PART IV

Documentation of Mongolia's Deer Stones, 2007 Field Season

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OVERVIEW OF THE 2007 FIELD SEASON

The 2007 field season was the third year of conservators' involvement in the field activities of the Joint Mongolian-Smithsonian Deer Stone Project [DSP], directed by William W. Fitzhugh, of the National Museum of Natural History's Arctic Studies Center. Led by senior conservator Harriet F. (Rae) Beaubien (primary author of this report), the MCI team also included Christiane Bathow, an intern at Breuckmann GmbH in Germany, the company that developed a scanner specifically for cultural heritage applications; through a cooperative agreement with MCI, Bathow received additional training in scanning within a museum context.

Our primary objectives during the 2007 field season were (1) to document deer stones at sites that the DSP would be surveying and excavating in Hovsgol aimag, especially the northern Darkhad Valley region; and (2) to complete the documentation of deer stones from the site of Ushkiin Uver, by scanning the two fragments belonging to deer stone #15, currently in the Hovsgol Museum collection. (The deer stones *in situ* were scanned in 2006.) Over a three-week period, complete high-resolution 3D digital records were produced for 14 deer stones from 6 locations including the Hovsgol Museum; these were among 30 partial or complete deer stones documented systematically with photographs and condition records. MCI's participation was supported by funds from the Smithsonian's Under Secretary for Science Endowment and the Samuel H. Kress Foundation.

General Time Line

Beaubien and Bathow arrived in Mongolia on 5 June 2007, meeting up with other members of the DSP team in Ulaanbaatar. Shortly before their arrival, the 4th Annual Symposium of the Joint Mongolian-Smithsonian Deer Stone Project was held in Ulaanbaatar, with conference presentations on current projects of interest to the archaeological community. Results from our previous season's scanning effort were incorporated in Fitzhugh's presentation.

The DSP team left Ulaanbaatar on 6 June, stopping at the deer stone sites at **Olziyt** and **Ulaan Tolgoi** in conjunction with a stop in Muren, the Hovsgol aimag center. There, Beaubien, Fitzhugh and key Mongolian team members visited Dr. Altantsetseg, the director of the Hovsgol Museum, in their temporary quarters in the theater building on the main square. We used this opportunity to distribute copies of field reports and make arrangements for scanning later in the season the recently recovered fragments of Ushkiin Uver's deer stone #15, now stored at the museum.

The team's destination for the first phase of archaeological research was the Shishged River, beyond Tsagaanuur [10-16 June] in the northern Darkhad Valley, passing en route the deer stone at **Tsatstain Khoshuu**. This phase was carried out from our base camp along the Khorgorgo River, north of the Shishged. Excavations included an area adjacent to our base camp, with a prominent stone feature that yielded evidence of lithic activity and a human burial. The scan team provided assistance with excavation as well as cleaning and packaging finds.

From this base camp, other sites that had been identified in 2006 were investigated as pos-

sibilities for scanning including two rock art sites, East Ridge and West Ridge; an *ovoo* nearby at the **Tsagaan Us** pass, which incorporates two stone monuments**;** and the deer stone sites of **Avtiin** and **Hort Uzuur**. The latter two sites were chosen for excavation and – given time constraints, logistical challenges of accessing the rock art sites with the scanning equipment, and archaeological priorities – selected as priorities for scanning.

The second phase of archaeological research was based at the deer stone site of **Khushuugiin Devseg**, on a plateau east of Lake Erkhel [17-23 June]. This was a focus of scanning activities in 2005, test excavations in 2006 and further exploration and scanning in the 2007 field season. Text excavations and deer stone documentation activities also took place at the sites of **Tumst** and **Khyadag** (located south of Lake Erkhel), with 3D scanning carried out at latter's East and West Groups. While based in this region, we returned to the **Hovsgol Museum** in Muren to scan the fragments of Ushkiin Uver DS #15, which are now considered part of the museum collection. The fragments were stored in a metal cage structure in the backyard of the original museum building, currently unoccupied because of structural problems but scheduled for reconstruction beginning in the summer. Based on the conservators' suggestions in 2006, shortly after their recovery, the fragments had been raised from the ground surface onto blocks of wood and covered with plastic sheet; they appeared to be in good condition. After official negotiations with the museum director and aimag authorities in Muren, and production of a written contract, signed by Ayush, Beaubien and the museum director, we received permission to scan.

After an overnight stop near the Khunuy River, we visited an **unnamed deer stone site** en route to Ulaanbaatar (arriving 24 June). Once in Ulaanbaatar, Beaubien and Fitzhugh were able to meet with Enkhbat, director of the Cultural Heritage Center, to discuss our deer stone documentation work and future participation in CHC's heritage registry program. Beaubien also consulted with the curatorial staff at the National Museum of Mongolian History and assisted the project personnel with registration of the season's finds. The team and equipment returned to the United States on 26 June.

DEER STONE DOCUMENTATION

All conservation activities were recorded in a notebook, supplemented with worksheets for individual deer stones, with descriptive information as well as details about the scanning parameters, digital photographs and the digital scan files. The original documents and additional reports are archived at MCI, in Suitland, Maryland. The deer stone documentation methods and activities are summarized below.

Sites and Monument Designations

For record keeping purposes, the deer stones were identified in as consistent a manner as possible, using previous systems if known. For upright stones, our convention for labeling the individual sides was to begin with the south face (side 1) and continue around the stone clockwise (west as side 2, etc.). For deer stones in fragments, letter designations (A, B) were assigned to fragments, from the top down.

Fig. 1 Olziyt deer stones: (left to right) #3, #2, and #1 (Beaubien, 7 June 2007)

Olziyt [Arkhangai aimag, Olziyt sum, Mungun Khundii district]

The site, which the DSP has visited in previous years, was photographed by the MCI team on 7 June 2007. Following the designations used by Volkov (2002) for Site 14, the deer stones are numbered #1-#3 (**Fig.1**); #4 listed by Volkov was not noted by the MCI team.

Fig. 2 Ulaan Tolgoi deer stones (left to right): #4, #5, (most distant), #3, #2 and #1, looking northeast [Beaubien, 2 July 2005]

Fig. 3 Tsatstain Khoshuu deer stone #1 [Beaubien, 9 June 2007]

Ulaan Tolgoