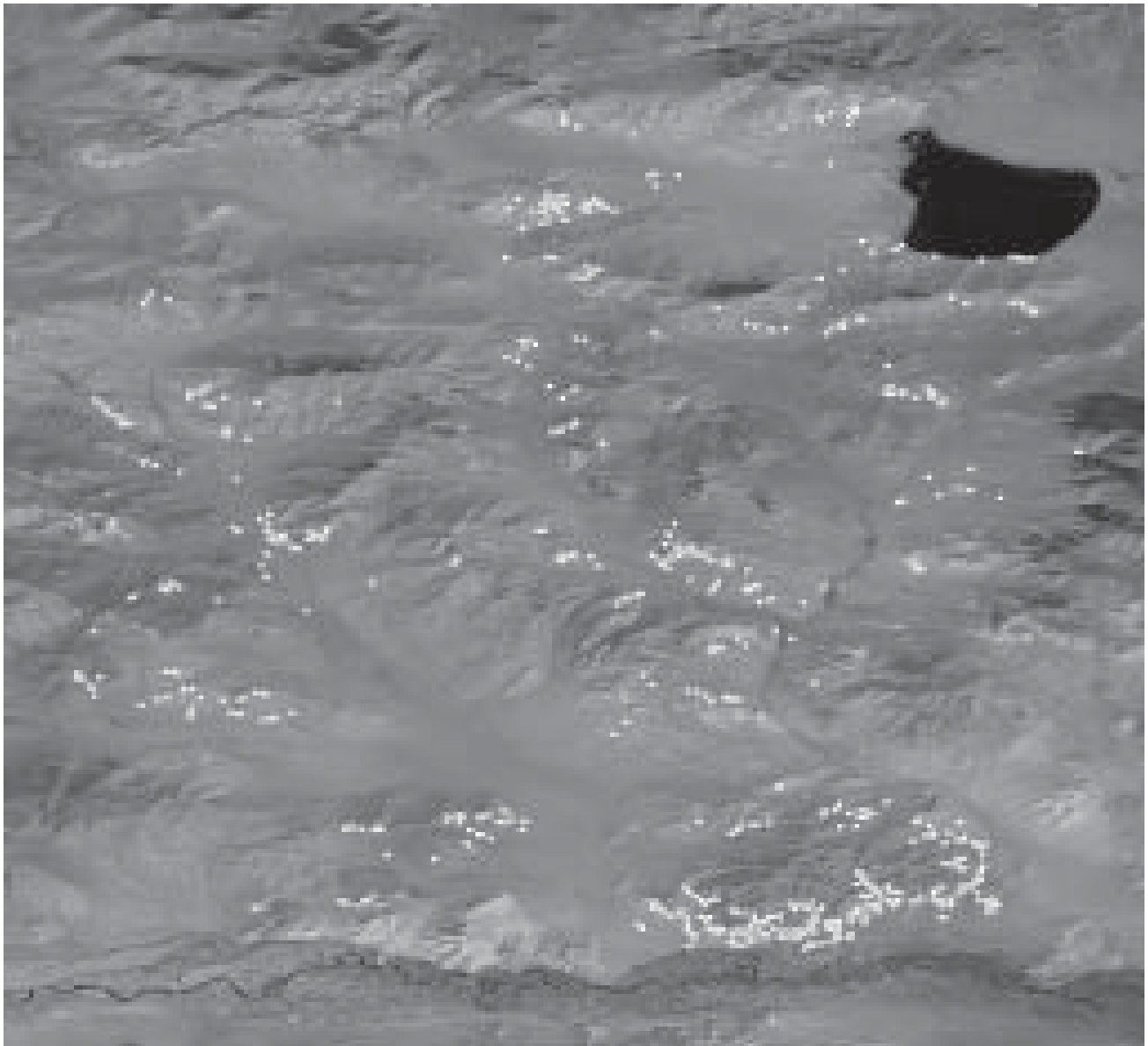


Figure 2: 2005 survey area (Landsat false color image), including mound distrobution (white). Symbols represent a total of 1,341 surveyed mounds.

on southern hill sides, on areas between southern hill sides and the flat steppe, and in the adjacent steppe landscape. We also hypothesized that larger mounds were found on the flat steppe (Class 1 mounds), and the smaller mounds would be identified on the upper hill sides (Class 3 mounds). This hypothesis was tested by exploring areas where mounds should be present, and areas where we hypothesized that mounds should not be present. The latter proved to be correct in most cases. However, the exploration of southern hill sides did not always yield the presence of mound structures. We found that the presence of raw material such as numerous rocks of various sizes needed to be added as an important additional criteria. Also, the density of mounds on southern hill sides ranged from a very few to extensive concentrations. This could not always be associated with restrictions in the natural landscape such as large boulders and deep depressions, and as such may be a function of other factors including social, economical and spiritual considerations (Frohlich and Bazarsad 2005).

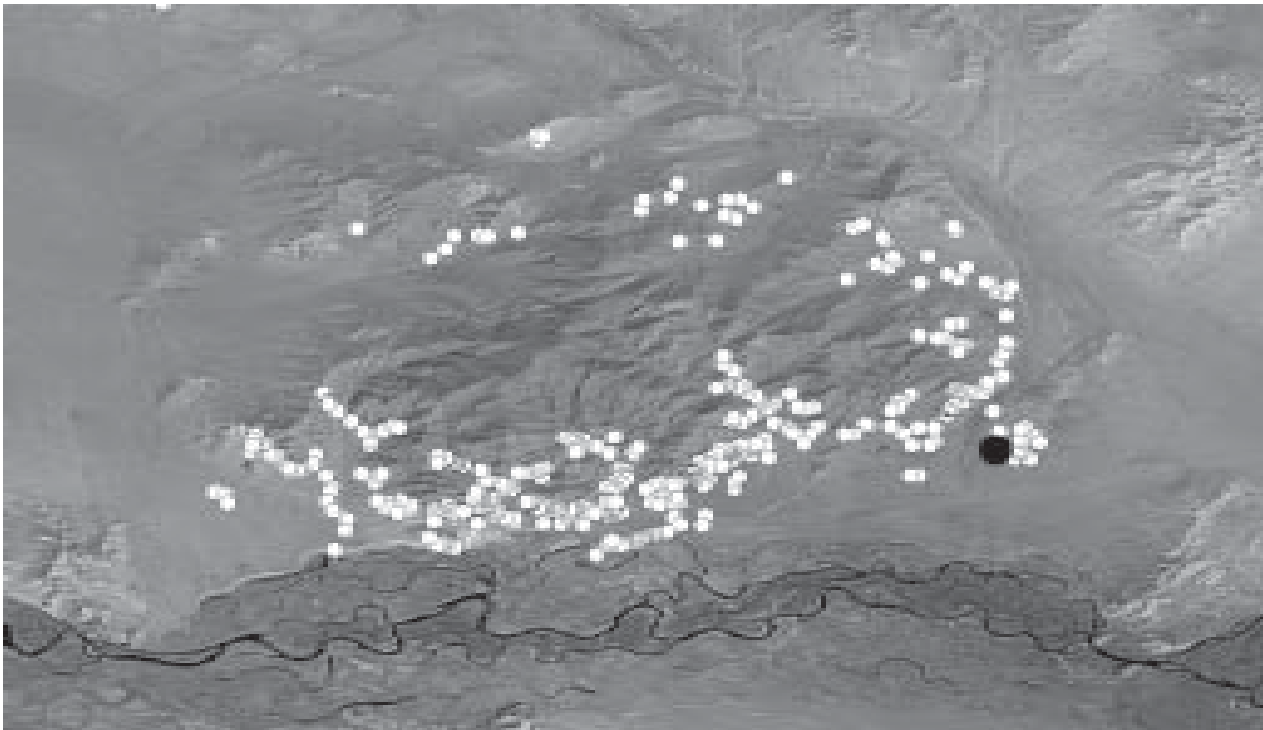
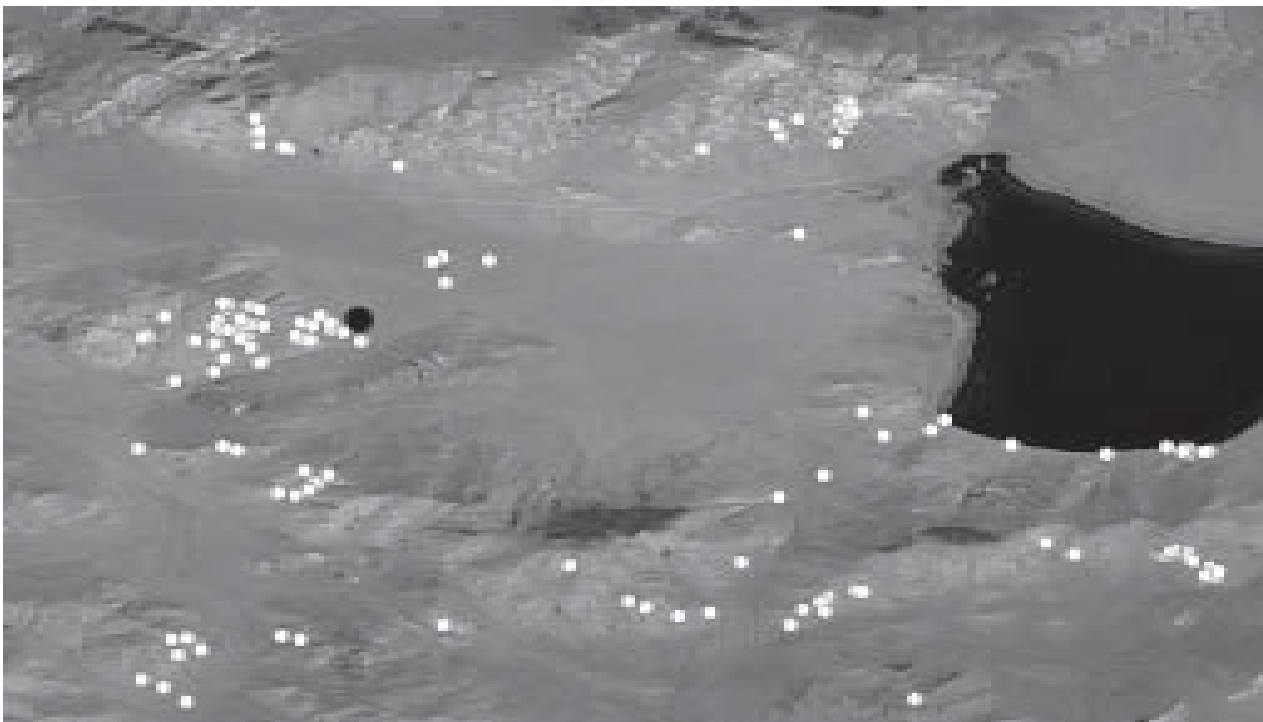


Figure 3: Ushkiin Uuver area (Landsat false color image), including mound distrobution (white) and deer stone complex (black).

Our 2005 survey team was divided into two groups. One was based on high mobility using a four-wheel-drive truck, and the second group consisted of a much slower three- to four-man team walking the hill sides. The first group identified areas of interest. Such areas would then be surveyed by the second group. The first group also surveyed, by foot, areas which according to our assumptions should not include any mounds. The survey was enhanced and made simpler by

Figure 4: Ulaan Tolgoi (Landsat false color image), including mound distrobution (white) and deer stone complex (black).



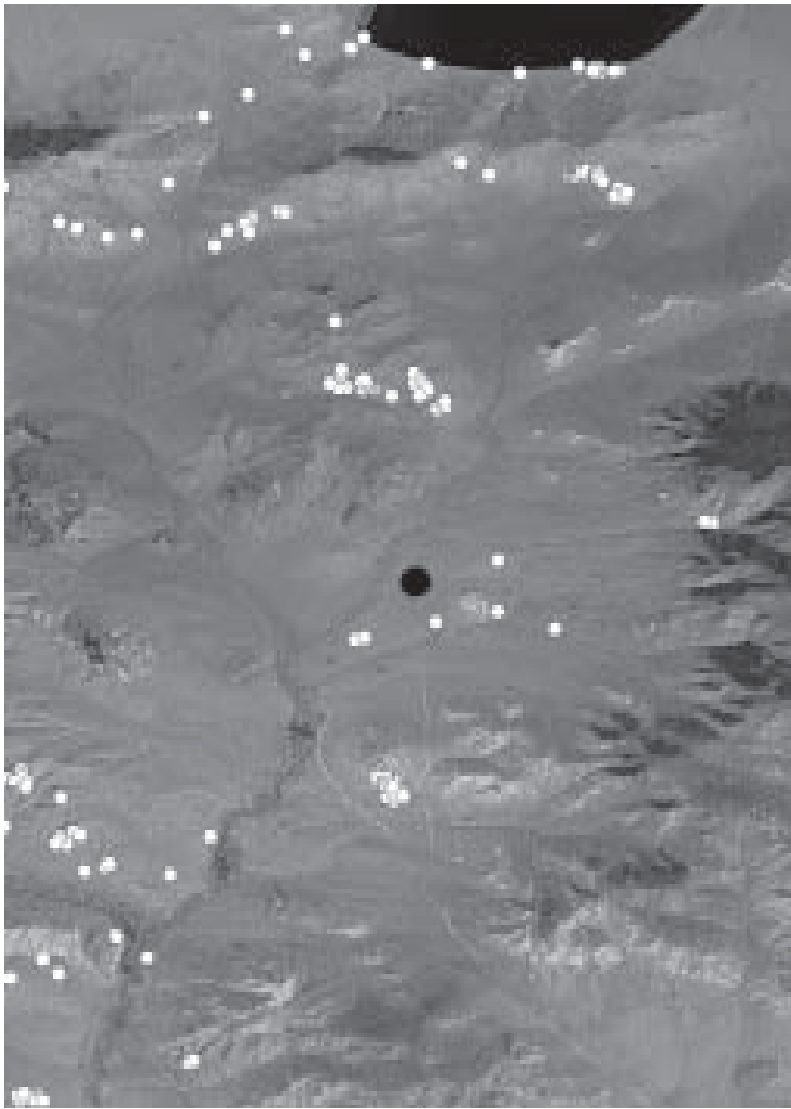


Figure 5: Central and eastern part of survey area (Landsat false color image), including mound distribution (white) and deer stone complex (black).

having access to poster size composite Landsat images including bands 2, 4, and 5 and producing a false-color map with color attributes close to what we would expect if flying in a small airplane at low altitude above the ground (Figure 2).

Mounds were recorded using a combination of GPS, compass, large measuring tapes, and basic map readings. Metric dimensions and magnetic direction of features were recorded manually, and geographic positions were recorded as longitude, latitude, and elevation and were stored in two small GPS units (Garmin GPS-12). At the end of each day all data were entered into a database management system and checked out for accuracy using software from Hildebrand (Waypoint). Later, and after our return to the laboratory at the Smithsonian Institution, mounds were displayed on geo-referenced Landsat images and Russian topographical maps using different colors and shape depicting various architectural and biological expressions. ESRI-GIS (ArcInfo/ArcMap),

and Leica Geosystems (Erdas Imagine) software were used for this purpose and also for more upcoming and advanced analyses of distribution patterns.

Results

Mound distribution

A total of 1,223 mounds were recorded within the study area. Five hundred and three mounds were located on the southern hill sides of the large hill complex north and west of the Ushkiin Uuver deer stone complex (Figure 3). The remaining 720 mounds were located in various clusters of between 3-150+ mounds evenly distributed in most of the surveyed areas and within one large cluster of 120 mounds around the Ulaan Tolgoi deer stone site (Figures 2 and 4). The 120 mounds were recorded during our 2003 and 2004 field seasons (n=118) and the 2005 survey (n=2; Table 1)(Frohlich and Bazarsad 2005). Tentatively, seven clusters of mounds can be defined within the entire survey area. This includes two clusters around the Ushkin Uuver and Ulaan Tolgoi deer stone complexes (Figures 3 and 4) and five



Figure 6: E. Erdene (left) and T. Amgalantugs, Institute of Archaeology, Mongolian Academy of Sciences, recording soil deposits on circular fence of a Class 1 mound.

smaller and less well defined clusters in the area between these two deer stone complexes (Figure 2). No mounds were associated with a small deer stone complex located 15 km southeast of Lake Erkhel and 17 km north of Ushkiin Uuver, at Latitude 49°48'54.0" East and Longitude 99°54'02.8" North (Figure 5). In some cases geographical features could explain the observed clustering of mounds, but in most, no clear natural landscape feature could explain the observed clustering. We argue that such clustering is a function of other factors including social, political, economic, and spiritual elements.

Architectural variation

The basic architectural expression of mounds in the central Hovsgol Aimag has been described in earlier field reports published in the Arctic Study Center's publication series (Frohlich et al 2004, and Frohlich and Bazarsad 2005). However, this season we realized that the architectural variation is much more elaborate than previously thought. Although mounds deviating from the basic architecture expression are few, their special location and unique features must be taken into consideration when the data is being analyzed and the results being discussed. This part of the study is still in progress, and results will be reported at a later time.

The antiquity of the mounds are assumed to be between 3,500 BP and 2,000 BP, however, the temporal distance between mounds may be significantly higher than the assumed 1,500 years. Also, the question of mounds being burials or ceremonial monuments still has to be verified by excavations of selected mound structures. Small and medium size mounds appear to be burials. At least four or five robbed (looted) mounds yielded human remains when the back-dirt of the thieves was examined in detail (Frohlich and Bazarsad 2005; Fitzhugh 2005: 24). Dating of human remains found in center mounds, associated horse remains found in external mounds all fall within 3200 to 2000 BP (calibrated), thus contemporary with dates obtained by Fitzhugh (2005) from external mounds and deer stone sites. Our radiometric dates, so far, suggest contemporary dates between (1) human remains from Khirigsuur main mounds, (2) associated external mounds (horse skeletal remains), and (3) from horse skeletal remains found adjacent to deer stones.

Some of the larger mounds (Class 1 mounds) are located on the flat steppe. Assuming that the stones used to build the surrounding walls were placed directly on the original surface, we hypothesized that the accumulated soil layers represented by the soils between the lowest part of the stones and the present surface may correlate with the age of the construction. Thus, we initiated a small pilot study in which several mounds were tested in two different areas,

all representing Class I mounds, defined as being located on the flat steppe (Figure 6). The average depth of the stones was found to be very similar within the same area but different between areas. We argue that this may represent some significant temporal distances between various groups of mounds. However, it might also be that these differences result from different Aeolian and sedimentary regimes of the different areas. This hypothesis will be tested further when returning to the field in the summer of 2006.

Finally, during the 2005 season we repeated the recording of mounds recorded in 2003 and 2004, and about 20 mounds recorded early during the 2005 season were recorded again at the end of the same season but by a different group of surveyors. This control work demonstrated that the survey data in most cases is of the highest possible quality.

Our results from the 2005 survey were fascinating. We demonstrated that some of the ideas and assumptions developed during the 2003 and 2004 seasons could be verified by the results from 2005, and also that the variability of mound architecture and location is much more complex than seen in the limited amount of mounds surveyed during the 2003 and 2004 seasons (Frohlich et al 2004; and Frohlich and Bazarsad 2005). We have initiated close collaborations with Francis Allard's excavation of burial structures in the Khanuy valley and with William Honeychurch's survey and excavations of mounds at the Baga Gazaryn Chuluu site (Honeychurch and Amartuvshin 2003; Allard and Erdenebaatar 2002). Apparently, and although the basic khirigsuur architecture is very similar between these regions, the three surveys also confirm that there are variations between regions. Is such variation a function of different time periods or to contemporary regional variation? We do not know the answer at this time.

In the following we present part of our summary statistical data as they appear at this time, based on data from all three field seasons from 2003 to 2005. However, some data is still being processed and is not included in this publication. Also, our quality control including second and third repeat recordings of selective mounds demonstrated that we had problems during the 2005 season recording external structures such as external mounds and stone rings. Thus, until some of the 2005 recordings have been repeated, corrected and/or verified, we will not use the complete database to report our results pertinent to external mound structures. Finally, based on additional quality control of the data both from repeated surveys of selected mounds during the 2005 and 2006 seasons and statistical data control in our laboratory, we may at a later time have to slightly alter some of our numbers and results presented in this report.

Summary of statistical data

The total number of recorded mounds covering the Ulaan Tolgoi, Ushkin Uuver, and the Soyo areas is 1,619 mounds. Of these, 262 were recorded in 2003, 134 in 2004, and 1,223 in 2005. A total of 278 mounds have been recorded in the Soyo area; 120 in the Ulaan Tolgoi area; 503 in the Ushkin Uuver ara; and 718 in the large area between the Ushkin Uuver and Ulaan Tolgoi areas (Table 1).

Mounds are found in three major architectural configurations: (1) mounds with squared fences, (2) mounds with circular fences, and (3) mounds with no visible fences (Figures 7 and 8). We have not yet identified any correlation

between shape of fences and the surrounding landscape. At this time, the selection of fence shape appears to be random. Mounds with no fences may represent structures where the natural silting and surface deposit over time have covered the fence, or it could be that no fence was constructed to begin with. In general, mounds with no fences are statistically smaller than mounds with fences. It could be argued that smaller mounds may be making use of smaller stones in the basic construction, thus fences could possibly be entirely covered by silt, or smaller mounds with no fences could part of a different architectural expression, which may include the Hunnu period.

Combining all mounds recorded from 2003 to 2005 within all four geographical locations we find that out of 1,619 recorded mounds, 638 (39%) include a circular fence, 683 (42%) include a squared fence, and 298 (18%) show no sign of fences (Table 2). This almost equal distribution between circular and squared fences is slightly different when comparing the four surveyed geographical areas on an individual basis. For example, the numbers for Soyo are: circular fences 121 (44%), squared fences 73 (26%), and 84 (30%) with no fences. The numbers for Ulaan Tolgoi are: circular fences 56 (47%), squared fences 54 (45%), and 10 (8%) with no fences. Ushkin Uuver: circular fences 184 (37%), squared fences 268 (53%), and 51 (10%) with no fences. And for the area between Ulaan Tolgoi and Ushkin Uuver: circular fences 277 (39%), squared fences 288 (40%), and 153 (21%) with no fences (Table 2). Ulaan Tolgoi and locations between Ulaan Tolgoi and Ushkin Uuver yield almost equal numbers of mounds with circular and squared fences. Soyo has a significant higher number of mounds with circular fences and Ushkin Uuver has a significant higher number of mounds with squared fences (Table 2). Whereas the uneven distribution of mounds with circular and squared fences at Soyo could be explained by the high number of mounds with no recorded fences (30%), this is not the case for the Ushkin Uuver area where the number of mounds with no recorded fences represents only 10%.

Figure 7: Burial mound with circular fence.





Figure 8: Four burial mounds with squared fences.

We need to study other potential factors which may explain this discrepancy. No hypothesis explaining why some mounds include a circular fence and some a squared fence have been published. At this time we argue that the selection process might be a sexual dimorphic trait, i.e. males being interred in one shape of mounds and females in the other. Upcoming excavations and the examination of human remains already retrieved may help accept or reject this hypothesis.

In general, student t-test using metric variables between mounds with circular fences and mounds with squared fences show no significant size differences between mounds including different shape of fences. Size differences are not statistically significant in mounds located at Ulaan Tolgoi and Ushkiin Uuver ($P = 0.730$, and $P = 0.370$, respectively). However, circular mounds tend to be larger than squared mounds in the area between Ushkiin Uuver and Ulaan Tolgoi ($P=0.003$). Comparative data from the Soyo area is not yet available.

During our 2003 field season we developed a classification system based on the location of mounds as related to being on the flat steppe, on hillsides (most often on the southern exposed sides), or in areas bordering the hillsides and the flat steppe. Thus Class 1 mounds are found on the flat steppe (Figure 9), Class 2 mounds on the border between steppe and hills (Figure 10), and Class 3 mounds in the hills (Figure 11). Of a total of 1,619 recorded mounds, including recording from all three field seasons, 360 (22%) are defined as Class 1 mounds, 651 (40%) are defined as Class 2 mounds, and 580 (36%) are defined as class 3 mounds (Table 3). Class 1 mounds are, in general, significant larger than Class 2 and Class 3 mounds, and Class 2 mounds are in general larger than Class 3 mounds. The basic statistics for metric variables between the three classes are as follow: There are significant size difference between all three classes for the following metric variables: maximum center mound diameter, circular fence diameter, and length of northern fence line (in squared mounds only) ($P=0.000$). Class 1 mounds located adjacent to deer stone complexes represent the largest



Figure 9: Class 1 mound

recorded mounds, thus supporting the contemporaneous relationship between the two types of structures (Frohlich and Bazarsad 2005).

When the distribution of mounds with circular and squared fences, respectively, are evaluated with the three different classes of mounds, we find an almost equal distribution of mounds with circular and squared fences in Class 1, Class 2, and Class 3 mounds; however Class 3 mounds include a slightly higher numbers of mounds with no recorded fences ($n=123$, 21%) versus $n=58$, (16%) and $n=89$ (14%) found in Class 1 and Class 2 mounds, respectively. This discrepancy may be a factor of higher levels of silting and natural soil coverage of fences on a slope than on more horizontally level surfaces. The statistics on classes of mounds are not finalized at this time. Surveys at Ulaan Tolgoi, Ushkin Uuver and the large areas between, most likely include all mounds. This is not the case at Soyo, however. Surveys north of the Khugiin Gol include Class 1 and Class 2 mounds, only. Logistic problems (weather) did not allow a detailed exploration for Class 3 mounds in the upper hill sides facing south and toward the Khugiin Gol.

Relative dating

During observation of earlier excavated mounds by other archaeologist we observed that most likely the original mound-builder placed the stones directly on the surface. From this we hypothesized that the thickness of silt and soil layers found between the lowest part of stones and the present surface would reflect the amount of silt accumulated since the time of construction and to the present time. From this we further argue that the thickness of such layers would become a measure of relative time differences between groups of similar classes of mounds.

To test this hypothesis we selected two areas: Class 1 mounds around the Ushkiin Uuver deer stone complex



Figure 10: Class 2 mound

and a second Class 1 group of mounds located a minimum of 6 km west and northwest of the deer stone complex. Both groups depicted similar surface characteristics. Small test pits were excavated next to and external to well defined stone fences, including squared and circular fences. Size of test pit was between 1 meter by 0.5 meter and 0.5 meter by 0.5 meter. Depths were dependent on lowest location of stone. Seventeen pits were tested in six mounds adjacent to the Ushkiin Uuver deer stone complex. Five of the six mounds were within 0.5 km from the deer stone complex and one mound about 1.5 km west of the deer stone complex. Twenty four pits were tested in 12 mounds located between six km and 12 km west and northwest of the Ushkiin Uuver deer stone complex. Fifteen tested mounds were Class 1 and three were Class 2 mounds.

Two metric variables were recorded: the vertical distance between the lowest location of the stone and the present surface (Variable B) and the vertical distance from the present surface to the top of the stone (Variable A). The total vertical height of the stone (variable AB was calculated by adding the two recorded variables.

We found a significant difference between the amount of accumulated silt or soil between the Ushkiin Uuver group and the mound group to the west and northwest, with the deposits at Ushkiin Uuver being less (19.0 cm) than the similar value for the western/northwestern group (25.4 cm) (Tables 4 and 5). A Student t-test between the two groups suggests a significant difference ($P=0.001$). There is also a slight size difference in the size of the recorded khirigsuur fence stones, with a vertical height measurement for the Ushkiin Uuver group at 27.5 cm and 35.5 cm for the western group (Tables 4 and 5). The Student t-test showed a significant size difference, although less significant than the amount of accumulated soils between the two groups ($P=0.005$).



Figure 11: Class 3 mound

Based on these preliminary pilot tests we may argue that the kherigsuur at Ushkiin Uuver are younger than the similar mounds located west and northwest of the of the deer stone complex. Also we could argue that stones used in the construction of fences are smaller in the mounds around the deer stone complex when compared to the stones used in mounds located to the west. Needless to say that the numbers and sample sizes used in the statistics are small. The sample of 17 for Ushkiin Uver and 24 for the western distribution may raise question about a normal distribution of the data, thus the t-tests may reflect slightly biased results. However, such data and test results raise new arguments and hypotheses which should be tested in future excavations and surveys. This would include a comprehensive study of soil silting in other well-defined areas closer to the Ulaan Tolgoi deer stone complex. The method applied in this pilot study suggests a temporal order of sequence, thus is not an absolute result. However, with absolute dating methods, such as radiometric and AMS dating of biological material from central mound and external mounds it should be possible to correlate our relative dates to absolute dates and achieve a better understanding of the temporal variation of mounds within a well-defined and well-understood geographical distribution. At this time several biological (horse tooth and charcoal) dating samples from the deer stone complex at Ulaan Tolgoi have suggested dates between approximately 3,200 BP and 2,000 BP (Fitzhugh 2005). Horse tooth samples from an inner tier horse sacrifice satellite mound and in outer tier horse mound at the large kherigsuur immediately south of the Ulaan Tolgoi deer stones yielded 3080-2870 BP (calibrated) and 3320-2940 BP (calibrated) (Fitzhugh 2006). Three samples from the Soyo area were submitted in March of 2006 and the results have just been received. Soyo Mound no. S49, External Mound (horsehead remains) yielded 3000-2780 BP (calbrated); Soyo Mound no. S49, Central Mound (human skeletal remains) yielded 3210-2880 BP (calibrated), and Soyo Mound no. S50, Central Mound (human skeletal remains) yielded two dates: 2760-2690 BP (calibrated nad 2660-2480 BP (calibrated)). Thus, human remains found in the center mounds appear to be contemporary with horse skeletal remains found in the external mound. Two center mounds have yielded dates between 3200 BP and 2000 BP, thus showing contemporary dates with horse skeletal remains found in other external mounds and in areas

associated with deer stones.

We plan to expand our sample size of absolute dates from both center mounds and external mounds in khirigsuurs located in the Ulaan Tolgoi and the Soyo areas, to conclusively establish a clear understanding of the relative time, if any, which may exist between burial features within the same mound structures.

Table 1: Number of mound surveyed in 2003,2004 and 2005

Year	UU	UT	Soyo	UU/UT	Total
2003	0	91	171	0	262
2004	0	27	107	0	134
2005	503	2	0	718	1223
Total	503	120	278	718	1619

Table 2: Number of Mound including circular, squared or no fences.

Fence	UU	UT	Soyo	UU/UT	Total
Circular	184	56	121	277	638
Squared	268	54	73	288	683
No Fence	51	10	84	153	298
Total	503	120	278	718	1619

Table 3. Mound Classes

Class	UU	UT	Soyo	UU/UT	Total
Class 1	103	22	102	133	360
Class 2	276	61	79	235	651
Class 3	121	37	97	325	580
No Class	3	0	0	25	28
Total	503	120	278	718	1619

Table 4: Test pit excavations of fence stones at Ushkiin Uuver. A: vertical height of stone above present surface, B: thickness of soil deposit from the ground to the base of the stone, and AB: total vertical height of stone.

	A	B	AB
N of cases	17	17	17
Minimum	2.000	8.000	10.000
Maximum	25.000	29.000	48.000
Range	23.000	21.000	38.000
Mean	8.529	19.000	27.529
Standard Dev	5.547	5.523	8.917

Table 5: Test pit excavations of fence stones at Ushkin Uuver West and Northwest: A: vertical height of fence stone above present ground surface; B: thickness of soil deposit from the ground surface to the base of the stone; and AB: total vertical height of stone.

	A	B	AB
N of cases	24	24	24
Minimum	2.000	15.000	22.000
Maximum	22.000	38.000	49.000
Range	20.000	23.000	27.000
Mean	9.292	25.375	35.500
Standard Dev	4.428	5.257	7.235

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Appendix A

Archaeological Sites Studied in 2005

Khoshoot

GPS: N 48° 07.478'; E102° 34.975'; 1346 elev.

3 deer stones, irregular shaped, placed upright by Sanjmiatav with Russian team in 1971

21 June 2005

Burdni Ekh ('source', 1 km east of Sakhatt or 'mustache hill')

GPS station #11: N 48° 20.783'; E 102° 22.578'; 1375 elev.

Deer Stone site with large slab burial built with deer stone corners and retaining walls

Dalka Valley Turkic Site: rectangular temple and statue site

GPS station #13: N 49° 17.244'; E 101° 16.285'; 1351m elev.

South of Selenge River in. 7-8th C. AD. One Turkic statue

Selenge River South Side

Sand blow areas with massive fire-cracked rock deposits (??)

Evdei Turkic Slab Site (Evdei 1)

GPS Station #15: N 51° 07.213'; E 99° 13.303'; 1631m elev.

Two irregularly shaped and unmodified standing slabs of a greenstone-type rock, placed in north-south alignment at the base of the hill bordering the north side of the valley. Excavation resulted in no artifact finds or burials, but an alignment of smaller vertical slabs extending east and west of the

large slab. The smaller slabs had apparently once been on the surface but had been covered by 50-75cm of slopewash.

Soyo Rock Art Site: Tolijii Boom

We briefly revisited this rock art site which we had seen in 2002, noting then that it had been trashed by thieves sometime before that. Tom Kelly took a number of photographs.

Khuggin Gol: Soyo North Site

GPS station #15: N 50° 59.972'; E 99° 08.654'; 1651m elev.

One the major terrace on north side of river at Soyo, opposite the sum center buildings, in middle of pasture. Collected some bone fragments and pieces of thick orange-surface ceramics like those found at Soyo 3.

Menge Bulag 2

GPS: N 51° 11.907'; E 098° 54.500'; 2219m elev.

Erden, Bayandalai's son, had found a dark chert end scraper at this former Tsaatan camp downriver from MB-1, and we went to see what else might be there. Although carefully searching the site for an hour, having good exposures, we found no flakes, artifacts, or hearth rocks, or any other sign of a site, other than Tsaatan ethnographic camp remains. I mapped this Tsaatan camp in 2004.

Evdei -1: Turkic Slab Site, Stone 1

GPS station: N 51° 07.310'; E 99° 13.300

Two standing slabs of roughly shaped greywacke of similar rock without their edges or sides having been trimmed or shaped, standing in north-south alignment on an alluvial fan of material eroded from the hillside to the north. Although we saw no sign of deer stone markings we decided to excavate the northernmost stone (stone 1) to learn about its cultural affiliation and age and features. No other features were seen on the surface nearby, and the slabs were not associated with khirigsuurs located further uphill on the alluvial fan.

The slabs were oriented with their flat faces toward east and west. Excavation of Stone 1 revealed a series of smaller slabs extending east and west of the large slab, buried ca 50-75cm below the surface, also with their flat sides facing east and west. These small slabs were spaced about 50-75cm apart, apparently being part of a large line of slabs that extends east and west from the large slab for an unknown distance, all which have been buried by alluvial deposits during the past 1500 years.

No diagnostic artifacts were recovered, only a few bone fragments and traces of charcoal and bark. These were not features other than the buried slabs, which were set into sterile rocky soil. This slab and alignment closely resembles one we found north of the Shishiged River, north of Tsaaganuur in 2004 and is a characteristic ceremonial feature known to date to the Turkic period, ca 700-800 AD.

Evdei 2: Buddhist Enclosure Site

(see Evdei survey report and detailed site reports for GPS locations, maps)

Evdei 3 Deer Stone Site

(see Evdei survey reports for GPS data)

Deer Stone 2 (GPS station 45: N 49° 55.0561'; E 100° 03.164'; 1720m elev.

Two fallen deer stones found in the northern area of the Evdei 2 site area. We excavated around DS 1, collecting a charcoal sample from a circular feature here; and at DS 2, to the west, we mapped circular features and excavated the deer stone and Feature 1, in the center of which we found a dark chert end scrapper made on a thick prismatic blade.

Hillside site south of Tsaaganuur

GPS station 30: N 51° 12.787'; E 099° 23.084'; 1638m elev.

Several khirigsuur are found on the south side of a big hill the road crosses just before reaching Tsaaganuur. Bayaraa's group surveyed the west end of the hill near the head of a small valley, finding chert flakes on the surface, and I found flakes of the same material in a grassy depression, on the hillside below a rock cairn and above the khirigsuurs, at GPS N 51° 12.786'; E 99° 22.922 at 1678m elev. However, nothing diagnostic was found, and the location may just be the source of a good chert outcrop.

Khogorgo River 1

GPS station 32: N 51° 25.125'; E 99° 18.783'; 1591m elev.

The site is found along the crest of an eroding terrace overlooking a former embayment of the K. river, where some of the chert flakes were found in 2004 near the north end of the terrace. We found a few more this year, but could not locate a concentration.

Khogorgo River 2 Standing Stone

This site was recorded in 2005, where the road track nears the south bend of the K. river and passes alongside a single standing slab, which is uncut, unshaped and without markings. It is probably a Turkic slab feature, similar to the one we recorded 2-3 km to the west in 2004.

Khogorgo River 3 Stone Feature site

GPS station 33: N 51° 25.264'; E 99° 18.036'; 1585m elev.

A series of 8-10 pavement features measuring ca. 1x 1m or 1x2m diameter along the north side of the river in a low terrace next to the stream.

Shishiged River 1 Rock Art Site

Rock art carved into lava blocks at outcrops on the level terrace north of the terrace edge overlooking the Shishig River.

Panel 1 art with 3-4 animals at GPS station 35: N 51° 24.841'; E 99° 17.015'; 1603m elev.

Panel 2 with a complicated geometric grid with a human figure in the middle at GPS station 36: E 51° 24.836'; E 99° 17.078'; 1604m elev.

Shishiged River 2 Rock Art Site

Located east of the mouth of the Khogorgo River

Shishiged River Terrace Mound

A large boulder pile ca 4m in diameter and 1.5m high on the upper terrace encountered while walking SW from KR-3 to the Shishig River bank near the rock art locations.

Shishiged River North Kherigsuur

Two circle-fence kherigsuurs below the rock art sites at GPS station 34: N 51° 24.908'; E 99° 17.168'; 1603m elev.

Erkhel Lake North Deer Stone Site

GPS station: N 49° 58.373'; E 99° 56.521; 1600m elev.

We found this deer stone site on a flat terrace on the north shore of Erkhel Lake, just south of the car track. One deer stone was standing and had faint but unmistakable deer stone markings; the other stone was to the north of the standing stone and had fallen. We excavated the stone and a circular boulder feature (empty) near Standing Stone 1. Both stones were laser - scanned. No bone or

datable materials or artifacts were found.

East Erkhel Looted Mound

GPS station 46: N 49° 55.806'; E 100° 01.938'; 1610m elev.

Returning from inspection of the East Erkhel deer stone site up in the hills east of the ger camp, we found a small mound pavement that had been looted on a small knoll overlooking the Hatgal road. From the looter's pit we recovered a number of human bones and a few pieces of Bronze Age period ceramics.

East Erkhel Deer Stone Site

GPS station 45: N 49° 55.0561'; E 100° 03.164'; 1720m elev.

A local herder told us about this deer stone site that is situated in the middle of a herder's winter camp in the hills east of the Erkhel Lake tourist ger camp. Two deer stones standing in the middle of the camp debris. The scanners and Betsy Eldredge recorded this site, which otherwise has not been mapped or studied.



Darkhat Valley illustrative map in Hatgal.



Enroute to tundra camp with Sanjin



Ulaan Tolgoi Mound 1 with Satellite Mound A in foreground



Appendix B

Materials Collected in 2005

1. Soya North -1:
 - 1 bag
 - 3 pieces of ceramic, 1 piece of bone
2. Hillside South of Tsagaanuur:
 - 2 bags
 - Chert finds – possibly not cultural
3. Khogorgo River – North of Tsagaanuur:
 - Surface collection
 - A piece of chert
4. Evdei – 2 Deer Stone Site:
 - 2 bags
 - Deer Stone 1 – Circular feature, two pieces of charcoal (AMS charcoal sample)
 - Deer Stone 2 – South Circular feature, chert end scraper
5. Evdei -1 Turkic Stone 1:
 - West Side, Square 3, shoulder bone
 - Square 1 possible charcoal sample from 205-215 beneath slab rock. Probably not cultural.
 - Bone fragments (10)
 - #8 Bone fragment, Square 4
 - Square 1, shoulder bone
 - Square 1, rectangular bone
 - Square 1, 2 small bone fragments.
6. Evdei-3 “Monastery” Site:
 - (Collection from looter’s pit)
 - 1 bag from pit 1 with ceramic figures and other material.
 - Looter’s pit 2 (William Fitzhugh, Melanie Irvine) surface collection and excavated material.
 - Looter’s pit 2 large bag of faunal remains, excavated from 1×2 meter pit.
7. Erkhel Square Burial- Bayaraa excavation:
 - 3 bags
 - 6cm - sheep vertebra
 - 7cm - 3 teeth
 - 20cm – 1 bone fragment

8. Erkhel Lake East:

- 1 human burial, looted mound on low ridge
- red surface pottery fragment
- rim sherd

9. Erkhel Lake Deer Stone 5

- Charcoal fragments (4) from -39cm, above horse skull
- Horse skull fragments

10. Erkhel Lake/Tolgoi

Big Mound NE Corner Mound in fence

- Level 1: charcoal from loose fill (possibly intrusive)
- Level 1: general bone collection (2 bags)
- Level 2: bone fragments (6)
- Level 3: Mandible and teeth fragments (AMS Sample)

11. Erkhel/ Ulaan Tolgoi. Big Mound (Mound 1)

Outer Row Horse head burial

- Horse head bones (one tooth for AMS date after Erika's analysis)

12. Erkhel/ Ulaan Tolgoi. Big Mound (Mound 1)

East Gate North Mound

- Turf zone: 2 piece of charcoal, 2 bone fragments (L.?)
- Level 1: Upper brown soil (bone, charcoal fragments)
- Level 2: (Cow leg joint?)
- Level 3: Horse Head Fragments
- Level 3: Mandible fragment with charcoal inclusion. (AMS date)
- Level 3: Mandible large fragment. (AMS date)



Deer Stone 2 at Ulaan Tolgoi



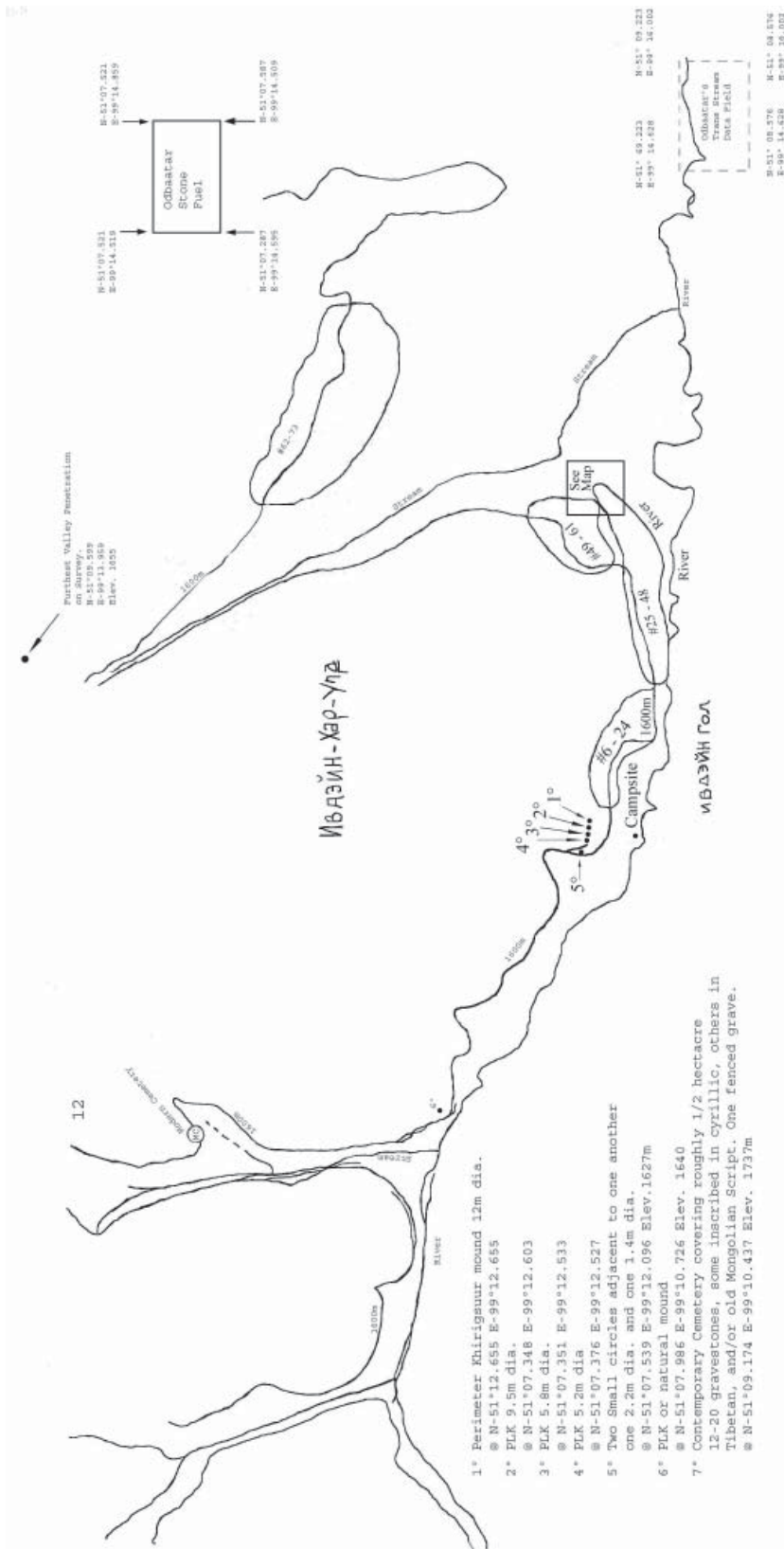
Appendix C

Evdei Valley Survey and Shishegid Data



2005 Evdei Survey Team

Evdei Survey



Evdei Survey GPS locations

(Survey by Ts. Odbaatar, Elizabeth Eldredge, and Denis Ryjeski)

- | | |
|---|---|
| 1. Mound | E-99° 12.757 |
| N-51° 07.346 | Elev 1633m |
| E-99° 12.655 | Diameter 6.30m |
| Elev. 1614m | |
| Diameter 12m | |
| 2. Mound | 8. Mound/ Looted |
| N-51° 07.348 | N- 51° 07.285 |
| E-99° 12.603 | E- 99° 12.757 |
| Elev. 1610m | Elev. 1644m |
| Diameter 9.50m | Diameter 4m |
| 3. Mound | 9. Mound/ "45% geology" |
| N-51° 07.351 | N-51° 07.361 |
| E-99° 12.533 | E-99° 12.757 |
| Elev 1610m | Elev 1633m |
| Diameter 5.8m | Diameter 4m |
| X. Mound | 10. Mound inside circle |
| N-51° 07.376 | N-51° 07.269 |
| E-99° 12.533 | E-99° 13.022 |
| Elev. 1610m | Elev. 1594m |
| Diameter 5.2m | Diameter, mound 12m |
| | Diameter, circle 19m |
| 4. Small Circles/ Consist of small piles and small circles. | 11. Mound inside 80% ring with 8 little mounds in the ring. |
| N-51° 07.539 | N-51° 07.270 |
| E-99° 12.096 | E-99° 13.117 |
| Elev. 1627m | Diameter, mound 12.70 |
| Diameter 2.2m | Diameter, ring 16.5 |
| Diameter 1.4m | Elev. 1599m |
| X. Low circular Mound | 12. Mound in Ring with 5(?) doors |
| N-51° 07.986 | N-51° 07.278 |
| E-99° 10.726 | E-99° 13.172 |
| Elev. 1640 | Diameter, mound 12.70m |
| Diameter ? | Diameter, ring 16.5m |
| 5. Cemetery/ Mongolian Fenced Grave | Elev. 1599m |
| N-51° 09.174 | 13. Mound only |
| E-99° 10.434 | N-51° 07.207 |
| Elev 1737m | E-99° 13.759 |
| 6. Mound | Elev 1587m |
| N-51° 07.300 | Diameter 8m (?) |
| E-99° 12.747 | |
| Elev 1605m | |
| Diameter 7.20m | |
| 7. Mound | 14. Mound in Ring |
| N-51° 07.357 | N-51° 07.214 |
| | E-99° 13.776 |

- | | |
|-------------------------------|-------------------------|
| Elevation ? | Elevation 1630m |
| Diameters ? | Diameter 9.70m |
| 15. Mound in circle | 24. Mound only |
| N-51° 07.247 | N-51° 07.258 |
| E-99° 13.793 | E-99° 14.021 |
| Elev. 1595m | Elevation 1598m |
| Diameter (skipped?) +/- 7.50m | Diameter 5.50m |
| Diameter 10m | |
| 16. Mound only | 25. Mound with circle |
| N-51° 07.246 | N-51° 07.235 |
| E-99° 13.807 | E-99° 14.065 |
| Elev 1599m | Elevation 1597m |
| Diameter 7.20m | Diameter 12m |
| | Diameter 16m |
| 17. Mound in a Circle | 26. Mound with circle |
| N-51° 07.234 | N-51° 07.234 |
| E-99° 13.826 | E-99° 14.106 |
| Elevation 1597m | Elevation 1586m |
| Diameter, mound 7.20 | Diameter 10.70m |
| Diameter, circle 18.5 | Diameter 16.20m |
| 18. Mound only | 27. Mound only |
| N-51° 07.234 | N-51° 07.241 |
| E-99° 13.924 | E-99° 14.132 |
| Elevation 1593m | Elevation 1585 |
| Diameter 11m | Diameter 8m |
| 19. Mound only | 28. Mound in circle |
| N-51° 07.284 | N-51° 07.204 |
| E-99° 13.930 | E-99° 14.016 |
| Elev. 1604m | Elevation 1585 |
| Diameter 8m | Diameter 11.20m |
| | Diameter 23.50m |
| 20. Mound only | 29. Mound in circle |
| N-51° 07.290 | N-51° 07.221 |
| E-99° 13.931 | E-99° 13.986 |
| Elevation 1608m | Elevation 1589m |
| Diameter 10.30m | Diameter, mound 11.20m |
| | Diameter, circle 17.30m |
| 21. Mound | 30. Mound in Square |
| N-51° 07.349 | N-51° 07.138 |
| E-99° 13.953 | E-99° 13.964 |
| Elevation 1630m | Elevation 1591m |
| Diameter 11.5m | Diameter 7m (50?) |
| | Diameter 12.60 × 11.40m |
| 22. Mound only | 31. Mound only |
| N-51° 07.326 | N-51° 07.138 |
| E-99° 13.982 | E-99° 13.629 |
| Elevation 1638m | |
| Diameter 8.5m | |
| 23. Mound only | |
| N-51° 07.277 | |
| E-99° 13.955 | |

- | | |
|--|--|
| <p>Diameter 7.7m
Elevation 1582m</p> | <p>E-99° 14.252
Elevation 1584m
Diameter 5m</p> |
| <p>32. Standing Stone
H 65m
W 44cm
Depth 15cm
N-51° 07.119
E-99° 13.637
Elevation 1582</p> | <p>39. Mound
N-51° 07.305
E-99° 14.275
Elevation 1579m
Diameter 5m</p> |
| <p>33. Standing Stone in Square (modern monastery?)
N-51° 07.097
E-99° 13.631
Elevation 1582m
H 1.50m (?)
W 67 (cm ?)
Th (Depth ?) 22 (cm?)
Square:
 L 10.40m
 W 10.80m</p> | <p>40. Mound only
N-51° 07.242
E-99° 14.271
Elevation 1574m
Diameter 5m</p> |
| <p>34. Mound in square – Excavated or Looted. 10' deep to where dug.
N-51° 07.235
E-99° 14.230
Elevation 1565m
Square Orientation:
 27.80 EW × 28.80 NS
 11.9m
Distance from NW corner to N. Standing stone:
14m
Distance from center to N. Standing stone:
13.30m</p> | <p>41. Mound in circle with linear feature of 5 small mounds
Also 3 rings (outside?) circle
N-51° 07.272
E-99° 14.351
Elevation 1573m
Diameter 12.80m
Circle Diameter 22m
 Linear Feature
 14.5m long
 8.5m from circle</p> |
| <p>35. Mound only – Looted or excavated and backfilled
N- 51° 07.286
E- 99° 14.239
Elevation 1583m
Diameter 6m</p> | <p>42. Probably former Standing Stone Site – Looted
N-51° 07.263
E-99° 14.566
Elevation 1570m
(?)5m</p> |
| <p>36. Mound only
N-51° 07.298
E-99° 14.239m
Elevation 1582m
Diameter 6m</p> | <p>43. Square of standing Stone – Excavated or Looted
N-51° 07.296
E-99° 14.551
Elevation 1572m
NS 2m × EW 2.2m
Stone Height 40cm (flat?)</p> |
| <p>37. Mound only
N-51° 07.314
E-99° 14.247
Elevation 1584m
Diameter 6m</p> | <p>44. Mound
N-51° 07.364
E-99° 14.681
Elevation 1570m
Diameter 6m</p> |
| <p>38. Mound only
N-51° 07.314</p> | <p>45. Mound in Circle Feature – Looted
N-51° 07.345
E-99° 14.736
Elevation 1572m
Diameter mound 20m
Diameter circle 42m</p> |
| | <p>46. Mound in circle Feature
N-51° 07.371
E-99° 14.791</p> |

- Elevation 1571m
Diameter mound 17m
Diameter circle 45m
47. Features(?) 6 mounds and rings (?)
N-51° 07.387
E-99° 14.754
Elevation 1571m
Distance to circle 37m (?)
48. Small mound
N-51° 07.403
E-99° 14.733 (?)
Elevation 1572m
Distance (unreadable)
Diameter 5m
49. (Unreadable word) Deerstone
N-51° 07.402
E-99° 14.827
Elevation 1569m
Dimensions: 1.9m L, 45(cm?)W, 20(cm?) (deep?)
50. Standing Stone
N-51° 07.395
E-99° 14.819
Elevation 1571m
Dimensions: 1.2m L, (11.0cm?) W, 19cm (thick/
deep?)
51. Mound in circle looted feature
N-51° 07.621
E-99° 14.766
Elevation 1576m
Diameter mound 11m
Diameter circle 22.5m
52. Mound in circle/hillside feature
N-51° 07.657
E-99° 14.740
Elevation 1576m
Diameter mound 8.5m
Diameter circle 17.5m
53. Mound in circle
N-51° 07.583
E-99° 14.467
Elevation 1599m
Diameter mound 9.7m
Diameter circle 15.5m
54. Mound in circle
Somewhat covered by outwash
N-51° 07.543
E-99° 14.336
Elevation 1612m
Diameter mound 11.5m
- Diameter circle 19.5m
55. Mound Hillside Steep
N-51° 07.543
E-99° 14.330
Elevation 1624m
Diameter 6m
56. Mound/ Steep slope – Looted
N-51° 07.437
E-99° 14.284
Elevation 1622m
Diameter 6m
57. Odbaater No # (?)
N-51° 07.462
E-99° 14.656
Elevation 1719
Maybe 20% / 80% (arch/geol.)
58. Natural or Mound low hillside
N-51° 07.304
E-99° 14.286
Elevation 1586m
Diameter 5m
59. Mound looted /excavated attempted?
N-51° 07.291
E-99° 14.222
Elevation 1570m
Diameter 6m
60. STILL LOCATING
FEATURE NO. 60
61. Mound
N-51° 08.038
E-99° 14.382
Elevation 1724m
62. Mound square
N-51° 08.618
E-99° 16.002
Elevation 1675m
Size: 4.20m square. +/-
63. Mound in circle
N-51° 08.571
E-99° 15.758
Diameter mound 13.5m
Diameter circle 22.5m
Elevation 1608m
64. Mound
N-51° 08.765
E-99° 15.397
Elevation 1649m
Diameter 12.6m

65. Mound / High Slope ?

N-51° 08.803
E-99° 15.397
Elevation 1649m
Diameter 6.8m

66. Mound in circle with Square

N-51° 08.848
E-99° 15.243
Elevation 1625m
Diameter mound 13m
Diameter circle 23m
Square size: 4.0 × 3.4m
Distance to ring: 5m

67. Mound

N-51° 08.840
E-99° 15.223
Elevation 1624m
Diameter 4.5m

68. Mound/ possibly with circle

N-51° 08.857
E-99° 15.229
Elevation 1630m
Diameter 2.1m

69. Mound

N-51° 08.886
E-99° 15.213
Elevation 1632m
Diameter 8m

70. Mound with circles

N-51° 08.904
E-99° 15.213
Elevation 1666m
Diameter 7m

71. Mound

N-51° 08.077
E-99° 15.037
Elevation 1670m
Diameter 8m

72. Campsite:

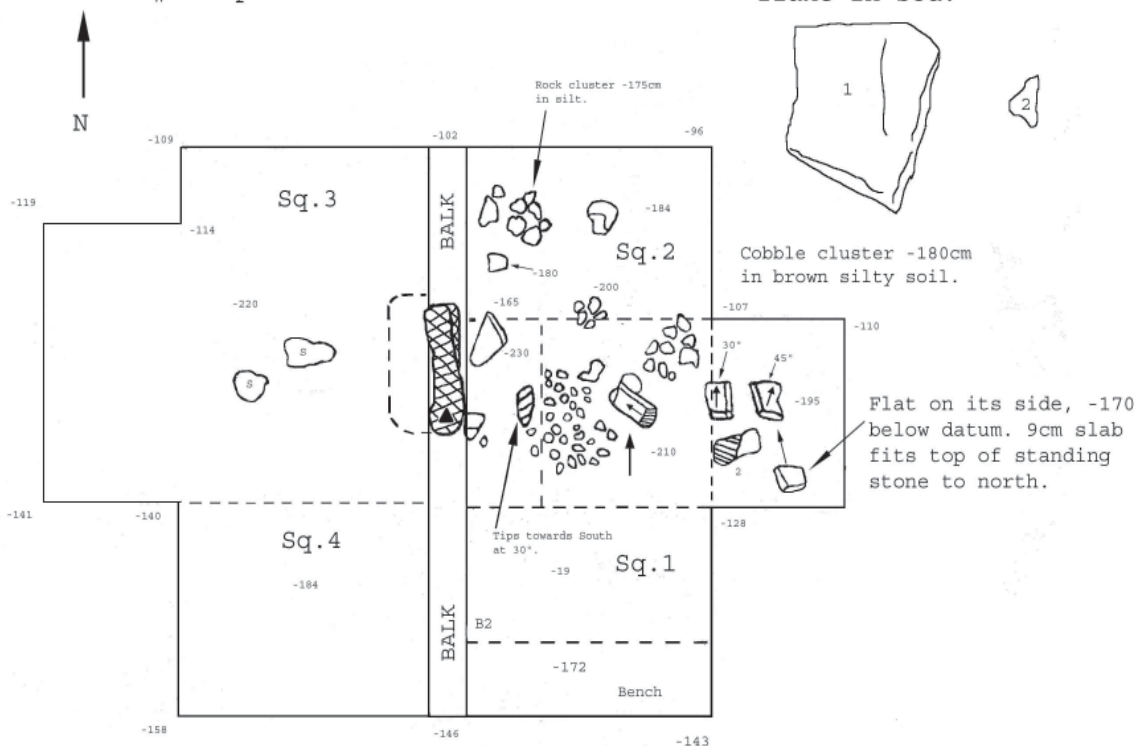
N-51° 07.134
E-99° 12.340
Elevation 1567m

Evdei 1

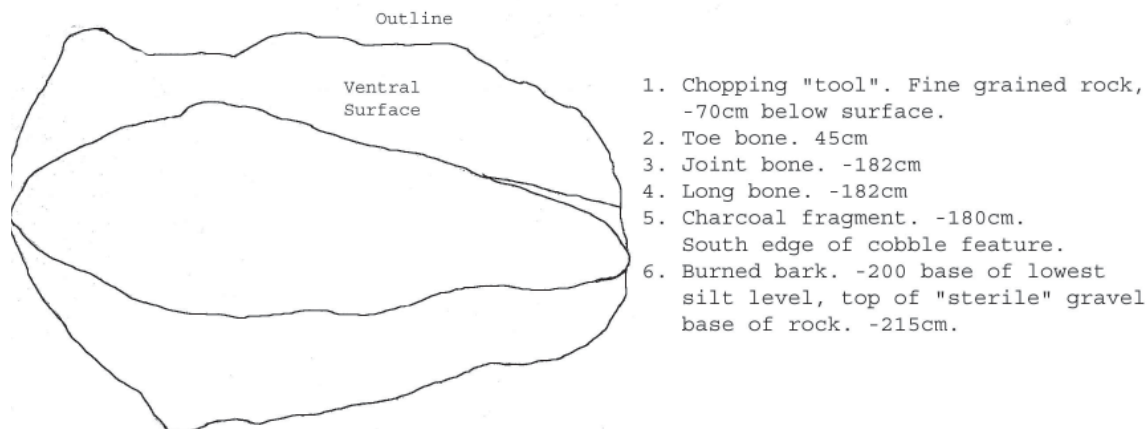
See General Notes for the Evdei-1 excavations in Appendix A. See 28 June diary notes.
Evdei 1 Stone 1:

Evdei - 1 Stone 1
Monument Site
24 June 2005

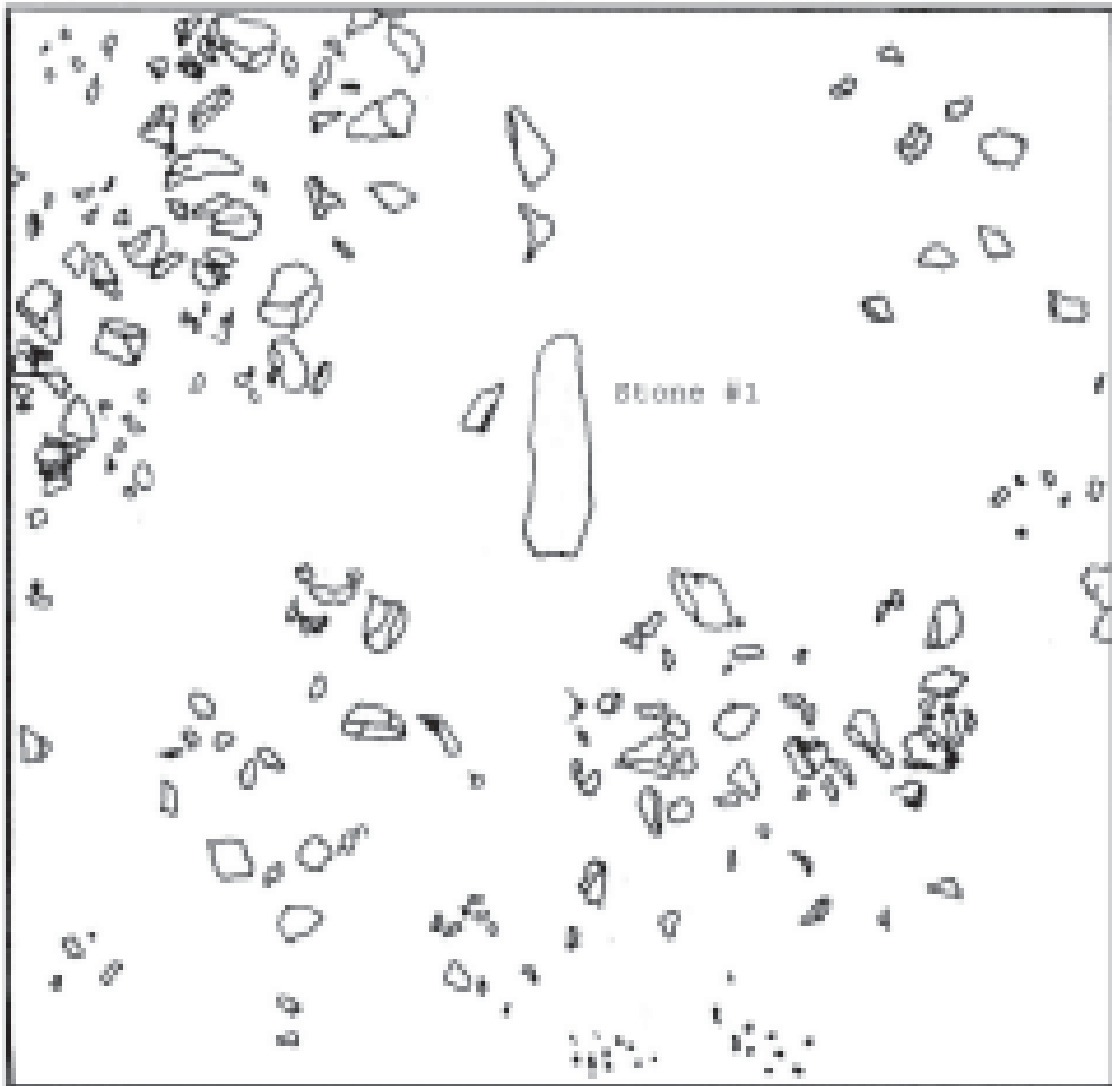
- S: surface rock
- ▲: datum (top of stone #1, center)
- #: depth from datum



Recovered from Evdei 1 Stelae 1:



Evdei 1
Stone 1
2nd Level



Evdei 1 Turkic Stone 1

Evdei 1
Stone 1
Level 3
27 June 2005



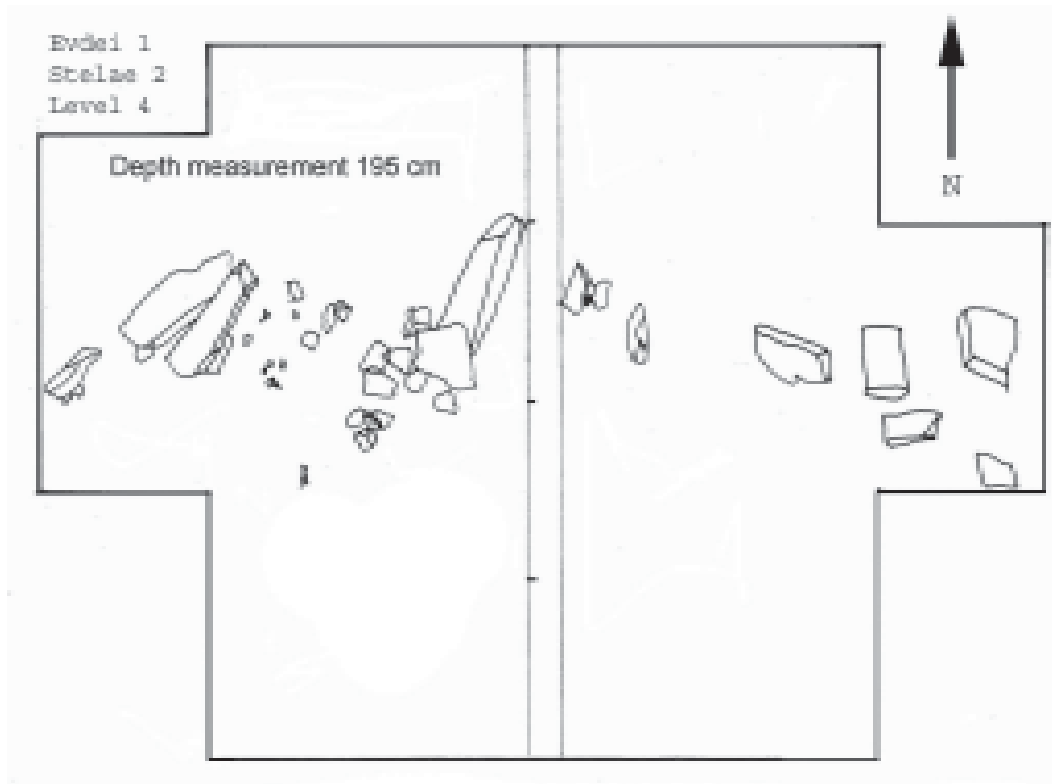
Evdei 1, view northeast



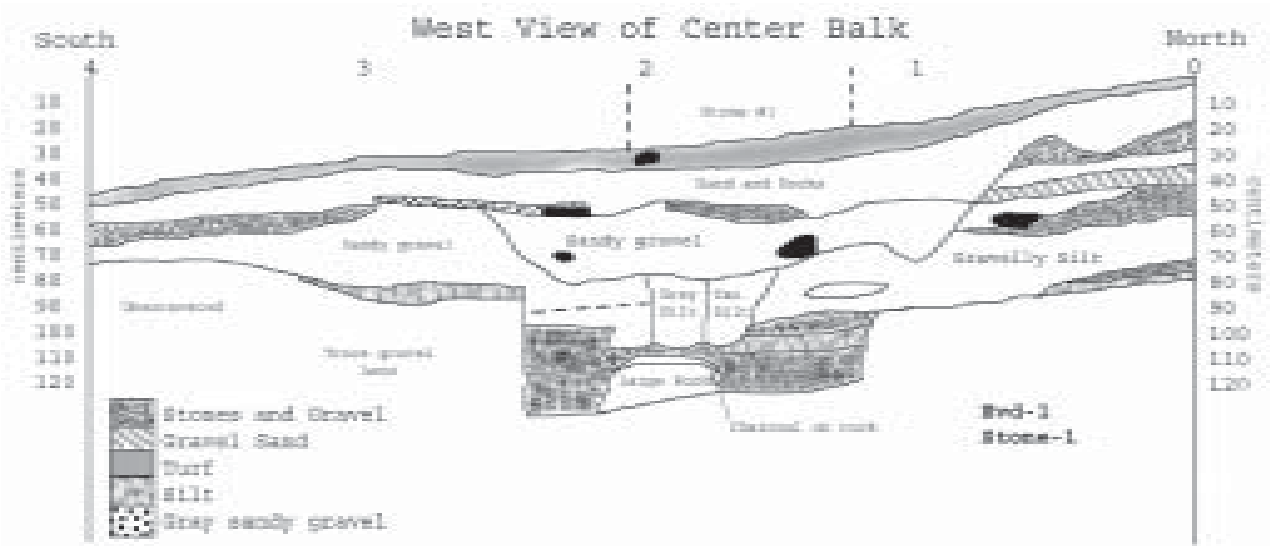
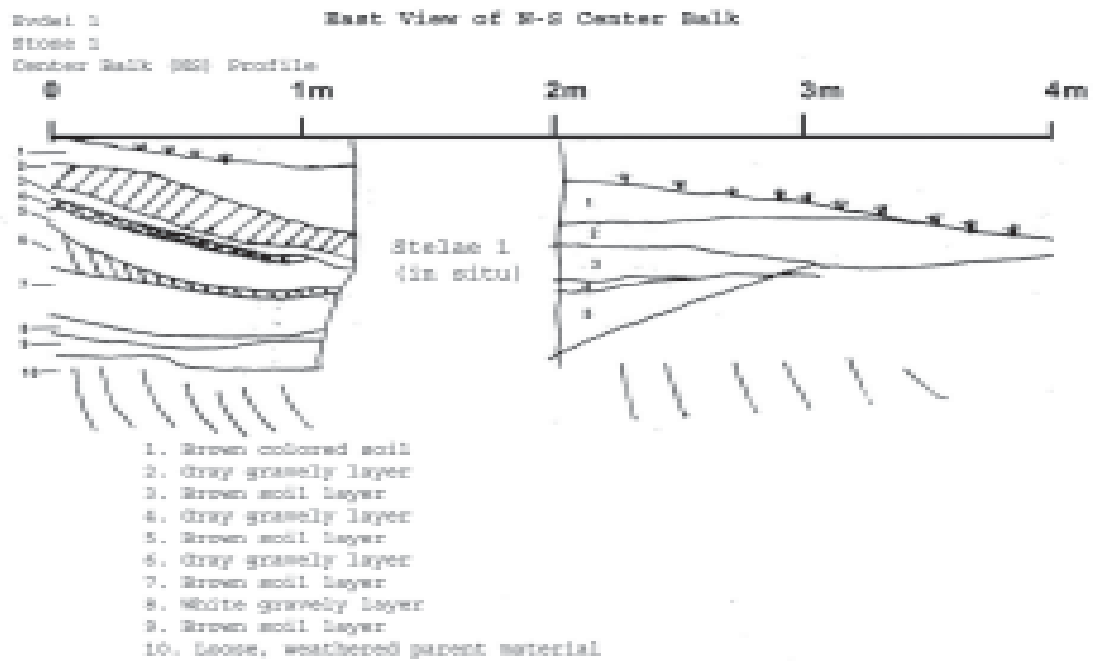
Evdei 1, view south



Evdei 1, view southwest

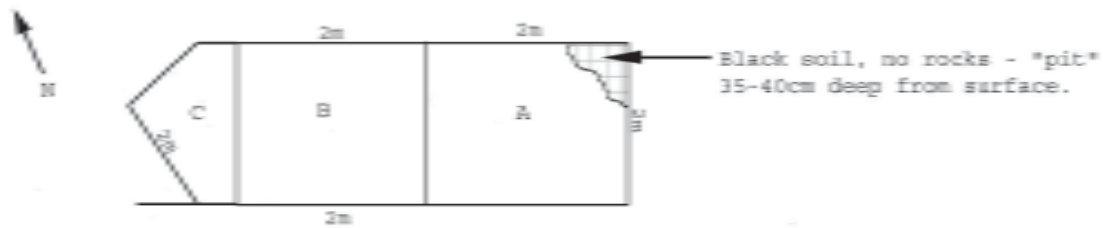


Evdei 1 west sid, view south



Evdei 3:

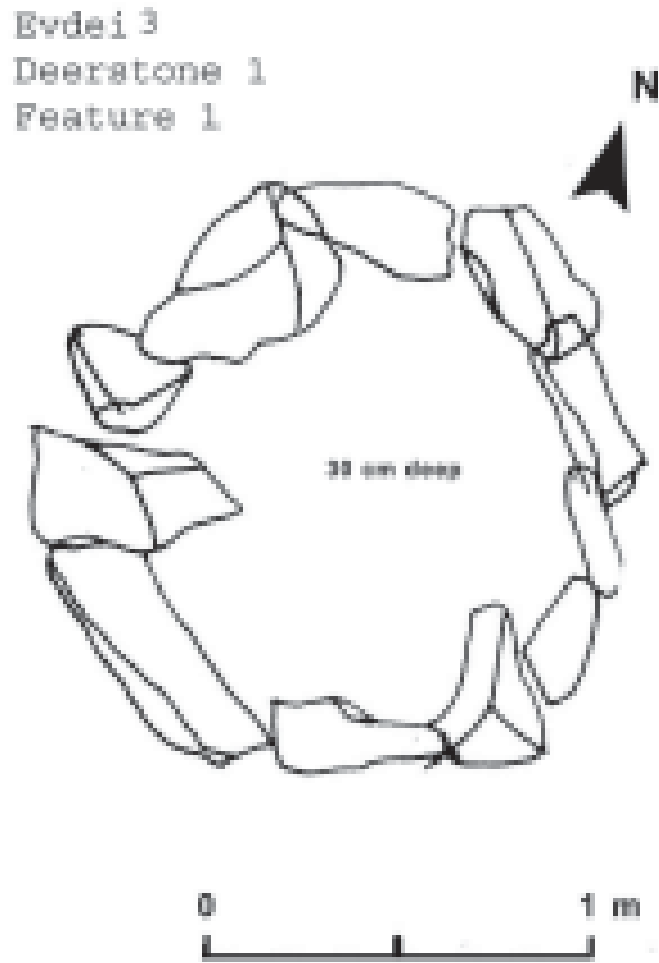
Granite Deerstone Excavation - Evdei 3, Deer Stone 1 Area
(Melanie Irvine notes Sq A)



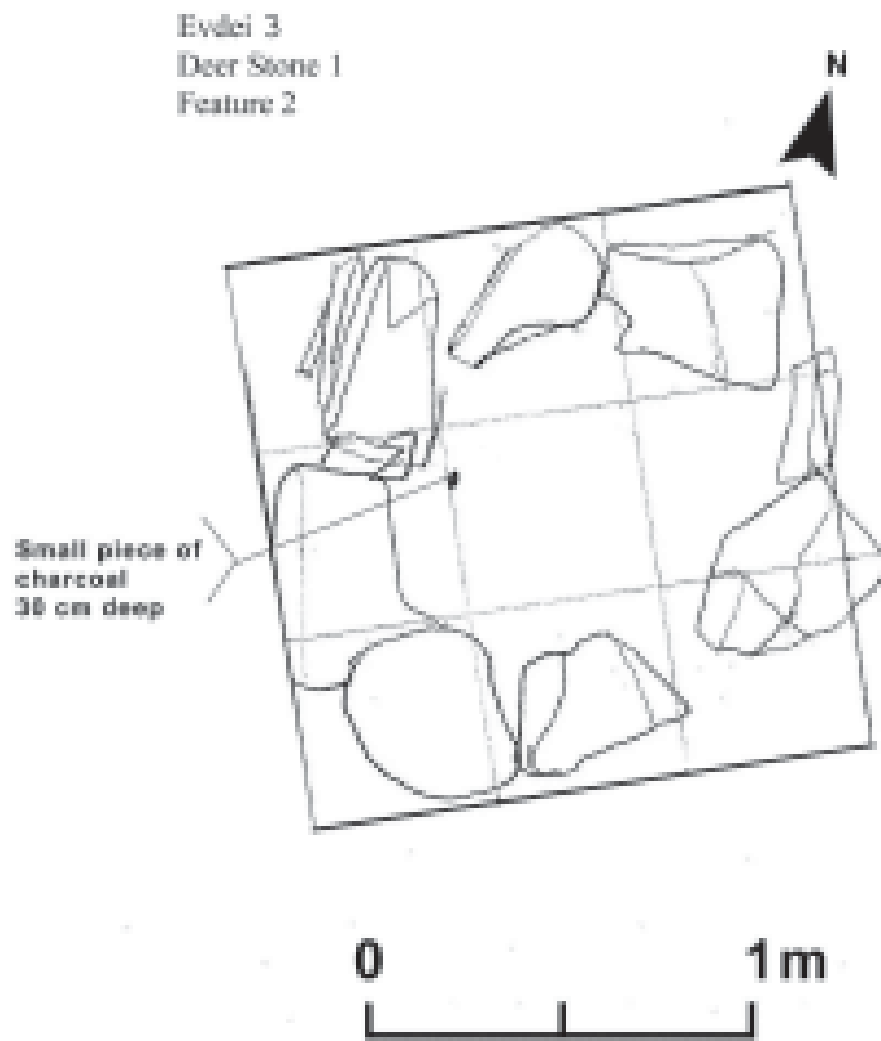
Evdei 3 Deer Stone 1 Pit, view south, showing unmarked slab that was found beneath the deer stone

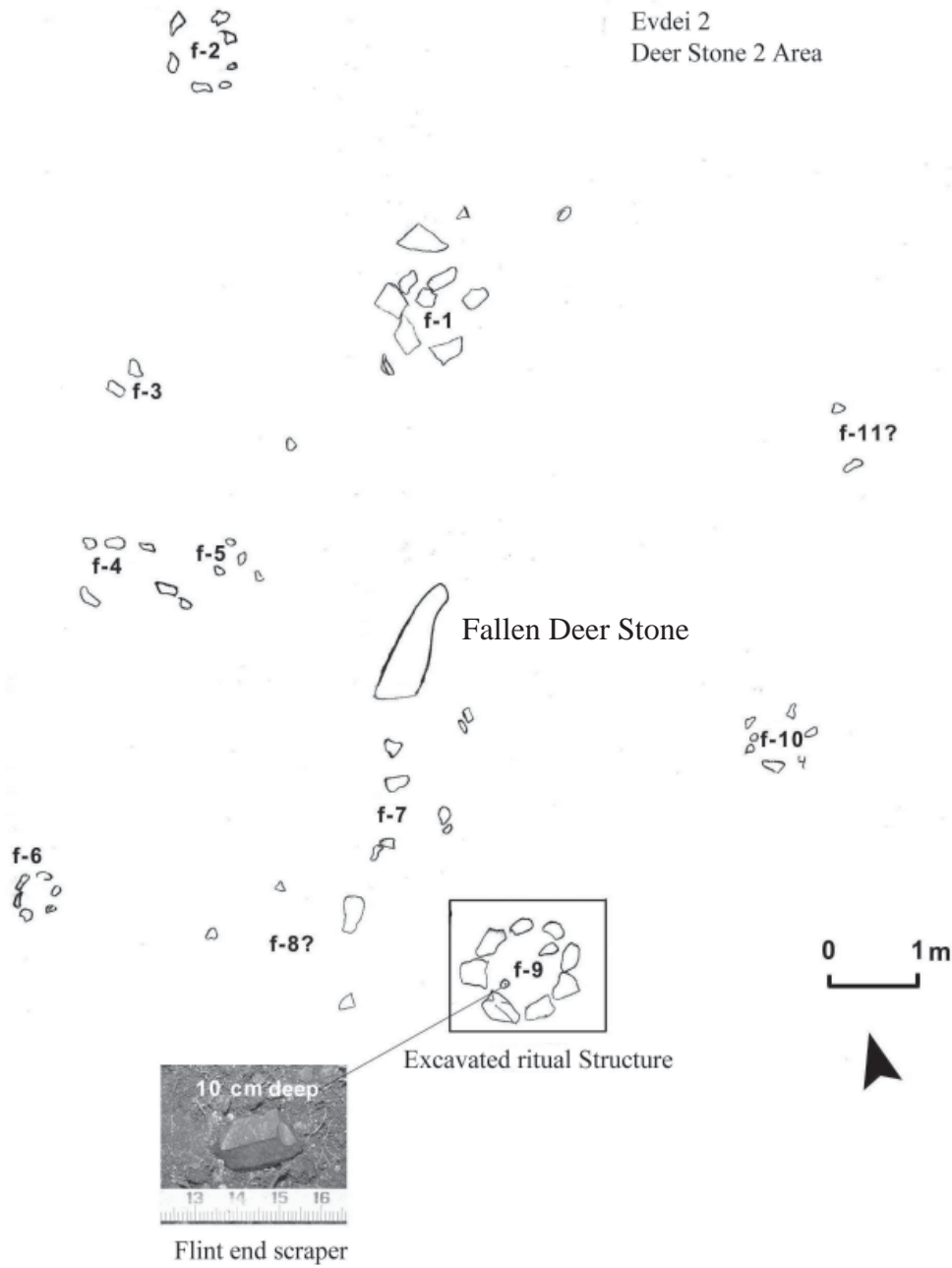
Pit A Notes:

- About 8cm topsoil cover, over pavement of angular rocks.
- Large angular rock layer spans entire pit, roughly 20 cm deep.
- Directly below rocks is a dark brown gravelly soil which extends over pit in a shallow layer at 5cm.
- Soil is patchily colored throughout, most notably a dark black stained soil lies a yellowish gravelly sand, and below this, a tan gravelly clay (lake bottom sediment), which is believed to be undisturbed, insitu soil.
- Extent of pit depth ranges from about 30cm at the shallowest to 60cm at its deepest.
- Black stained soil may be organically saturated soil, or depressions where newer, more organic soil has deposited.
- No charcoal, artifacts or other cultural materials were recovered from any of these levels.



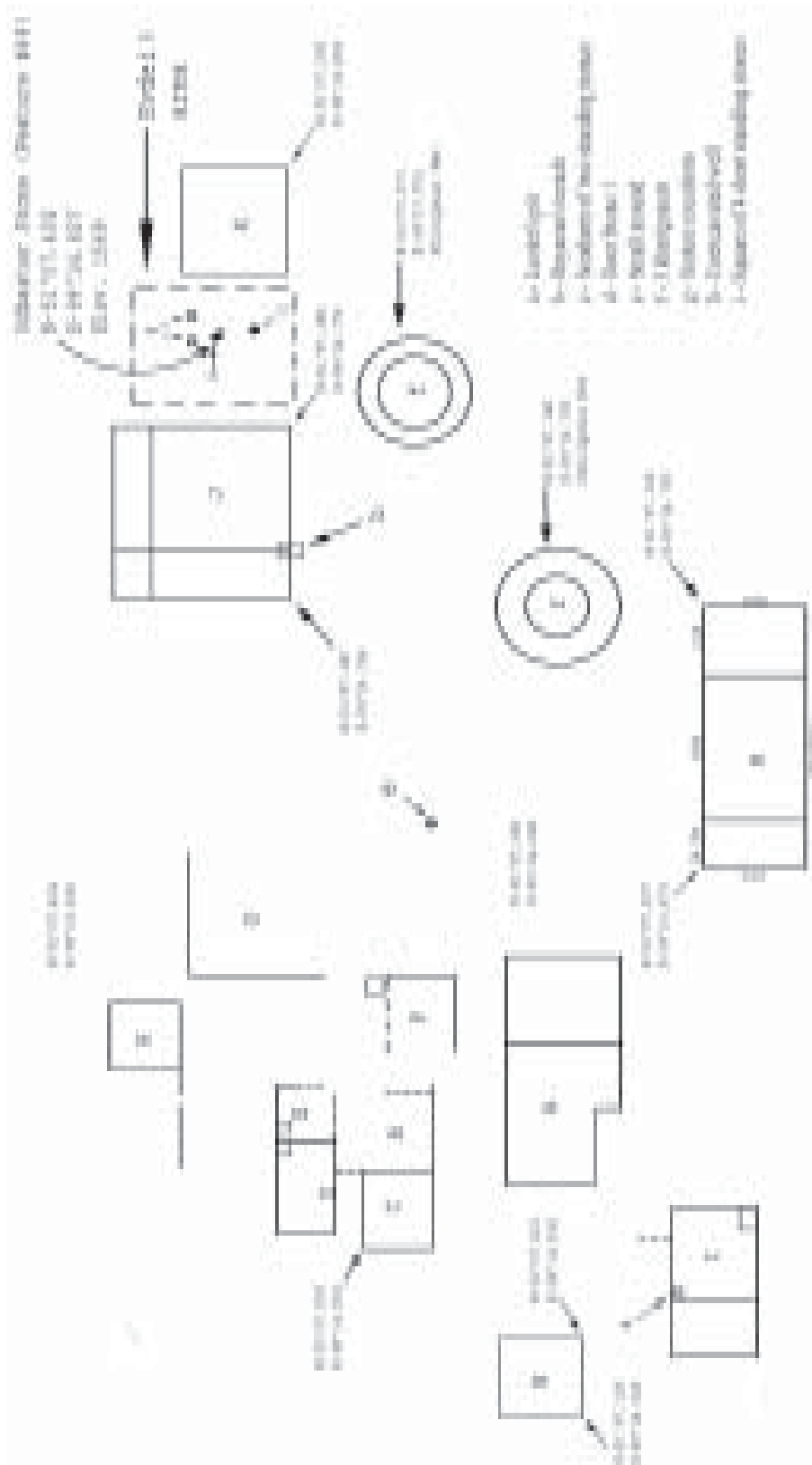
Evdei 3 West Deerstone ring feature



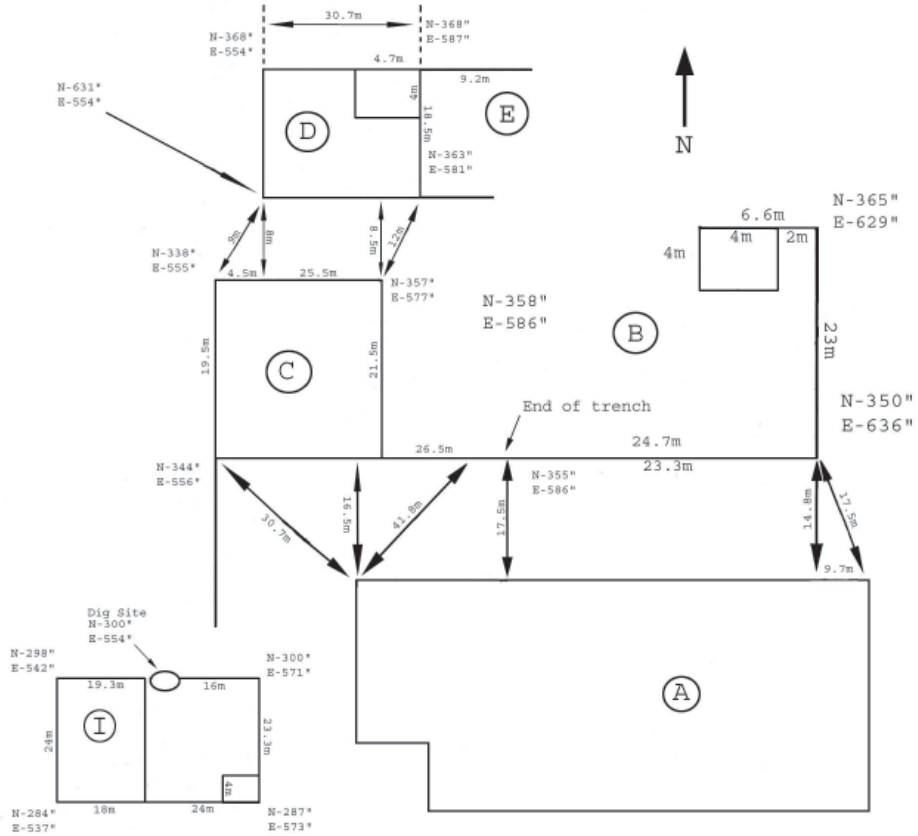


Deer Stone 2, a fallen deer stone at Evdei 3

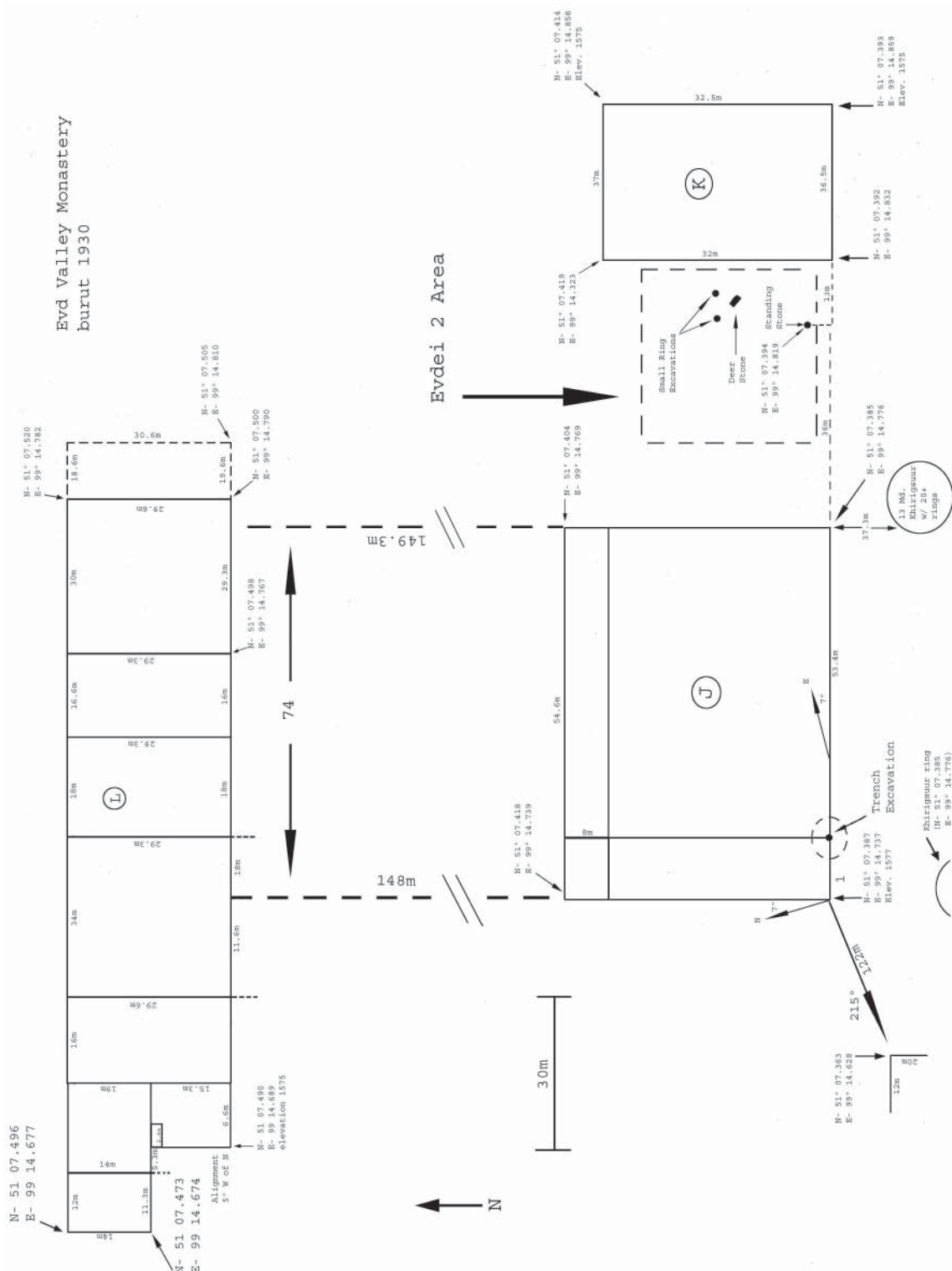
Evdei 2 Monastery Site Layout:



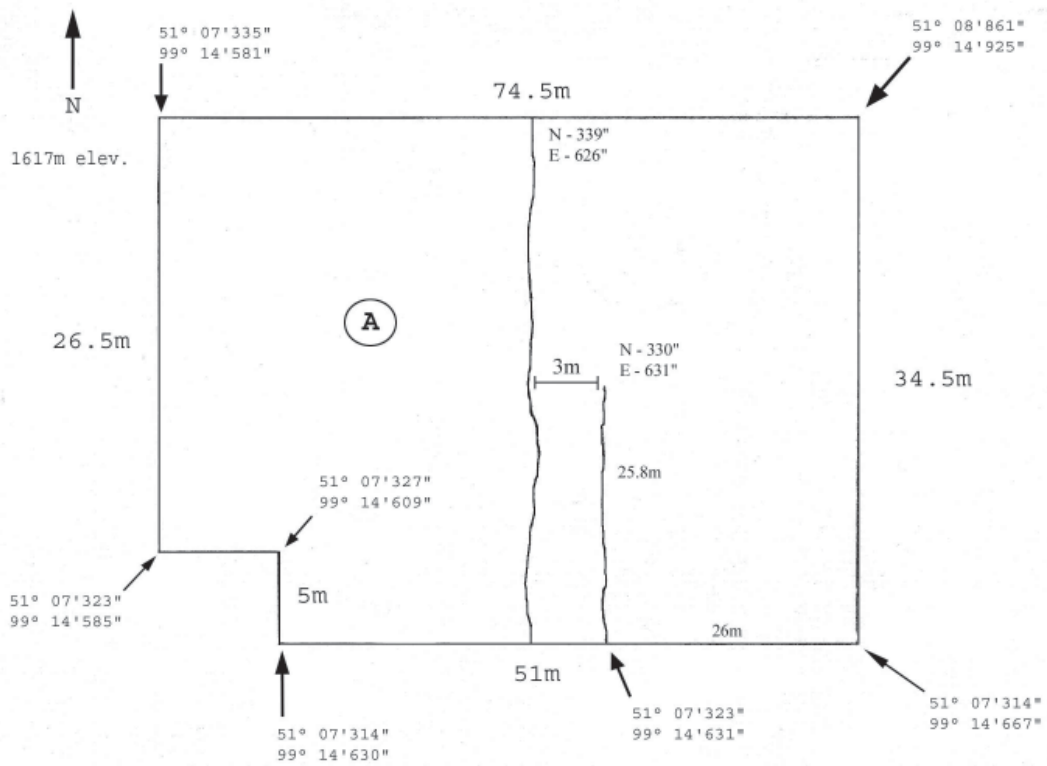
Close Up of Evd Monastery Site Features A, B, C, E, F and I:



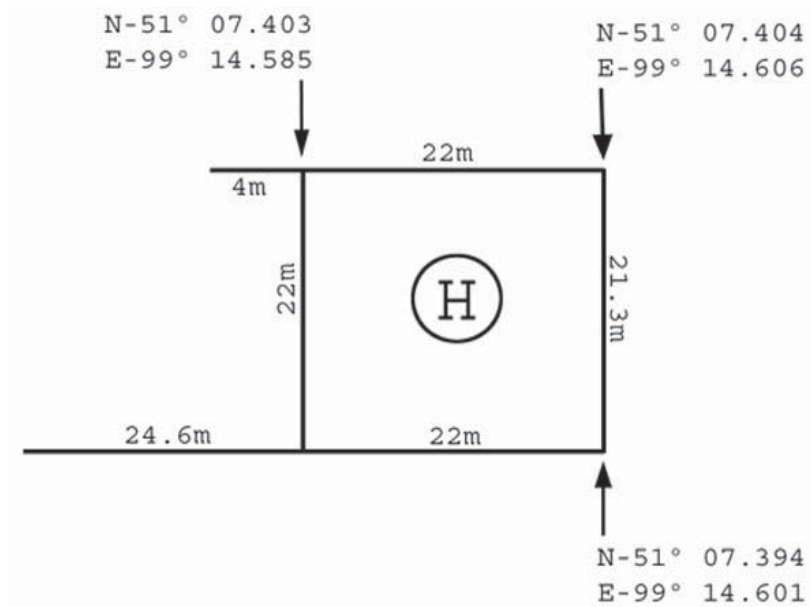
Close up of Evdei 2 Monastery Site Feature J,K and L:
(Mapped by Odbaatar, E. Eldredge, D. Ryjesky)



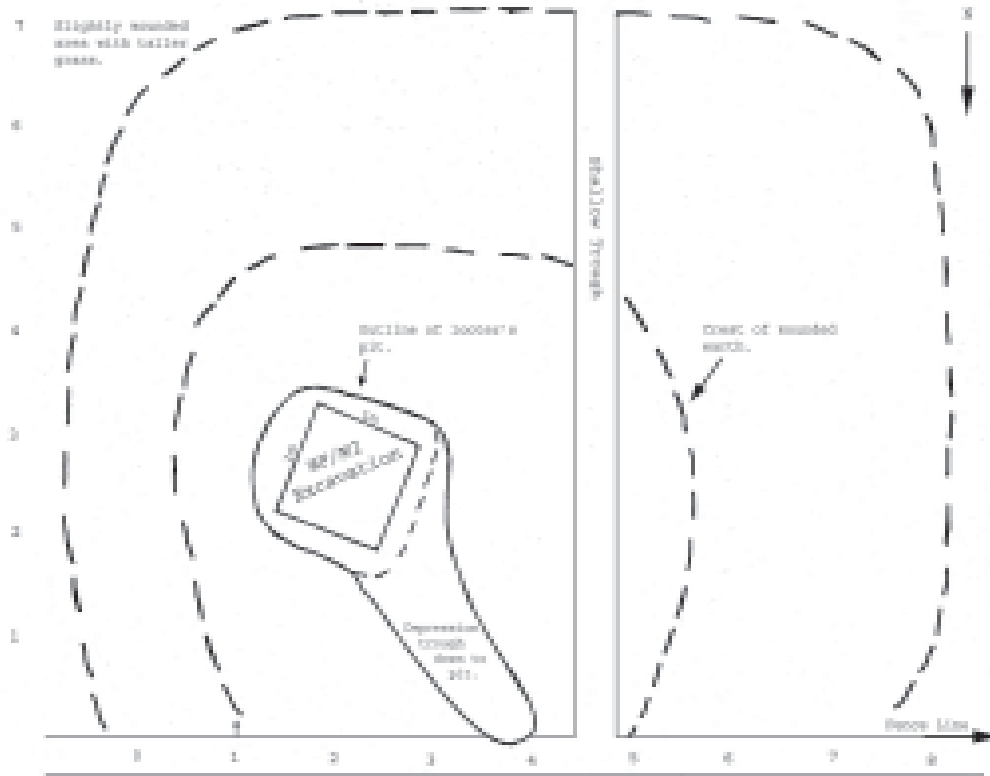
Close up of Evdei 2 Monastery Site Feature 'A':



Close up of Evdei 2 Monastery Site Feature 'H':

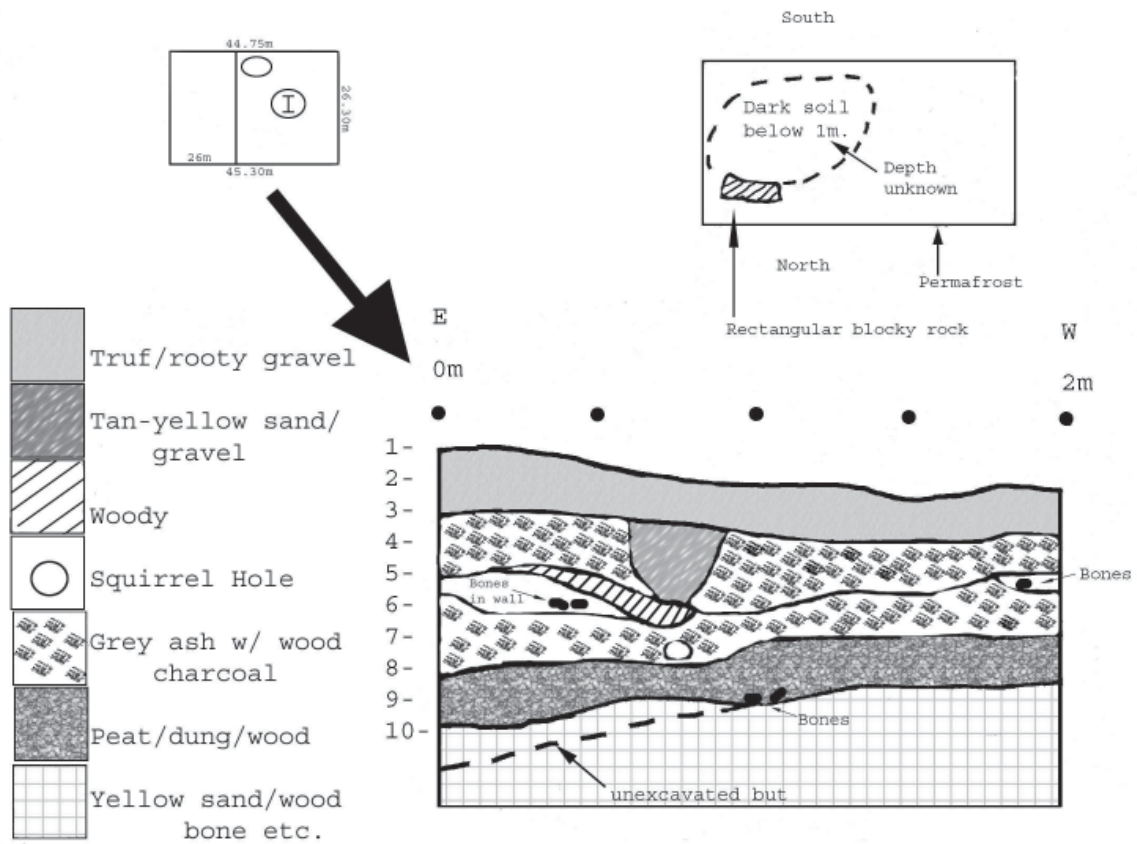


Evdei 2 Monastery Site Enclosure I:



Evdei 2 Looters Pit

Evdei 3 Monastery Site
 Enclosure I:
 Excavated South Wall Side View
 Excavated by Melanie Irvine and William Fitzhugh.



Shishiged River 3

Shishiged River 3 Rock Art

7



8



9





Appendix D

Erkhel / Ulaan Tolgoi Data



Bayaraa, Adiya and Dennis digging Mound 1 Satellite Mound B

Ulaan Tolgoi
Deer Stone 5
Feature 1



*Ulaan Tolgoi Deer Stone 5
shown with Grid*



Ulaan Tolgoi Deer Stone 5 Feature 1 view north



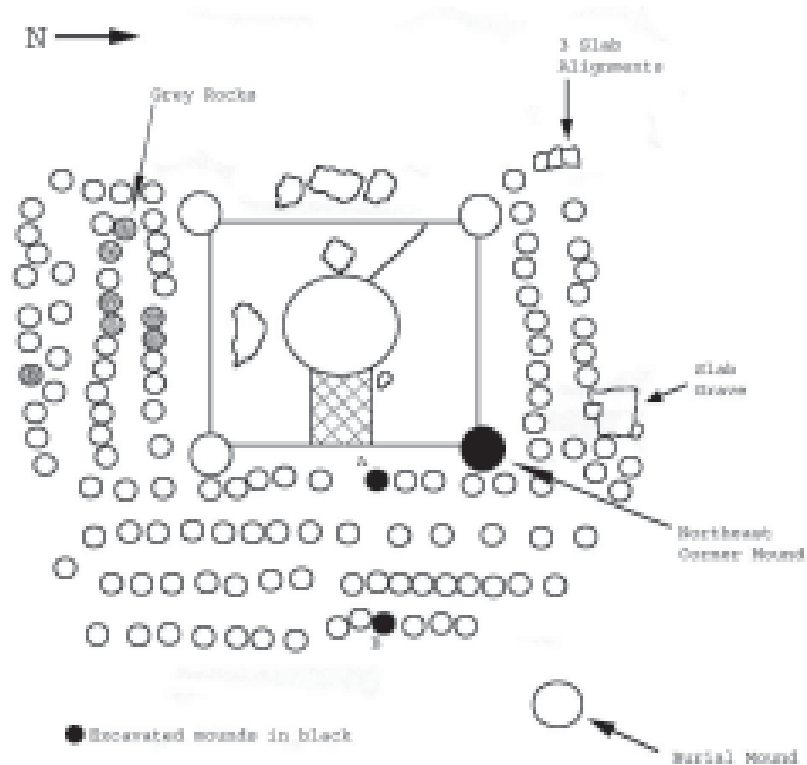
*Ulaan Tolgoi Deer Stone 5 Feature 1
level 1, view north.*



*Ulaan Tolgoi Deer Stone 5 Feature 1
view south*

Ulaan Tolgoi
Mound 1
Northeast Corner Mound
July 9, 2005

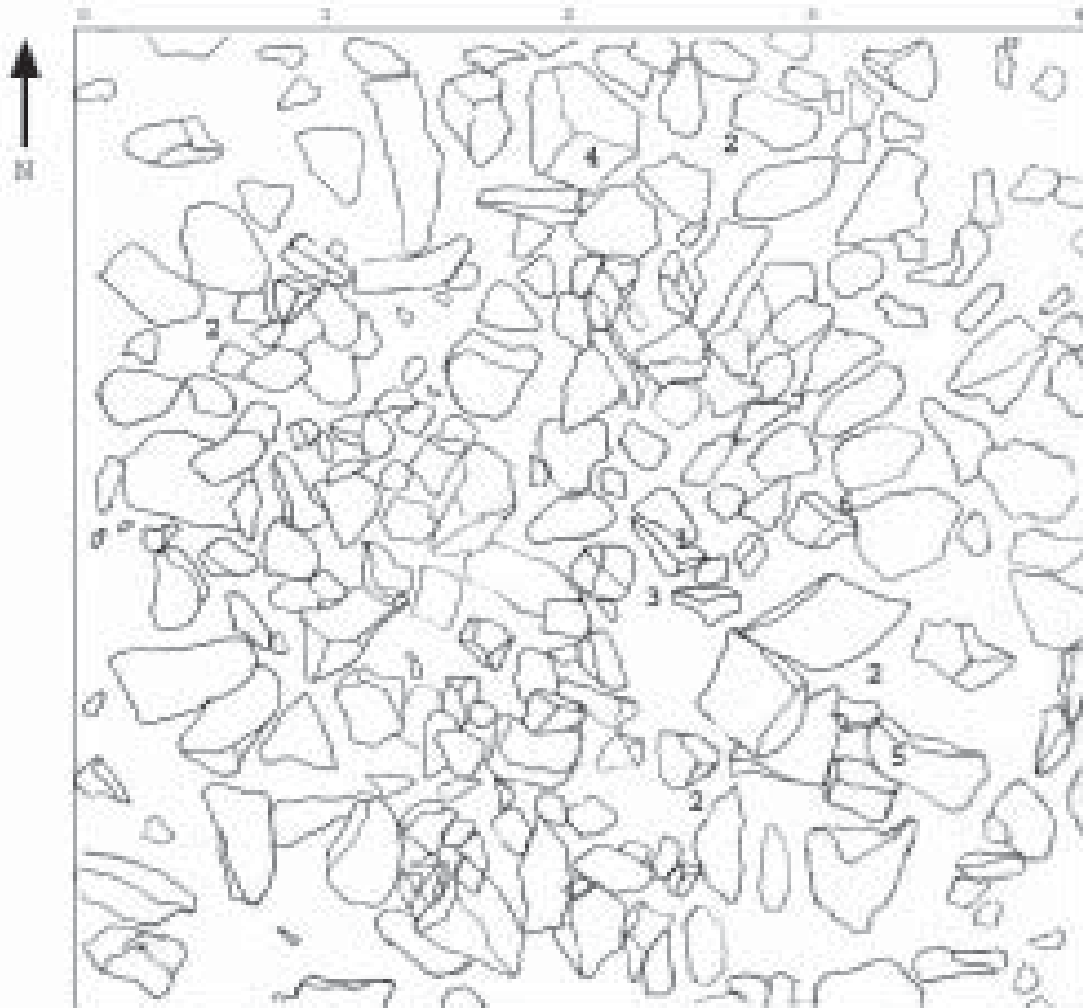
Sketch Map of Ulaan Tolgoi: Big Mound (Mound 1)
 Northeast Corner Mound; Satellite Mound A; Satellite Mound B Diagram:



After excavating one of the horse head burials at Erkhel Ulaan Tolgoi Deer Stone (DS) No. 5, hopefully securing a more accurate date for that monument, we decided to test a square burial 50 meters north of the big mound because it seemed intact and Bayaara thought it might provide some artifacts and a date comparable to the DS complex. We did recover a bit of human remains from it and could date it, but found no artifacts or other human remains. Bayaara thinks the grave was probably looted, but there just may be not much remaining from such a shallow burial, only a few (20cm) below the surface. So we turned our attention to trying to establish a connection between the DS complex and the khirigsuurs – or at least some of them.

Excavating the NE corner mound should provide a date for the construction of the big khirigsuur almost as accurate as dating the inside of the big mound itself.

Level 1 Map and Artifact Locations
Erkhel/ Ulaan Tolgoi Big Mound
NE Corner Mound
8 July 2005



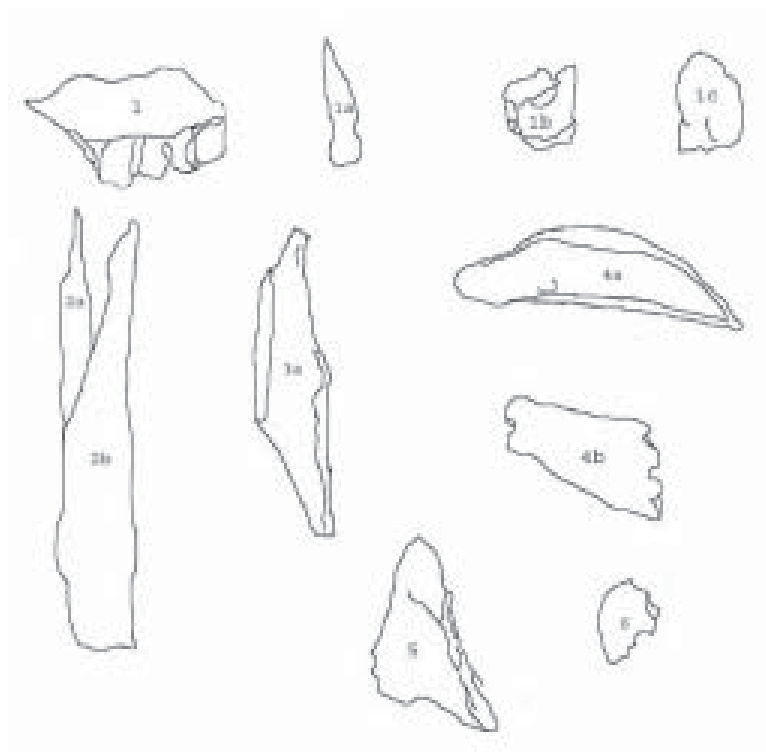
2nd layer of rocks after surface rocks removed and site cleaned to upper fine brown soil – bones and charcoal here and above could be dating after mound constructions.

1. The interesting features of the Mound 1, Northeast corner mound were:

1. Lack of horse head
2. Presence of scattered food remains
3. No preserved artifacts of any kind (the submound “pit” may have been a rodent burrow – explaining its dark soil – but on the other hand it was more or less central in the mound plan.)
4. A clear circular construction plan to the mound with rings of blocky large rocks on the pit perimeter; flat inward sloping rocks at the center/core (2-3 meter diameter).
5. Some sort of food ritual at least is indicated and possible deposit of perishables in the mound. No evidence of pit a pit (outline, or soil texture change was noted).

Northeast Corner Mound Finds, Level 1:

1. Sheep/goat mandible fragments -20cm in upper fine brown sandy soil.
2. Rib fragment in loose sand/brown sand. 17cm below SW corner surface.
3. Two fragments, long bones. -14cm in upper brown soil.
4. Three fragments of charcoal from upper fill backdirt (general location)
- 4a. Long bone found in backdirt – no location.
- 4b. Two bone fragments: a. 11.2cm in upper fine brown soil. b. 10cm. 1b. tooth fragment -16cm in upper fine brown soil. 1c. bone fragment in upper fine brown soil.
5. Bone fragment in upper fine brown soil. Depth of 7cm and on top of rock.
6. Bone fragment in brown soil. Depth not measured. 90 cm from east Wall, 1.90cm from north wall.

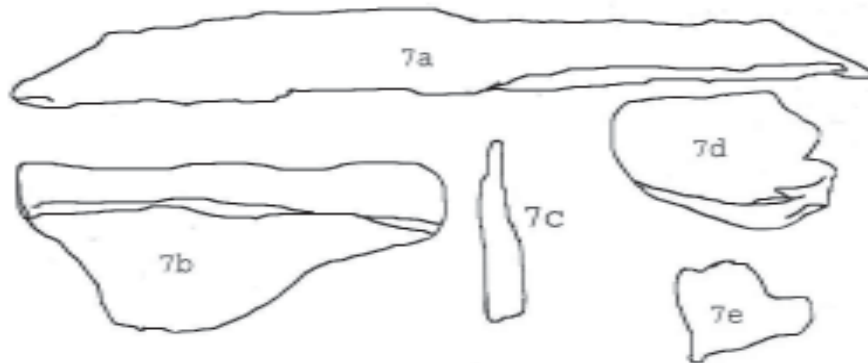


Note: The above material was found in soil between upper rock level and 2nd level rocks. This material could be intrusive and date after mound construction.

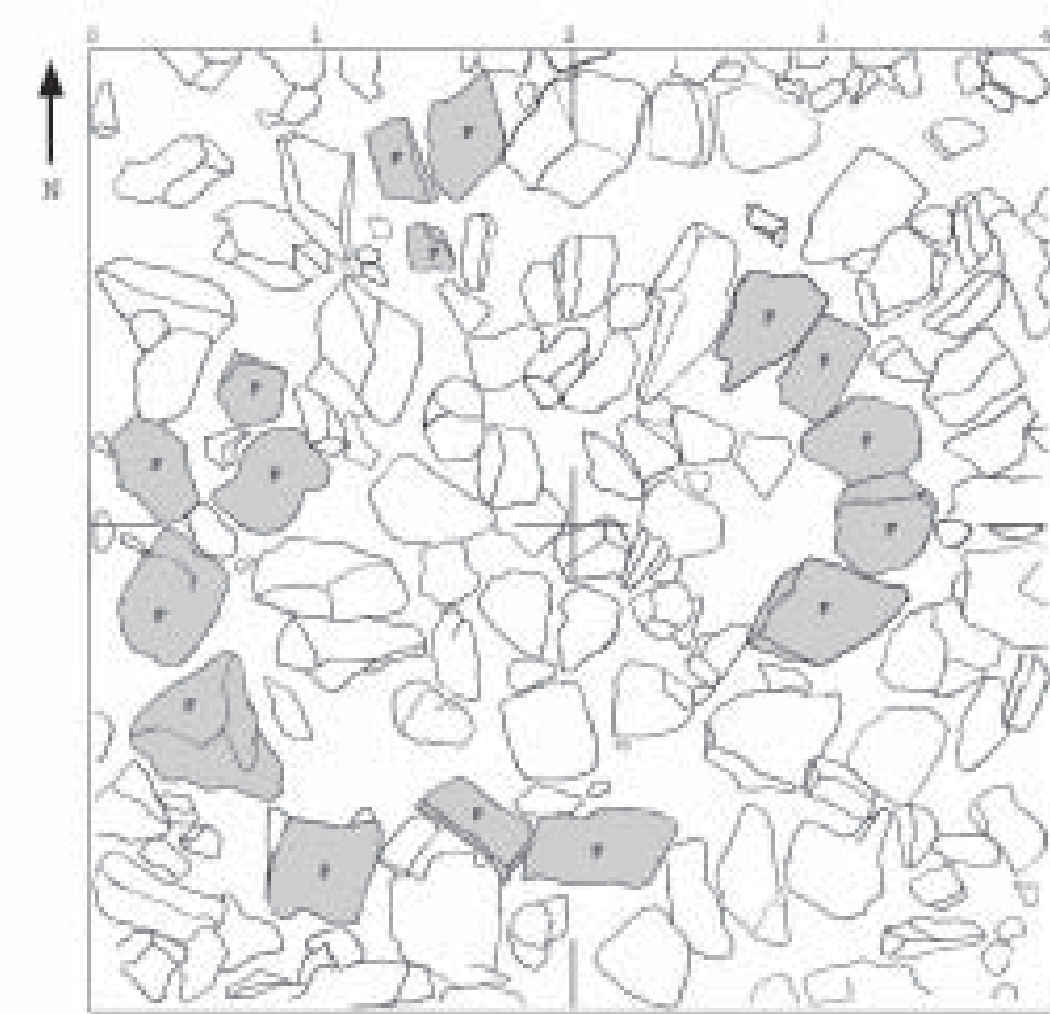
Mound 1, Northeast Corner Mound, Level 2:

7. Split long bones (cf3) -27 at junction of brown and tan soil. Cleaned and moved 62 rocks.

Erkhel/Ulaan Tolgoi
Big Mound/Mound 1
NE Corner Mound



Ulaan Tolgoi
Big Mound / Mound 1
Northeast Corner Mound Level 2:
Excavation Diagram
Soil Level 2



Note:
Partial ring of flat (F) slabs. The other rocks were thick blocky rocks.

Northeast Corner Mound Level 3: Excavation Diagram

Removed inner rock core and slab ring, leaving blocky outer rings in place. (Not shown)

Northeast Corner Mound Level 3 Notes:

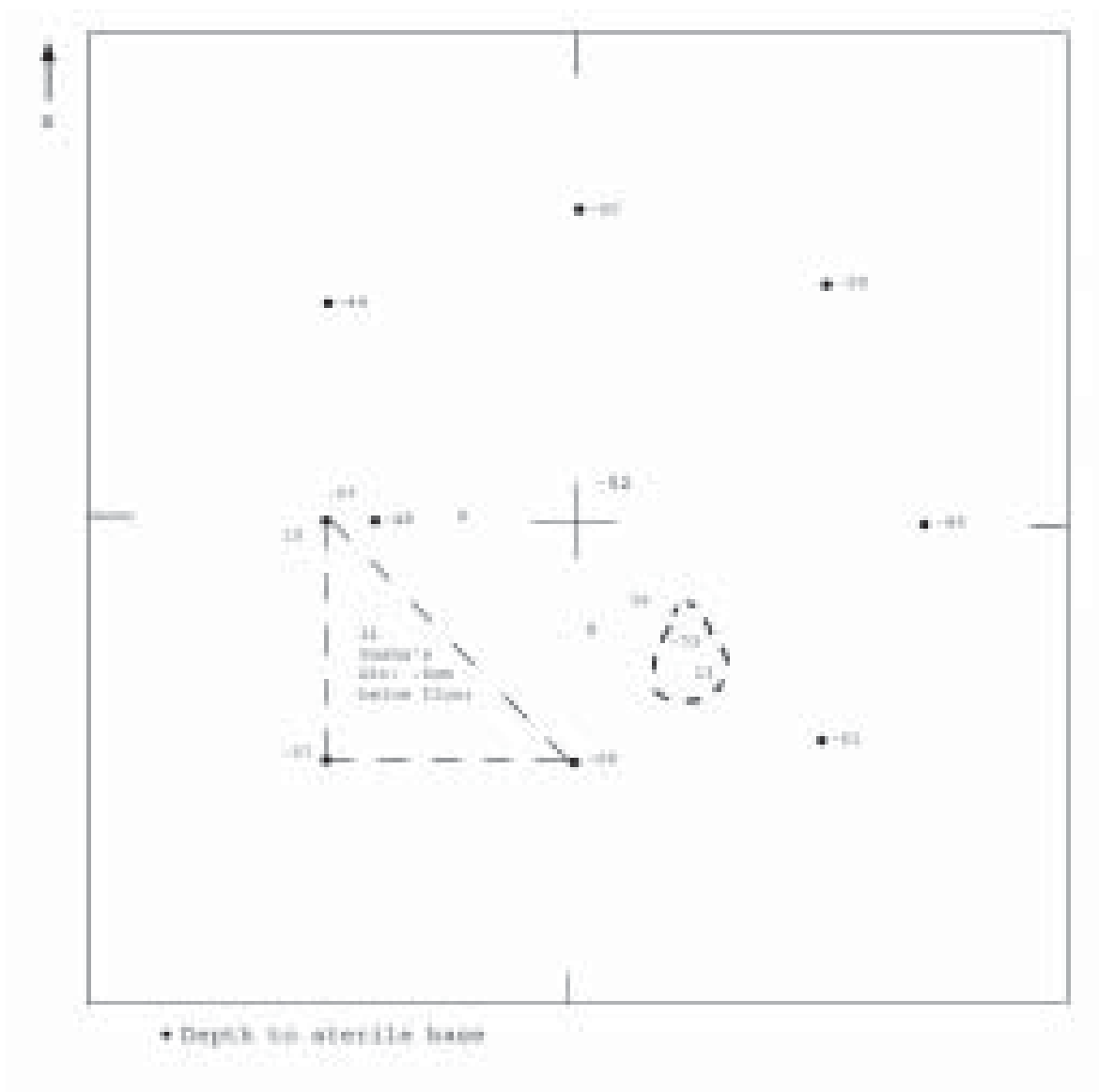
There was a small pit 10cm deeper than rest of the gravelly silt level where we terminated excavation. No finds or charcoal or bone since #13. General change from silty brown soil at -40cm to gravelly soil at -50cm, which is the level we stopped excavation except for a pocket of brown silty soil that extended down to -73cm in the center of the feature, which ended on hard-packed gravel.

Bone preservation was good throughout, so loss of deposit of bone is not likely an issue. Most of the bone was cracked from marrow extraction or cooking, and only fragments of probably one animal was present, at various depths, so the upper level bone may also date to the mound construction. The charcoal was only in the upper level and could be more recent, because it was very fresh and flaky and none – unlike the bone – was found in level 2, level 3

Erkhel / Ulaan Tolgoi

Big Mound Level 3, NE Corner Mound

8 July 2003



Northeast Corner Mound, Level 3:

8. (Level 3) Two small bone fragments (cancellous lumps) at top of 8. Found in tan soil beneath second rock level.
9. Two small bone fragments. -44 in upper tan soil.
10. Bone fragment in tan soil. -39cm.
11. Sheep/goat tooth row fragment. -45cm in tan soil.
12. Bone; long bone sliver in tan gravelly, silty soil. -51cm.
13. Long bone fragment -54cm in silty/gravelly tan soil.



Erkhel

Satellite Mound A: (Formerly East Gate Mound)

This excavation is still in progress, but there are already some interesting points emerging. Very large surface rocks covering the center of the mound, more than in the corner mounds, which are roughly the same size (4 × 4 meters). There are 5 of these “super” horse head mounds, 3 on the north side of the ‘East Gate’ and 2 on the south side.

After this, the mounds in the first rank are somewhat smaller and with fewer large rocks on the surface – perhaps these 5 are the principle donors to the large mound ceremony. Thereafter, the mounds in the 2nd, 3rd, and 4th ranks generally decrease in size. The mound Bayaraa excavated in the 4th rank had its horse head buried only 5-10cm below the surface, with only one rock over the skull and several large boulders encircling the burial. No real mound was constructed.

After removal of the top/surface rocks, a pattern similar to the construction of the NE corner mound emerged – a circular outer ring of large stones, with an intermediate ring of inward sloping slabs, and a central core of rounder/blocky smaller rocks. Some small split long bones were found scattered in the fill as in the corner mound. There was also a 20-30cm thick layer of black charcoal – rich soil on the west-center part of the mound that had a few small bone fragments and the joint frag of a cow or other large ungulate at its base (perhaps the small fragments elsewhere are part of the bone) – seems like same type of feasting ritual was underway here as this part of the mound fill was all soil and strangely free of rocks, compared with other parts of the mound.

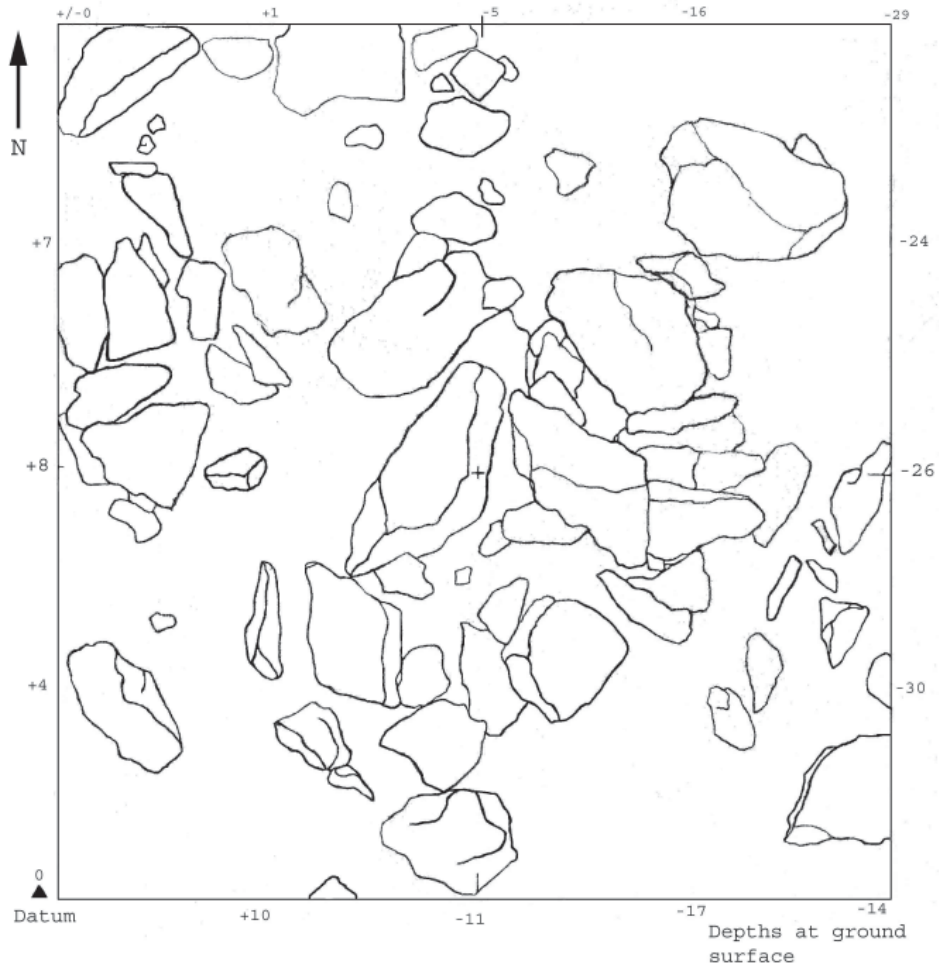
Charcoal lumps were found scattered throughout the upper mound soil (level 1) – also an indication of fire activity associated with the mound construction.

*Erkhel east gate mound 3
before excavation*



*Erkhel east gate mound
after surface rock removed*

Ulaan Tolgoi Mound 1
Satellite Mound A
Surface/ Level 1 Map
8 July 2005

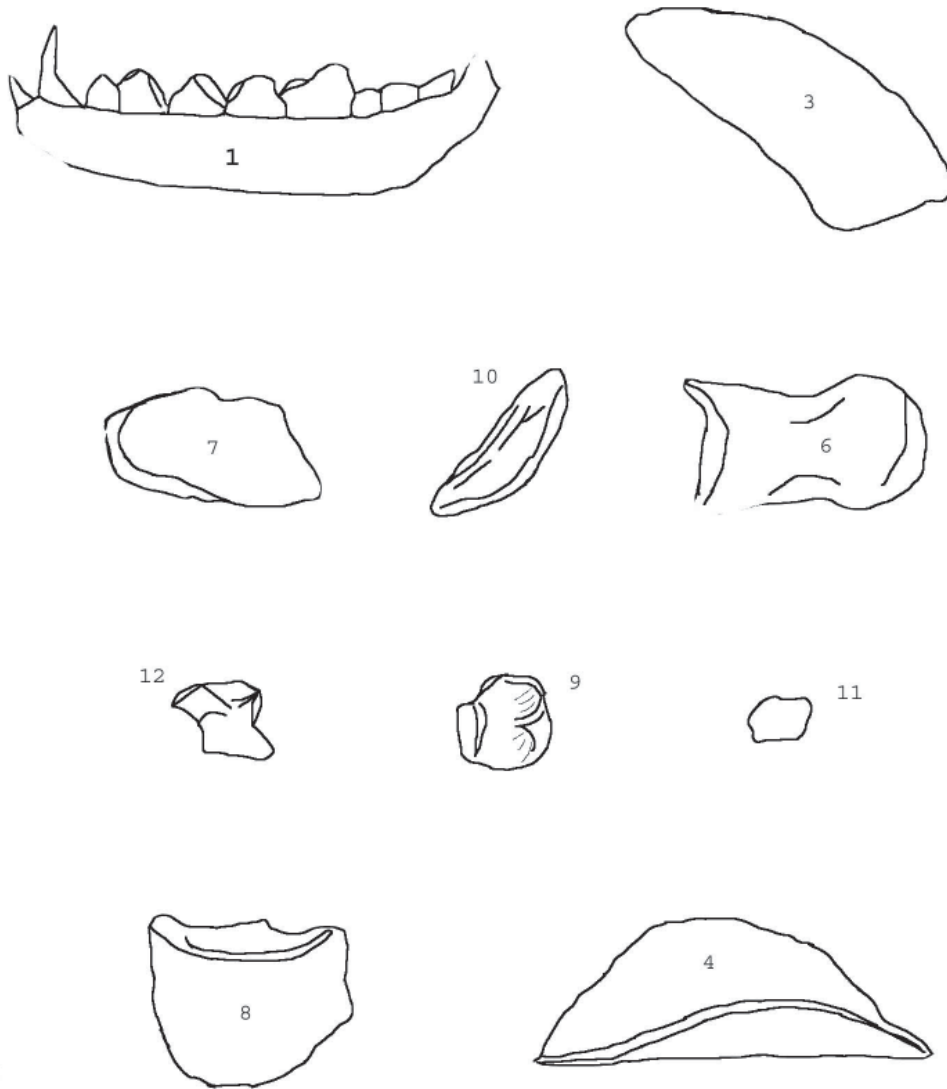


Ulaan Tolgoi Satellite Mound A with grid

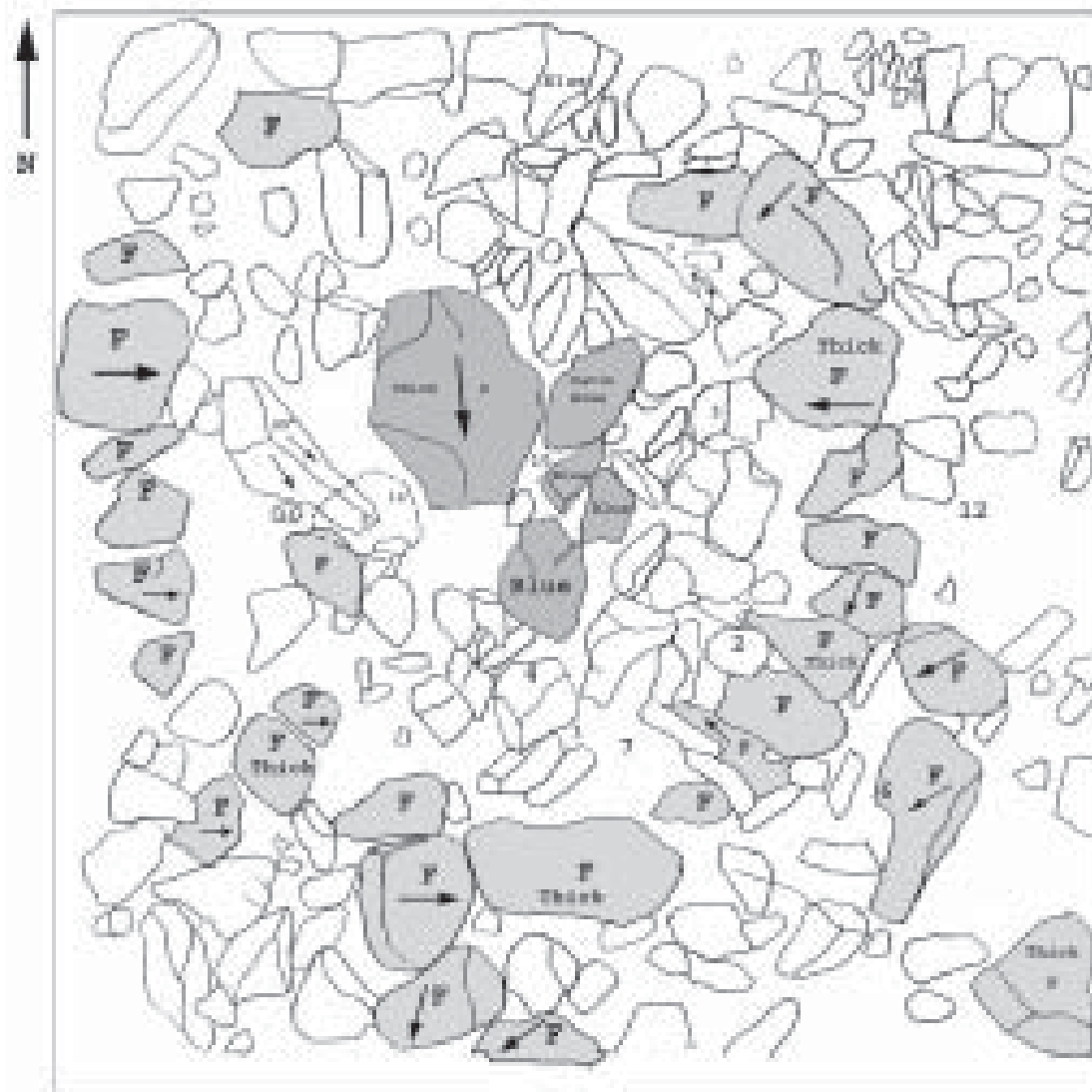
Mound 1 Satellite Mound A. Level 1 Finds:

1. Canid (small dog/fox?) in brown soil and turf beneath/under surface rocks. Found while cleaning upper rock removal (-15 from SW corner ground).
2. Charcoal found cleaning turf zone (multiple locations - general collection). Not shown below.
3. Cow hoof in brown soil. -29cm in brown soil.
4. Long bone fragments -13cm in brown soil.
5. Bone fragment. -13cm in black soil.
6. Cow phalange in brown soil. -35cm in brown soil. (This packet of black, charcoal-stained (but no lumps) soil - extended down to ca -25cm between the rocks).

Erkhel/Tolgoi Mound 1, Level 1 Finds
Satellite Mound A
8 July 2005



Ulaan Tolgoi Mound 1
Satellite Mound A
Level 2 Map
9 July 2005



*Ulaan Tolgoi Satellite Mound A with grid
view to south*

Mound , Satellite Mound A Finds:

Level 2:

7. 1 piece and fragment of long bone in brown soil.
8. 1 bone at -35 in brown sand.
9. 2 small pieces of bone. -40cm in brown soil.
10. Small bone joint fragment -34cm.
11. Small bone joint fragment -35cm.
12. Small bone joint fragment -52cm.
13. Small bone joint fragment -15cm.
14. Leg joint fragment. -28cm in brown/black soil. Most likely cow (?) joint at base of level 2. Brown/black soil just above level 3 rocks, at base of the dark soil deposit.
15. Horse tooth at -52cm. Beneath level 3 rocks brown soil.
16. Horse bone (?) -53cm. In brown soil.
17. Partial horse head - right mandible proximal fragment, with front of mandible eroded/missing. Some evidence of weathering before burial. Two teeth in jaw and one found loose (which is listed at #15).

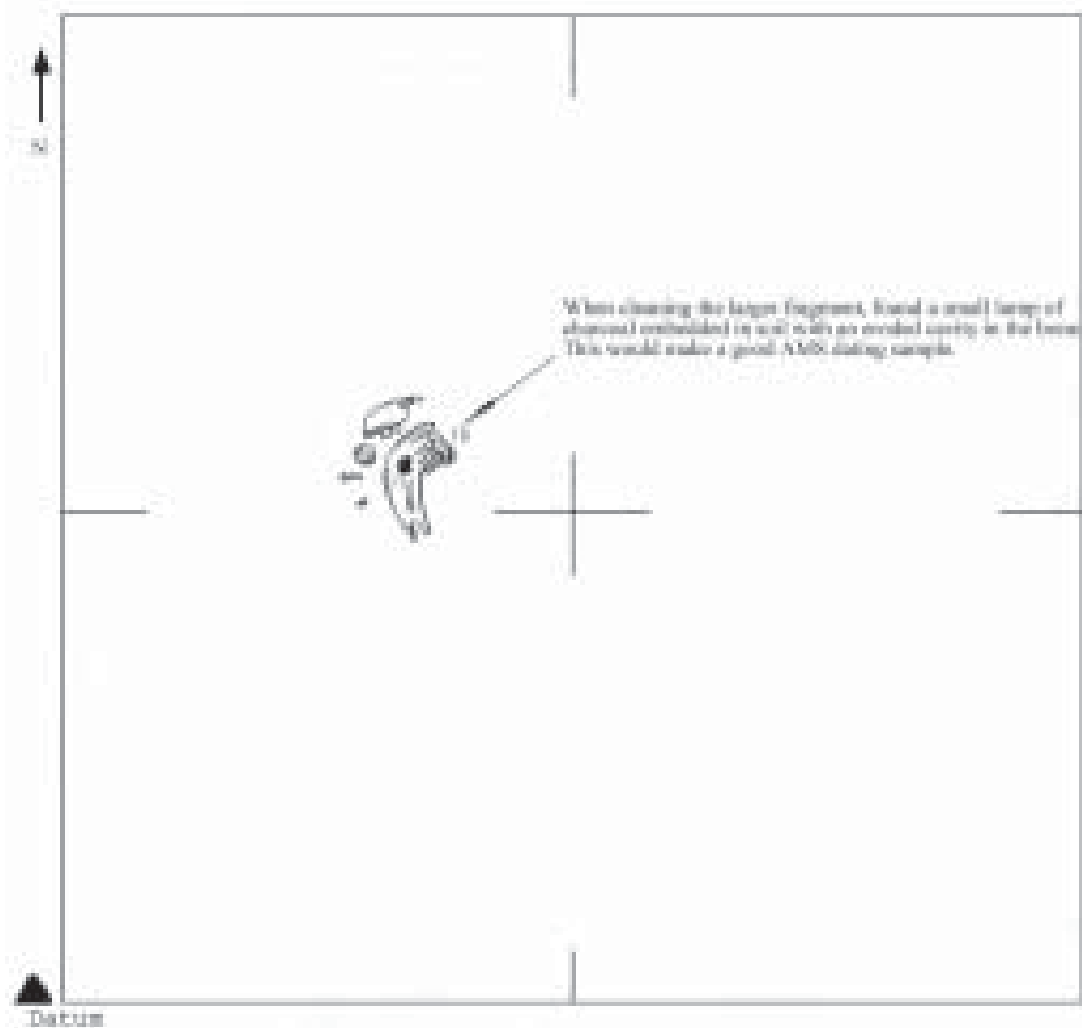


14, Leg Joint Fragment; 15, horse tooth; 16, horse bone.



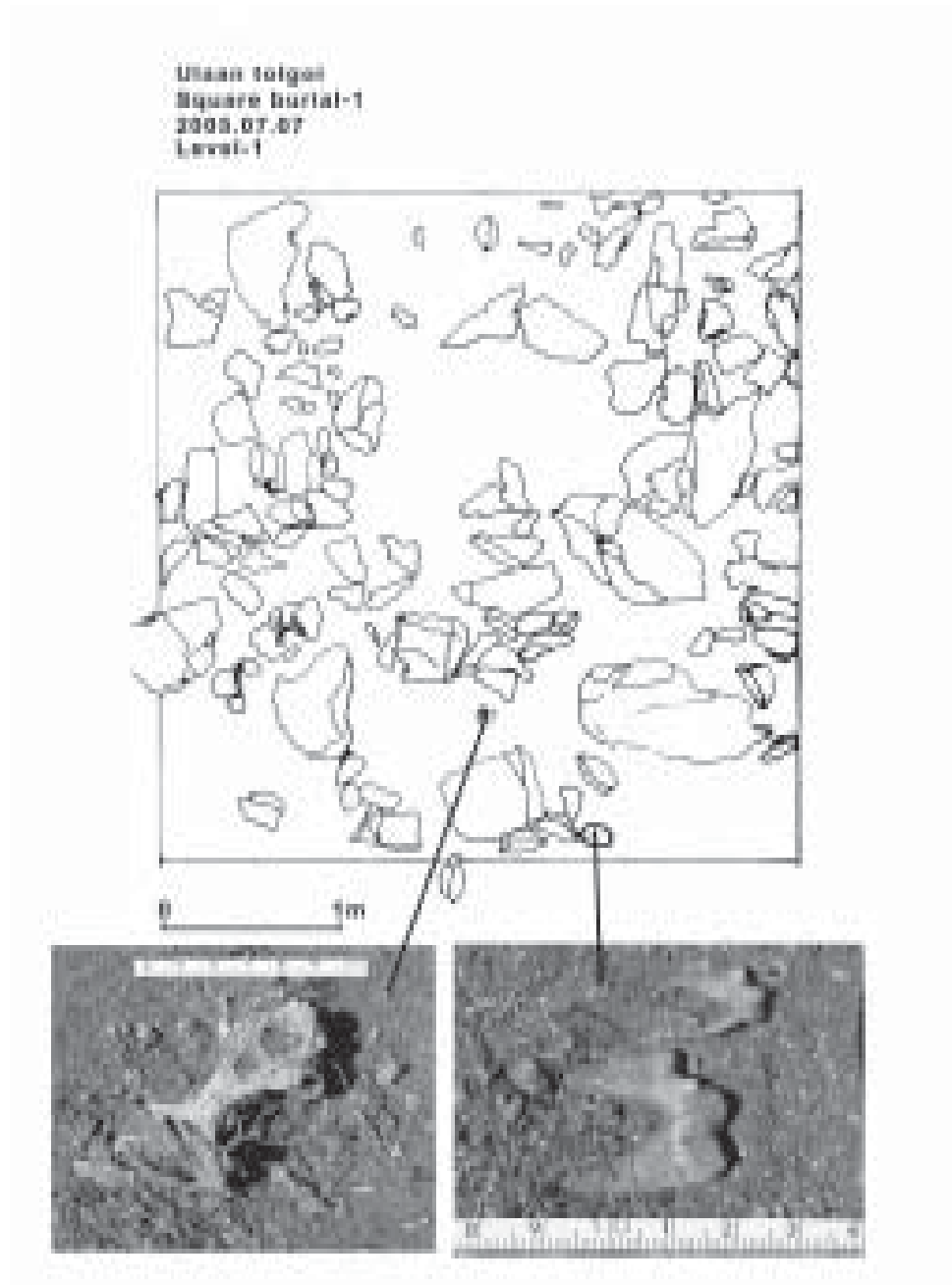
Ulaan Tolgoi Mound 1, Satellite Mound A, Level 3

Ulaan Tolgoi, Mound 1
 Satellite Mound A, Level 3:
 Excavation Diagram



Satellite Mound A Level 3 Notes:

Fragmentary horse mandible found at base of sandy organic - stained deposit 20-30cm deep. The horse mandible was surrounded by rock and with fragments of bone and joints of a cow(?), about 10cm above it. The larger mandible fragment was missing its distal end and seemed to have been very weathered at the break, as from exposure to fire. The smaller fragment of the left mandible was missing both its proximal and distal parts and included only the main molar portion. A few other bone parts were present (not skull parts), making the deposit appear to be a desposit of the remains of a horse that had died sometime earlier whose remains were re-interred here in fragmentary condition. There was no orientation as the parts were lying flat and jaw was disarticulated and no maxilla present.



Excavating the NE corner mound should provide a date for the construction of the big khirigsuur almost as accurate as dating the inside of the big mound itself.

Excavation at Etah Lake North, Deer Stone Site
DS-2
F-1
in July 2006



Erkhel Lake North Deer Stone Site. 10 July 2005.



Erkhel Lake North Deer Stone 1



Erkhel Lake North Deer Stone 1

Deer Stone Site Erkhel Lake East (see notes Appendix A)



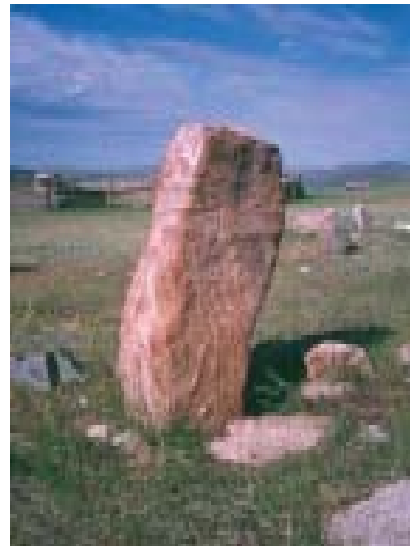
Deer Stone 2



Deer Stones 1 and 2



Deer Stones



Deer Stone 1



Deer Stone 1



Odbaatar and Bayaraa measure Deer Stone 1



Ceramic period site on north side of Khug River at Soyo



Appendix E

Deer Stone Motif Drawings

By Elizabeth Eldredge



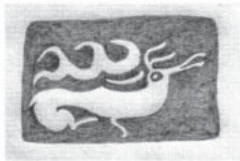
Erkhel 1



Erkhel 2



Erkhel 3



Erkhel 6



Erkhel 7



Erkhel 8



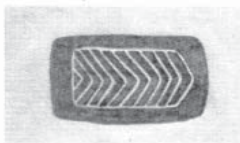
Erkhel E Stone 1, Side 1



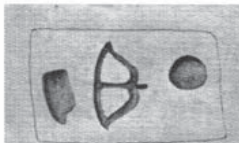
Erkhel E Stone 1, Side 1 i



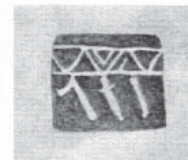
UshkinUver Stone 6



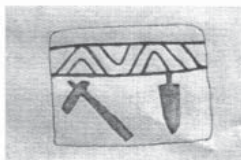
UshkinUver Stone 6 iii



UshkinUver Stone 9



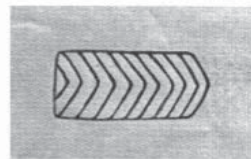
UshkinUver Stone 9 i



Erkhel 4



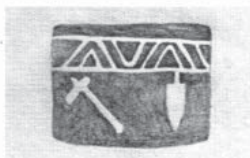
Erkhel 5



UshkinUver Stone 6 i



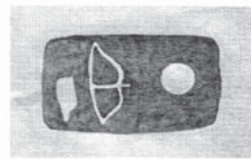
UshkinUver Stone 6 ii



Erkhel 9



Erkhel 10



UshkinUver Stone 9 ii



UshkinUver Stone 9 iii



Deer Stone Conference opens at University



Appendix F

Deer Stone Project Conference and Workshop Program

Smithsonian Museum Workshops

Friday, 17 June

10:00am 'plenary session' [location?]

Care of Collections on Exhibit and in Storage (presentation and demonstration for the whole group): *Conservation concerns and solutions related to handling, mounting, and displaying museum objects, including ethnological and archaeology materials and natural history specimens. Demonstration will include test procedures to determine if materials are safe for use with museum objects.*

2:00pm Afternoon Sessions [locations?]

Practical Techniques for Use in Exhibits and Storage (demonstration and hands-on workshops, presented in two concurrent sections):

Group 1: **Storage Supports** (*participants may bring small objects to use as examples in preparing a storage support*)

Natalie Firnhaber, Conservation, Dept. of Anthropology, Smithsonian Institution

Group 2: **Bracket-Making and Taxidermy**

Carolyn Thome, Office of Exhibits Center, Smithsonian Institution

Paul Rhymer, Office of Exhibits, National Museum of Natural History

Note:

During the week of 20-24 June, Paul Rhymer and Natalie Firnhaber will be available for additional consultation on conservation, bracketing, and taxidermy. Please speak to them directly to make arrangements for meetings and/or visits to your museums.

Conference Day
Saturday, 19 June, 10 – 5
Morning Session 10-12:30

Peopling the Americas: The Mongolian- Beringian Connection

Bruno Frohlich, Department of Anthropology, Smithsonian Institution

***Abstract:** Anthropologists have argued for years about the first peopling of the Americas and how many waves of migrations took place. Professor William Laughlin, a single migration proponent, proposed to test his theory by joint research with Russian Academician A. P. Okladnikov, first in 1974 in the Aleutian Islands and in 1975 on Olkhon Island in Lake Baikal. Since then, new hypotheses have been proposed. Stephen Zegura proposed a two-wave migration based on Y-chromosome haplotypes that demonstrated that the Asians most closely related to American Indians came from the Lake Baikal area and northern Mongolia. In the future more sensitive analytical methods will include mtDNA, advanced statistical procedures, and enhanced studies of skeletal collections from Mongolia and Russia. This presentation will focus on the Laughlin-Okladnikov collaboration, the results of later studies, and how this affects our current Mongolian – American collaboration.*

Eskimos, Vikings, and Mongolians: Cold and Frozen? Or “Empire States” of the Arctic?

William W. Fitzhugh, Arctic Studies Center, Smithsonian Institution

***Abstract:** It might seem hard to imagine what Erik and Red, Genghis Khan, and the some unknown Alaskan Eskimo of about 900AD had in common; but in fact Vikings, Mongols and Thule culture Inuit are responsible for three of the most widely-dispersed human expansions ever known before the Columbian era. Why are we getting such surprises from the North? And what is the future of a melting Arctic?*

Reindeer Herding in Eurasia: Origins, Practices, and Relevance to Mongolia

Paula DePriest, Smith. Ctr. for Materials Research and Education
William Fitzhugh, Arctic Studies Center, Smithsonian Institution

***Abstract:** Reindeer-herding has been a way of life and livelihood for northern Eurasian peoples for more than 2000 years. Replacing the unpredictable life of hunters and fishermen, reindeer breeding provided a secure means of transport, clothing, shelter, tools, and food. Managing domestic reindeer is a complex task, and many ethnographic varieties are known historically. Despite its importance, the date and place where reindeer-herding originated is not known, but it has been hypothesized to have first taken place in Tuva and northern Mongolia. This paper reviews reindeer biology and ecology; practices used by the Tsaatan and other reindeer-herding peoples, and theories about its history and origin.*

Digital scanning in an archaeological setting: creative applications in Mesoamerica and Mongolia

Harriet F. (Rae) Beaubien (presentation) and Basiliki Vicky Karas (demonstration)
Smithsonian Center for Materials Research and Education

***Abstract:** The most common method of digital documentation employed in an archaeological setting is photography, but several other techniques are being used creatively for the purposes of documentation and preservation. Flat-bed scanning, currently in use at the site of San Bartolo in Guatemala, and three-dimensional laser scanning, which will be tested during the Deer Stone Project's 2005 field season in Mongolia, are discussed; the 3D technique will be demonstrated.*

Afternoon Session: 2 – 5 pm



Appendix G

Conservation Report 2005

Natalie Firnhaber

Conservator, Department of Anthropology,
National Museum of Natural History
Smithsonian Institution
firnhabn@si.edu

Mongolian report June 15 – 26, 2005

The conservation presentation was given at the National Museum of Mongolian History on June 16 to museum staff from a variety of museums. It was primarily on storage. Four different methods of storage were shown. A seal skin Eskimo headdress demonstrated three dimensional hat storage. A pair of Mongolian trousers was used as a costume example, and included vacuuming and crease removal (including testing for color bleeding), and storage. Mongolian bow and arrows were used to show storage care of delicate feather arrow fletchings and how to provide balanced support along the bow. The final example was artwork on paper, using a four-flap design with a glassine cover over the artwork. Paul Rhymer discussed bracket making for exhibition. At the coffee break, I met Purevsuren Soren, an archivist with the National Archives. She was interested in learning how to identify problems in paper. A group from the Cultural Heritage Center attended the presentations. Apparently they are the only conservators in the country and museums take their conservation needs to their center. We arranged a visit with them. A woman presented her card from the costume museum, which is new and still under construction, but she had questions about exhibiting costumes. We want to visit her, but the collection is not available to see right now, and we could not arrange anything with her.

After the break Rae Beaubien and I demonstrated several materials testing techniques. They were the Oddy test, pH pens, and the Bielstein test. We passed around the various test results so they could see them for themselves. We gave away pH pens and all the Oddy equipment, as well as handouts describing how to do the tests. They practiced with the pH pens, but the room was too

crowded and time too short to have anyone individually practice the other tests.

In the afternoon Paul and I did our workshops—he at the Natural History Museum and I stayed at the Museum of Mongolian History and used the same room as for the presentations. I had the participants divide themselves into groups of three. I had brought souvenirs from Washington—baseball cap, SI keychain, ceramic disk, pen and spoon. I asked them to make storage boxes and supports for the objects I brought. They could choose from a variety of materials (blueboard, pellon, various papers, richfab, ethafoam) and could keep whatever they worked on. It became very competitive, lots of energy, laughter, but not many questions. After they finished, I asked them to explain their work to each other. We applauded each effort. They seemed to enjoy it and I hope got some ideas from each other and from us.

Sunday morning, June 19, Paul and I went to the Mongolian History Museum to meet with Odbaater. He was heading to the field with Bill on Monday so this was his only day to meet with us. We looked at his exhibits with him. He showed us an actively corroding bronze vessel. He said the Cultural Heritage Center would do the treatment for it. We looked at a silver display with black felt under the silver. We suggested he test for wool because of sulfides attacking the silver and change it if it is wool. It might be the typical wool felt we see everywhere in Mongolia. His cases were very clean. He opens and cleans them every two months. He asked about marble statuary in the open with no protection. It was dirty from hands touching it. I suggested how he could clean it. We suggested he put up barriers (but it was clear he knew that should be the thing to do). Paul showed, with a drawing, how Odbaater could exhibit small stone tools without using tape on the back, but brass posts instead. Odbaater clearly was dedicated to his work and wanted to do it in the best way, which for the most part, he already was. He also expressed concern about taking care of objects at archaeological sites. I told him I would try to send him books on field conservation. He was very happy for that.

June 20 Paul and I visited the Cultural Heritage Center. We met with the director, who told us they have 17 on the staff, nine of whom are conservators. This is the only restoration center in Mongolia and they also serve the provincial museums. (All museums in Mongolia are government museums, according to her) They also take care of collections in the Buddhist monasteries and the National Library. When a monastery is restored (so many were destroyed or damaged by the Russians) the artifacts inside are also restored. The damaged objects are brought to the center.

They had a 13th century silk archeological garment laid out for me to see. They showed me the photos they had taken when they received it. They had washed it and flattened it, perhaps under glass. It was very flat. It was in very nice condition and beautifully made. It had been found by looters who disrupted the gravesite and threw a lot of things all over, including this magnificent

gown, which didn't look magnificent to the looters. I did show them how to humidify and then remove some creases in a sleeve to give it three dimensionality and prevent breaking of crease edges. They showed us the replicas they had made, especially for Paul, as they all knew of his work with the deer stone. They showed us their casts, which were very good. China is their main source for all of their supplies. They are interested in having conservation specialities at the Center. Currently the conservation staff have all had the same training. They studied this discipline at the university under one special individual, Khishigbayar, who then became the head of this center. He earned a Bachelors degree in Poland and a Masters in Bulgaria and studied in various other countries, including Japan and Holland, learning different methods of conservation and restoration. He died last year.

In the afternoon we went back to the Mongolian History Museum and met with Twl, the person in charge of storage. Objects here were stored on metal shelves. She took us to the Museum of Natural History because most of their storage is actually there. They said the Mongolian History Museum was a former school and the design doesn't include good spaces for storage. We looked at many saddles hanging on wood supports with stirrups hanging down. They are heavy metal stirrups hanging by leather and cloth from the saddle. Twl said the heavy stirrups needed additional support to prevent the leather/cloth from breaking, and she had already requested this, but the director hadn't decided yet to have that made for them. She said one problem is that the NMNH isn't eager to put money into storage for the objects from NMMH. She pointed out the long windows in the storage area. Twl had attached blue plastic to keep out the light, which did minimize it. She asked if she should also put curtains over it. I said yes, there should be no outside light in storage. She seemed to already know that, but maybe she appreciated support to her knowledge. Textiles (clothing) are stored in a deep wooden drawer with each garment lying on top of each other with different kinds of paper in between (it looks like perhaps whatever they could find). I suggested she test the papers for acidity, and also suggested using cotton cloth between each separate textile. She also has boxes of rugs and other flat textiles and is waiting to put them on rolls as soon as she can have rollers installed in another room.

On Tuesday, June 21, we went to the NMNH to meet our interpreters, Chimgee and Naagi. Naagi came back with me to the Cultural Heritage Center to pick up Ganaa who wanted me to see the National Library collection of sudras (bound books of Buddhist texts/prayers). The Library is a very large building, built in 1921. There are two million books, not including the sudras. We went upstairs to a large open room that looked like an exhibit space with glass cases along the walls. There were large windows, and all covered so no light came into the room. On exhibit were primarily sudras, including a famous one, according to Ganaa. She said there are two famous sudras

in Mongolian Buddhism. One is here and the other is in the Gandan Monastery. These are from the 17th and 18th Century. One is the Gan Guur and the other is the Dan Guur. They are still both being read every day by the monks. The sudras are long narrow books with wood covers. They brought out an 18th Century sudra which they said had been in a wet condition and they thought was moldy. It was wrapped in a quilted cloth which appeared to have been made for it. The pages were discolored and sticking together, but there was no moldy smell. I demonstrated how one could gently begin to separate the pages with a thin spatula, and how not to go too far. I suggested a paper conservator should come to show them various paper care techniques and they were very enthusiastic about that. But this sudra was not in danger of getting worse if it was not handled. The pages are written on both sides and they asked how they should be protected since the edges break easily. I asked if the pages could be photocopied, but she said the monks would not want to use a copy, only the original. The monks read 2 -3 books, usually the same ones, every day. This causes damage to the paper. I opened the sudra very slowly and carefully to illustrate handling, which generally seemed rough, with edge breakage as a result. I looked at the brown brittle edges of the sudras and suggested checking for pH of these papers. Ganaa said the reason the edges are brown and breaking now is because after the sudra is written, the edges are burned to prevent insect attacks. She said there are almost no insect problems in the sudras.

Ganaa said paper conservation is the next most important area to learn. She actually had studied in Japan for one year, with a scroll mounter. The idea of a paper conservator seemed a good idea to me, as well as textile conservation. The weather here is dry and there seem to be little problems with bugs or mould. The metals look good, the stone seemed OK and even the wood was in pretty good condition. However, the more archaeology is done, the more they are also going to need instruction in field conservation and instruction in working with archaeology objects brought to them.

Naagi and I visited the Bohg Khan Monastery/winter palace. Exhibited were extraordinary royal clothing with tiny coral and pearl beads and gold thread so close it looks like sheets of gold, but exhibited in light and on hard wood supports.

On Thursday we traveled to the countryside with Jafsma, Dagea, Tsogoo and Boldoo from the taxidermy department of the NMNH museum and Chimgee came along as our interpreter.

Friday Naagi and I went to the Mongolian History Museum. We visited with Bumaa and talked to her about possible US internships. Afterwards Naagi and I visited the Religion Museum, the Chojjin Temple Museum. Saara is curator of collections and met us there. She told us the temple was built in 1904 and all of it was built for one monk, the younger brother of Bohg. It became a museum in 1960 and before that it was an active temple. We met Pugi, director of the museum.

Five separate temples make up this one temple complex. It cannot be heated. There were UV lights

inside all case.

She asked about cleaning the metal of copper and gold images. There is a nice brown patina on the copper. There is a smaller temple built for the Buddha with 16 scholars seated next to the Buddha. The images were made of a combination of clay, paper and water. She showed us their storage. The room had actually been storage for food when used as a temple. Everything was a jumble and damaged. One statue made from clay and straw was crumbling; a sudra very torn at the edges was handled by her quite roughly. Sudras were wrapped in silk cloth and tied and lying on top of each other in large wooden boxes or stacked on unpainted wood shelves. Paintings were lying on top of each other or were haphazardly rolled and crushing each other. There were widely spaced shelves with open space in between. I suggested rolling paintings with a roller inside. She asked if I would suggest changes in the exhibit, and I said the UV light inside the cases should be covered with UV absorbing plastic and I would look for sources for her on the internet. Most of the cases were either lit with UV tubes inside cases or illuminated by open windows. I suggested covering the windows to prevent fading, especially of the reds in the intricate embroidered hangings.

We went back to the Natural History Museum and met up with a biologist and a botanist. They said every year they “smoke” the collection as a pesticide. It is a poison, but they do not know what it is. It is from China. They said the pesticide does not stay in the specimen. I told them about freezing. They have new plant storage—wood cabinets with pressboard sides and plywood shelves. They have 2000 plants in the collection. Last year 100 mounting papers were brought (perhaps by Debbie Bell) and have already been used

They have no minerals nor gemstones in the collection. The Mongolian geologists do not work in the museum. They make 10 times more money working outside the museum, I was told.

Batamtsetsehe is the botanist.

We walked through the exhibit and many dried plants were fragmenting on exhibit. I suggested they exhibit them on a slanted surface and use illustrations of plants instead of the real thing. They did not know what I meant by illustrations. They said there is a drying method from Japan where the plant still looks full and real but is dried. They want to know how to do that.

We met with Bumaa again. I gave her the rest of the conservation books I brought, hygrometers, and handouts, hoping she will distribute as she sees fit. We also met again with the director. Paul mentioned to him the idea of having another deer stone made by the fellow from the Cultural Heritage Center. The director liked the idea. I suggested having a paper conservator come to do a workshop because we saw so many sudras that were in bad shape. I also suggested an internship in the US for one of the conservators from the Cultural Heritage Center. He was enthusiastic about both. He has studied the sudras and is anxious to have them cared for.



Adiya translates Natalie Firnhaber's conservation lecture at the museum



Appendix H

Archaeology Magazine Story

Eric Powell

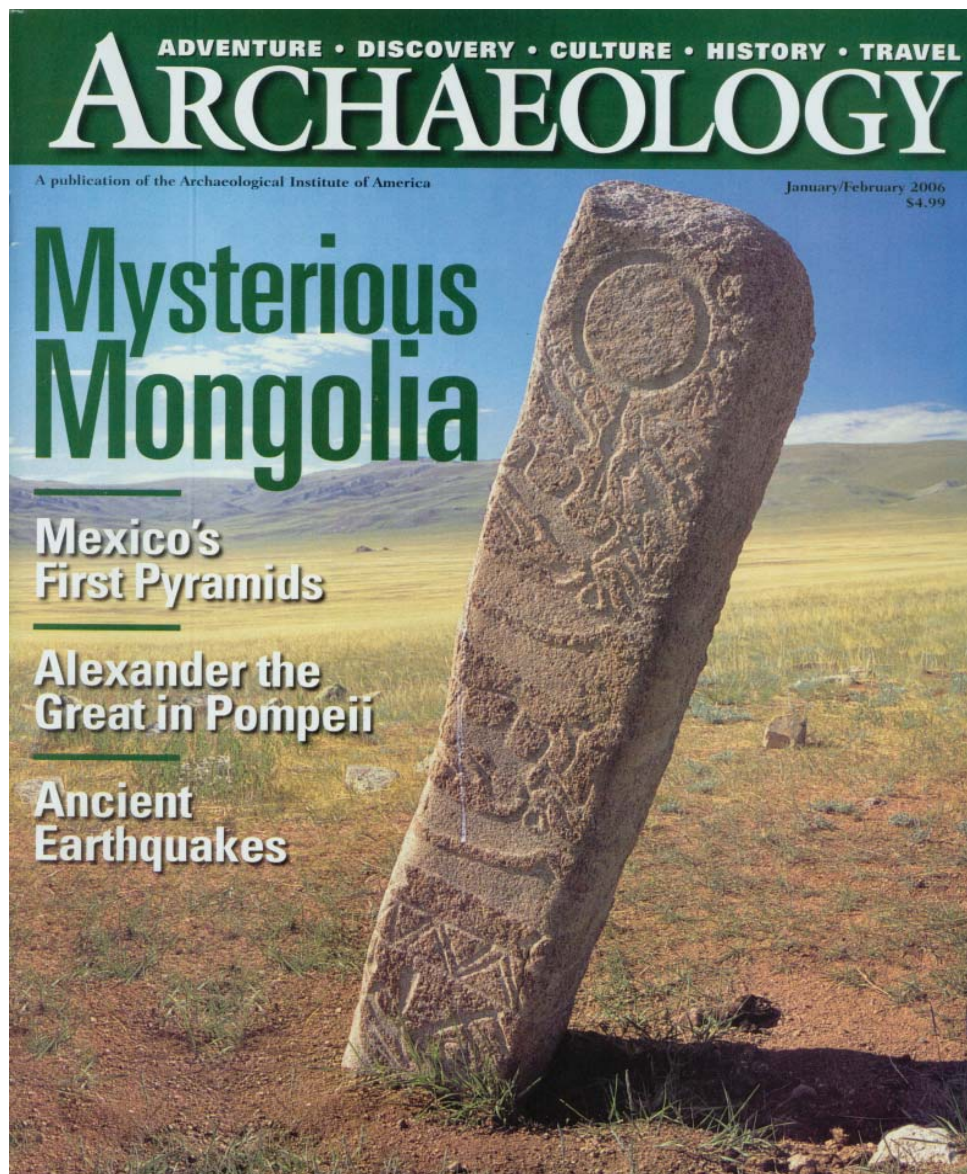
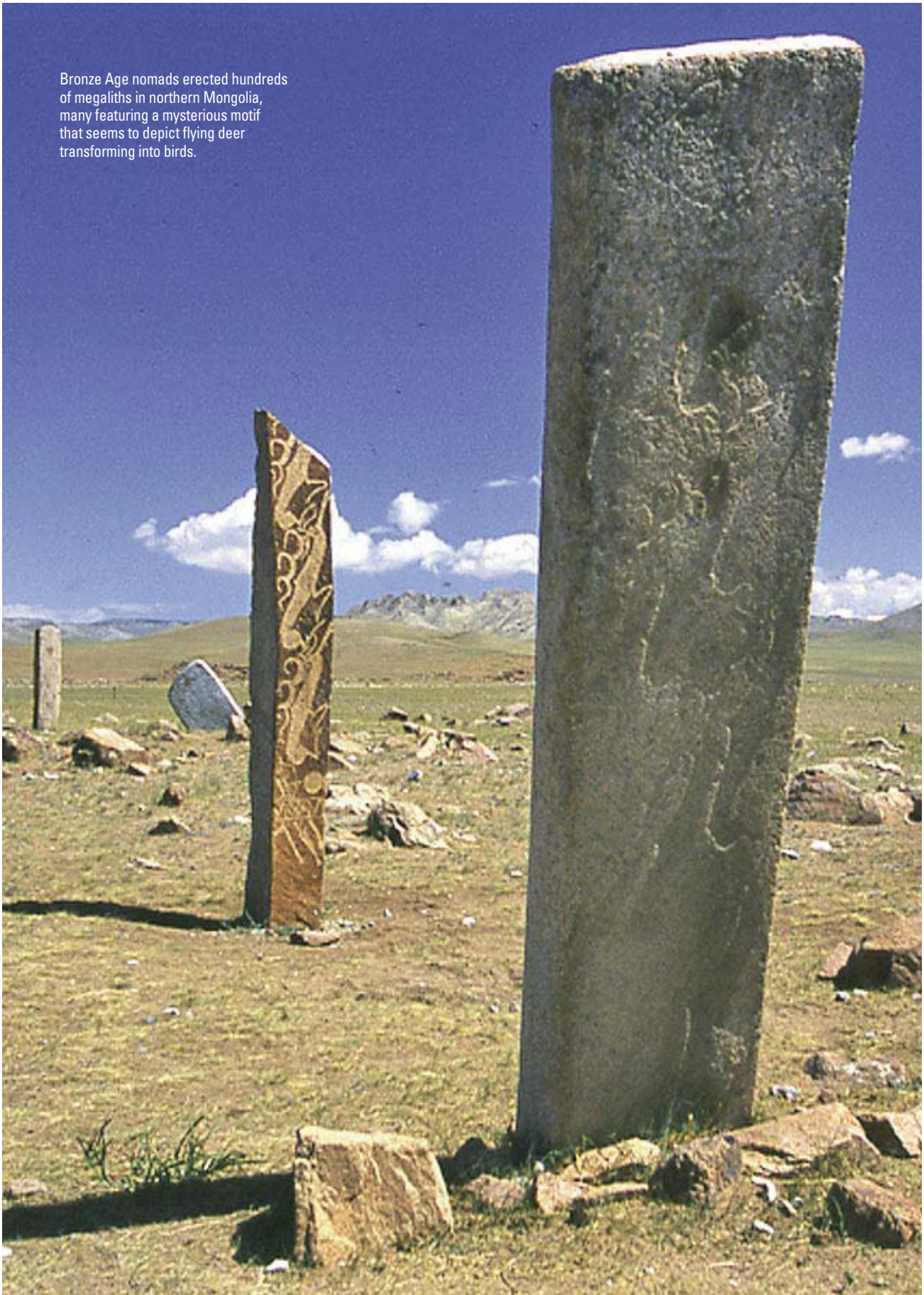


Figure 1: January/February 2006 Archaeology Magazine Cover

Bronze Age nomads erected hundreds of megaliths in northern Mongolia, many featuring a mysterious motif that seems to depict flying deer transforming into birds.





WHEN GENGHIS KHAN SET OUT to unify the Mongolian tribes in the thirteenth century, the man whose ruthless ambition would bind most of Eurasia into the greatest empire in history began with the tribes of an obscure northern valley, the Darkhat. Today lying near the border with Siberian Russia, the Darkhat Valley marks the boundary between the vast central Asian steppe and the forested Siberian taiga. From the earliest times, this region has been a crossroads, a place where the worlds of Central Asia and the Arctic met. The result is a landscape littered with dramatic archaeological monuments, especially huge rock burial mounds known as *khirigsuurs* and upright stones carved with mysterious symbols.

It's likely that Bronze Age nomads erected these graceful and mysterious megaliths throughout the northern regions of Mongolia and southern Siberia around 1000 B.C., though some scholars think they may be the work of later, Iron Age peoples who appeared by 700 B.C. Known as deer stones for their carved depictions of flying deer, the monuments rival Europe's megaliths in their intricate designs and careful craftsmanship. Just why they were created and what role they played in ancient nomadic cultures are two of the many puzzles in Mongolian archaeology, which was dominated by the Soviets during the Cold War.

Mongolia

Seeking clues to ancient nomadic life at the edge of the Arctic



by ERIC A. POWELL

photographs by THOMAS L. KELLY

Since the early 1990s, scholars from all over the world have gravitated to Mongolia. Turkish archaeologists come to learn more about the ancient Turks, who are believed to have originated here around A.D. 500. French and German expeditions are excavating medieval sites. And since 2001, a multidisciplinary team from the Smithsonian, coordinated by archaeologist William Fitzhugh, has worked here in the largely overlooked Darkhat Valley of the Hovskol *Aimag*, or administrative region. Fitzhugh is drawn to this remote region of Mongolia because it is at the very southern edge of the Arctic world, which as the director of the Smithsonian's Arctic Studies Program he knows quite well.

The world's southernmost reindeer herders, a nomadic people known as the Tsaatan, still raise hundreds of reindeer in the tundra of the Hovskol's mountains. (*Tsaat* means "deer" in Mongolian, which most Tsaatan speak, though some elders still speak Tuvan, a branch of the Turkic language family that is also spoken by their ethnic cousins across the Russian border.) The average Mongolian learns to ride a horse before age 10, but here in the mountains, Tsaatan children all of three years old are as comfortable on the backs of reindeer as an American child might be on a tricycle.

In an effort to understand this slice of the Arctic world, Fitzhugh has put together

a large team of specialists, including Bruno Frolich, a Smithsonian archaeologist and physical anthropologist with a particular interest in khirigsuurs, and Paula De Priest, a Smithsonian ethnobotanist. A specialist in lichens, De Priest has spent several summers with the Tsaatan studying their traditional botanical knowledge, especially as it relates to reindeer herding. The Tsaatan's way of life may be dying out thanks both to rapid modernization and global warming, which threatens the lichens the reindeer depend on. A team of Smithsonian conservators headed by Harriet "Rae" Beaubien is studying ways of preserving the region's deer stones, and this summer used a 3-D laser scanning system to make extraordinarily detailed records of the monuments (see "Deer Stones in 3-D," page 21).

Dubbed the Deer Stone Project, the expedition's goals are ambitious. Fitzhugh hopes to find evidence of cultural links to a circumpolar artistic tradition that could stretch from Mongolia all the way to the Pacific Northwest. "Most people think about Mongolia in terms of East-West connections," says Philip Kohl, an archaeologist at Wesleyan University who has worked on Bronze Age nomadic cultures in Central Asia. "Bill brings a whole different perspective by looking at northern connections. He's also working within a broad anthropological tradition, looking at archaeology in the context of ethnography, for instance." As early as the 1950s, American anthropologists have theorized that Mongolian Bronze Age art influenced Eskimo death masks and ivory ornaments with shamanistic and animal motifs. Fitzhugh's work in Mongolia is aimed in part at looking at these possible links.

Also on the expedition's plate is investigating the nature of the distribution of the thousands of burial mounds across the landscape and their possible relationship to the mysterious deer stones. Still another major interest is the origins of reindeer domestication. Reindeer are herded throughout the Arctic world, from Scandinavia to Kamchatka, but reindeer herding may have gotten its start in northern Mongolia. Though the expedition has so far found no archaeological evidence for early reindeer herding, their search is resulting in the kind of bread-and-butter archaeological data that prehistorians depend on to formulate theories about the past.

The Deer Stone Project is affiliated with archaeologists from the Mongolian Academy of Sciences and the Mongolian National Museum: T. Sanjmyatav "Sasha," an old hand who worked extensively with the Sovi-



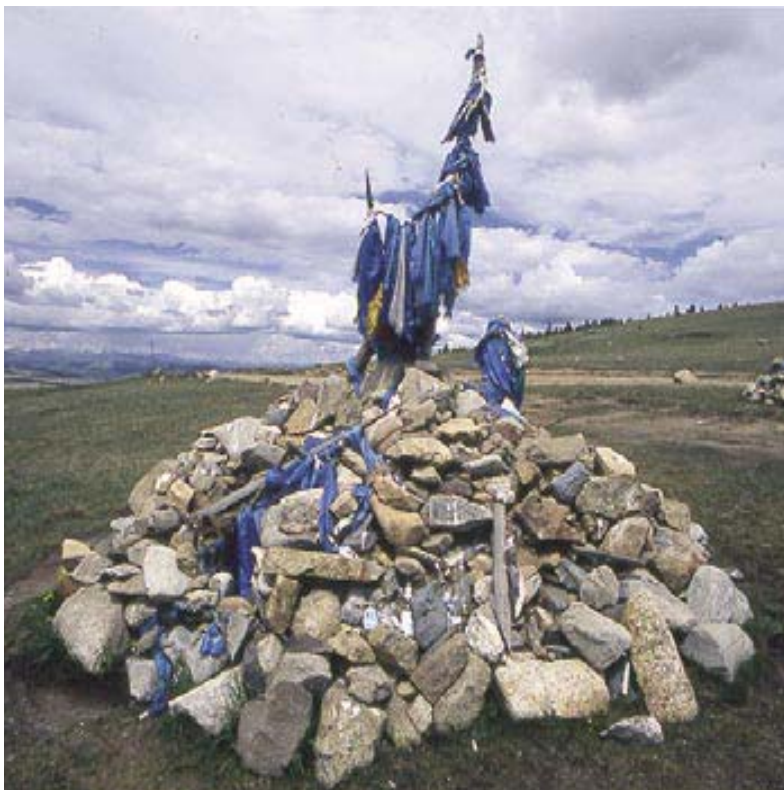
ets, and two young archaeologists, T. Odbaatar and J. Baryasaikhan (Mongolians often use only one name), work closely with Fitzhugh. Ethnographer J. Sukhbaatar, who was born in the Darkhat and maintains close ties to the Tsaatan, also works with the Smithsonian specialists.

This summer I accompanied the expedition for two weeks (Pamela Slutz, the American ambassador to Mongolia, also came along for a few days) and got just a brief glimpse into its wide-ranging program, which includes mapping, surveying, excavating, and ethnographic interviews, in addition to the cutting-edge conservation work. But as I quickly learned, any ambitious expedition in Mongolia

has to budget enormous amounts of time and energy for travel, just as the ancient nomads did.

AFTER LANDING IN ULAANBAATAR, we learn that Mongolia's main airline, Aero Mongolia, has grounded two thirds of its fleet of three planes. A new airline is running flights to Muron, the capital of the Hovskol Aimag,

Buddhist prayer flags decorate a modern-day stone mound, or *ovoo*. William Fitzhugh, far right, examines a deer stone with archaeologist Jamsranjav Baryasaikhan, left, and translator Aidyaibold Namkhai.



Uver, and that one has been looted in recent years. The local government recently turned the site into a kind of archaeological park, which will hopefully discourage this kind of behavior.

Aware that the site is one that would benefit from more complete recording, Beaubien and her team get to work testing their scanning equipment on one of the smaller stones. The results are mixed. Sunlight and wind conspire to make laser scanning difficult.

As the conservators work at Ushkin Uver, the ambassador accompanies Fitzhugh and De Priest to the governor's office in the center of Muron to register their project, a process that is redolent of residual Soviet officialdom.

PERMIT IN HAND, THE expedition heads north to the Darkhat Valley, stopping to spend the night at Lake Erkhel, where another fantastic deer-stone site, called Ulan Tolgoi, is nestled amongst huge khirigsuur overlooking the small lake. (There is a strange abundance of dead birds. A team of biologists later found the avian flu H5N1 had killed them.) One deer stone stands more than 15 feet high, and is the tallest known in Mongolia. Fitzhugh and his crew have excavated here in previous fields seasons. Around one deer stone, the team found horse head burials that date to the late Bronze Age, about 900 B.C. The burials are arranged in a circle around the monument, which Fitzhugh believes shows they were part of the original dedication of the deer stone. The dating is important, and advances a theory proposed by art historian Esther Jacobson-Tepfer of the University of Oregon that Mongolian deer stone art is an early form



of the famed Scythian animal art style that spread across much of Central Asia by 600 B.C. Some Soviet scholars argued that the deer stones were derivative of the Scythian style. But Fitzhugh feels his dating at Ulan Tolgoi supports the idea that nomads in Mongolia were already carving their impressive monuments by the time Scythian art became the rage in Eurasia.

It takes another day for the team to reach the Darkhat Valley. The entrance to the valley is marked by a number of *ovoos*, large sacred stone piles that Mongolian Buddhists place at important points on the landscape, often marking the political boundary of territories. Mongolian Buddhists traditionally add rocks to the *oovo* as an offering while praying for a safe journey. That night we make camp in a small valley called Eft, just upstream of a large number of standing stones. Khirigsuurs dot the small valley.

Next on the agenda is a visit to the Tsaatan reindeer herders in the mountains above the camp. Fitzhugh starts some of the archaeologists digging around a curious, undecorated upright stone not far from where the expedition has pitched its tents. The rest of the crew heads up to the summer camp of the Tsaatan. Numbering just a few hundred, many of the Tsaatan pitch their summer camps in an alpine meadow near at the headwaters of a stream called Mendebulug.

A rare deer stone with a human face, Stone 14 at the site of Ushkin Uver is a frequent target of vandalism. Below, a Bronze Age khirigsuur, or burial mound, at the site of Ulan Tolgoi near Lake Erkhel.



Deer Stones in 3-D

MOST OF THE APPROXIMATELY 500 deer stones in northern Mongolia are isolated and exposed to harsh environmental conditions that threaten to weather them into oblivion. Even their relative isolation doesn't deter vandalism and the occasional looting of stones. In some ways, the monuments are a conservator's nightmare. But they also provide a unique opportunity to test a new technology that is beginning to be adopted by the conservation community: 3-D laser scanning.

"It's still a little-known technique in the archaeology and museum fields," says Harriet "Rae" Beaubien, a conservator at the Smithsonian Center for Materials Research and Education (SCMRE). This past summer, working with SCMRE fellow Vicky Karas and Carolyn Thome, an expert model maker from the Smithsonian's Office of Exhibits, Beaubien used a laser scanner to digitally record 10 deer stones.

The premise is simple. The scanner projects laser light at an object, creating a detailed profile of the object's surface that can then be processed into a highly accurate three-dimensional image. "It's handheld and portable and easy to use with fast results," says Beaubien. "It's not yet a technique that a normal archaeological project might use. But it's got great potential for research, long-term preservation, and conservation."

Monuments like deer stones are traditionally recorded by taking photographs or making line drawings. "Those are great techniques, and they have the advantage of being low cost and relatively easy to do," says Beaubien. "But with the scanning you get something fantastic. Its true beauty is the three-dimensional aspect."

Photographs and drawings can gloss over details like edges and depth, especially important when studying something as intricately carved as a deer stone. A 3-D scan can create a record of the surface down to the tiniest detail, which would make it possible for art historians to assess the possibility that templates, something like ancient



Courtesy Harriet F. Beaubien



Smithsonian conservators shield their scanner from sunlight, above, while collecting data resulting in the image below. Left, Harriet Beaubien monitors scanning as Vicky Karas guides the laser across a stone's surface.



stencil kits, were used to make the deer-stone designs. "The scan allows you to record these designs very, very accurately," says Beaubien. "So it's fodder for art historians and people interested in technology."

The scans can also be used to create faithful replicas of monuments for display and research, and that could replace objects in the field that need to be removed because they are at particularly high risk.

Perhaps the only drawback to the technology is that the laser is sensitive to light, which the Mongolian steppe has in abundance. Most of the team's time was spent devising shelters for their equipment and the deer stones that were being scanned. Eventually, the crew worked out a system of teepee-like structures that could cover even the tallest deer stones. Once they had the logistics worked out, it took two hours to set up the shelter and only an hour to scan a deer stone.

Next year the team plans to return to Mongolia to scan the deer stones at Ushkin Uver, a site that has already lost at least one monument to looting. —EAP

But before we can reach the Tsaatan, we pay another official visit, this time to the local administrator in his office in the village of Tsaganuur. The official is a young man, a former teacher, who has just taken office. In a recent election he defeated the incumbent administrator, who, we learn, may not have had the best interests of the Tsaatan at heart. Apparently, much of a supply of canvas sent from the U.S. embassy for the Tsaatan to use for their tents was actually parcelled out by the previous administrator to inhabitants of the lowland areas as well.

After a lengthy visit to the border guard's offices in Tsaganuur, the expedition rendezvous with the Tsaatan at the head of a narrow valley that leads to Mendebulug. The Tsaatan treat all of the team, especially De Priest, as old friends. Outfitted with horses, we head up the valley and into the mountains. After eight hours of a steep, hard climb on horseback, which is partially alleviated by a clear view of the vast Darkhat Valley and the neighboring Sayan mountains, we reach the Tsaatan camp.

About a dozen teepees are scattered throughout a small valley. I can spot a couple of satellite dishes, and reindeer are everywhere. Completely docile, most of them are lying down behind the tents, tied to stakes. The Tsaatan use reindeer for milk and transport. They rarely slaughter them for food.

But there are signs that reindeer herding may not be viable much longer. Because of the onset of global warming, the tundra at this elevation is effectively thawing, and the lichens the reindeer feed on are not as prevalent as they once were. To hedge their bets, the Tsaatan are bringing lowland yaks and sheep into the mountains, which no one on the expedition can remember seeing at the camp before.

Along with other ethnographers and archaeologists, Fitzhugh believes that reindeer husbandry may have gotten its start here on the southern margins of the reindeer habitat. Perhaps inspired by the close proximity of domesticated horses, the people who once lived where the Tsaatan do today may have taken it upon themselves to train reindeer, using horses as a model.

A trip to Mendebulug means a visit to the tent of Suyan, a woman who is more than 100 years old, and is the group's most revered shaman. She is the only source for much of Tsaatan tradition and folklore. Her frail body and ancient face give us all a sense of how she is linked to a mystical tradition that dates back thousands of years. It's this tradition that Fitzhugh thinks might be responsible for similarities in ritual artifacts used by people across the Arctic world, people as different as the Tsaatan and the Alaskan Eskimo.

There is not much archaeology to be done in the alpine meadows at this altitude, though Fitzhugh has excavated sites here before, including a Neolithic hunting encampment. On this visit, while taking shelter from a storm squall in the tent of a Tsaatan man name Bayandalai, a youth named Erdne shows us two stone artifacts that he found downstream where his family had pitched camp the season before. With a gleam in his eye, Fitzhugh gets on one of Bayandalai's horses and heads to the site with Erdne. I trail behind. We don't find any other artifacts, but it's a tantalizing hint that there is more archaeology to be done in the mountains, though digging here is logistically quite difficult. There are no roads, and everything must be brought in on horseback, which limits the amount of work that can be done.

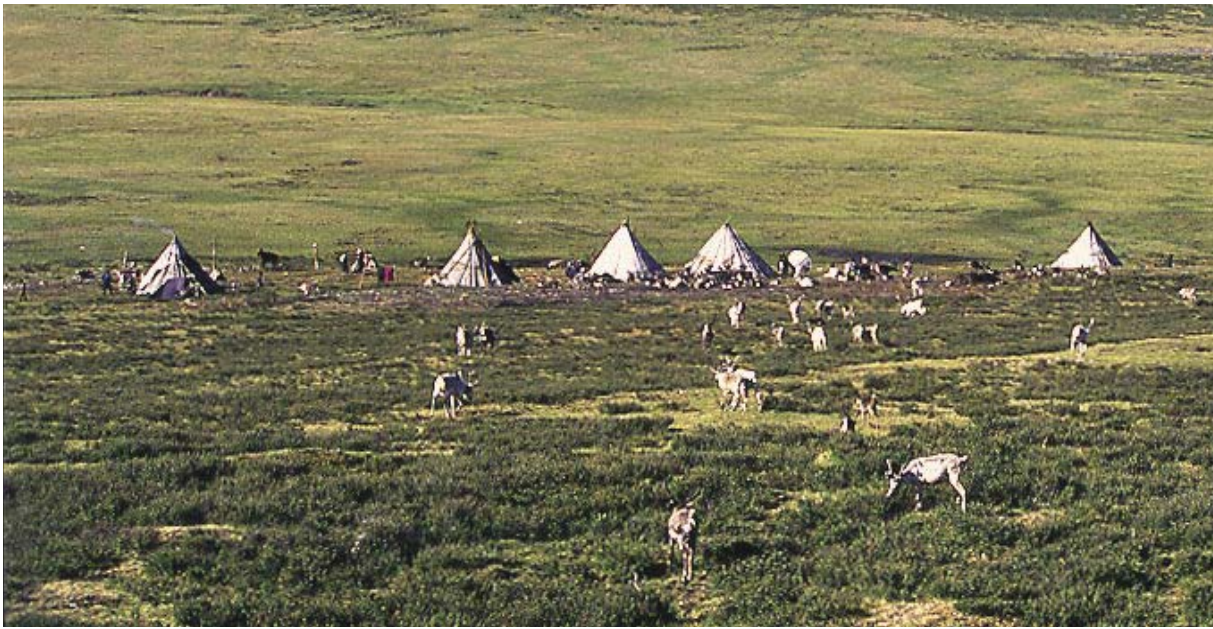
After several rounds of visiting Tsaatan families in their tents, we have had our fill of tea and reindeer cheese, which the Tsaatan are quick to offer any visitor, and it's time to get back down to the valley and the lowland archaeological sites. De Priest stays behind to spend the week with the Tsaatan, who have agreed to accompany her on horseback to the Russian border to look for rare plants.

The trip down is quicker, though muddy. When we reach the lowland, the Mongolians let their horses run. After spending time cooped up in the mountains, all the horses are eager to run. It's exhilarating to race across the steppe.

Back at camp, we find the crew has dug deep around the unmarked stone Fitzhugh had selected for excavation. They have discovered a curious east-west stone alignment below the surface, as well as bones that should date the monument.

Members of the Deer Stone Project excavate a curious undecorated stone in the Darkhat Valley, one of hundreds of upright stones in the region.





The Tsaatan summer camp at Mendebulug offers plenty of lichen, fodder for the large reindeer herds. More than 100 years old, this Tsaatan elder, Suyan, is a link to a millennia-old shamanistic tradition.

The next day, the ambassador leaves, and while the crew continues to dig, two American volunteers, Denis Rydjeski and Betsy Eldredge, and I accompany Odbaatar on a survey of the valley's *khirigsuurs*. For two days we record dozens of the stone mounds before we come across something really exciting: a previously unknown granite deer stone lying on its side in the floodplain. It looks like a simple stone, but Eldredge has sharp eyes, and traces the stone's faint telltale belt with her fingers. She also makes out the faint impressions of an earring carving. Other features reveal themselves as the light changes. Beaubien and her team do a 3-D scan of the stone, which could reveal even more features.

My last day with the archaeologists is spent backfilling the trenches around the upright stone. They feel that it is probably Turkic, based on the alignments of stone that they've found beneath the monument, which often accompany Turkic ritual sites. But only dating the bones will tell for sure.

Leaving the archaeologists after a feast of Mongolian BBQ prepared by the expedition's drivers, I hitch a ride back to Muron with Beaubien and her team, who are headed back to Lake Erkhel to scan more deer stones. My last day with them is spent in the town's vast market, where Beaubien buys large bolts of black cloth. Her team has discovered it needs a reliable tent to shelter their equipment from the sun, which disturbs the scanner. As I leave, she is discussing ways to fashion a makeshift shelter with Tsog, our driver—a low-tech conversation that has to be had before they can use their cutting-edge laser.



THE DEER STONE PROJECT is still years away from completion; work investigating the rich cultural history of the steppe-taiga boundary in the Hovskol Aimag will likely continue for some time.

More excavation and further study of deer-stone iconography will be needed to determine if Mongolia gave birth to the Scythian animal art style, though new radiocarbon dating from this summer's excavations of still more horse-head burials from Lake Erkhel confirms that the deer stones predate the rise of the Scythians. Fitzhugh also needs more time to study whether Bronze Age Mongolia did indeed have some influence on cultures as far away as the Alaskan Eskimo. Frohlich's burial-mound map-

ping project will guide a series of targeted excavations during coming field seasons. If his team can recover bone from enough of the *khirigsuurs*, they may be able to assess whether the square and circle patterns were used to symbolize gender in prehistoric Mongolia.

And all the expedition members are pooling their data with a political scientist, Claudio Cioffi-Revilla of George Mason University. An expert in computer simulations of social networks over space and time, Cioffi-Revilla will use the Deer Stone Project results, along with information from two other expeditions, to model the prehistoric rise of the nomadic cultures of Mongolia. Frohlich and Fitzhugh's carefully collected data will be added to a computer simulation that aims to show, in the words of the project proposal, "how a relatively obscure group of steppe nomads managed to conquer and rule such a substantial swath of the Old World." ■

ERIC A. POWELL is managing editor of *ARCHAEOLOGY*.



Appendix I

Radiocarbon Dates List

Table 1. Radiocarbon Dates from Deer Stone Sites in Hovsgol Aimag

site / feature	location/year	sample no.	material*	uncorrected#	calib (2-sig)
Ulaan Tolgoi DS5	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 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 / 2003	B-193738 AMS	bone coll.	2530 ± 40 BP	BP 2750-2470
Ulaan Tolgoi DS4 F2	Erkhel / 2003	B-193739 AMS	bone coll.	2950 ± 40 BP	BP 3240-2970
Ulaan Tolgoi DS4 F3	Erkhel / 2003	B-193740 AMS	bone coll.	2810 ± 40 BP	BP 2990-2800
Ulaan Tolgoi DS4, F5	Erkhel / 2004	B-207205 RAD	bone coll.	2790 ± 70 BP	BP 3220-2800
Ulaan Tolgoi DS4, F6	Erkhel / 2004	B-207206 RAD	bone coll.	2740 ± 70 BP	BP 3150-2780
Ulaan Tolgoi Md1 SM-A 3260-3000		Erkhel / 2005	B-215644 AMS		charcoal 2980 ± 40 BP B P
Ulaan Tolgoi Md1 SM-A BP	BP 3080-2870	Erkhel / 2005	B-215692 AMS		tooth coll. 2860 ± 40
Ulaan Tolgoi Md1 SM-B BP	BP 3320-2940	Erkhel / 2005	B-215693 AMS		tooth coll. 2950 ± 60
Ulaan Tolgoi Md1 NEC	Erkhel / 2005	B-215643 AMS	charcoal	3030 ± 40 BP	BP 3350-3090
Tsatstain Khoshuu	Tsatst / 2004	B-207207 AMS	tooth coll.	2920 ± 40 BP	BP 3330-3060
S49 external mound	Soyo / 2004	B-216280 AMS	tooth coll.	2800 ± 50 BP	BP 3000-2780 +
S49 central mound	Soyo / 2004	B-216281 AMS	bone coll. @	2900 ± 50 BP	BP 3210-2880 +
S50 central mound	Soyo / 2004	B-216282 AMS	bone coll. @	2560 ± 50 BP	BP 2660-2480 +

* collagen date; # with $^{13}\text{C}/^{12}\text{C}$ correction; @ human; + B. Frohlich samples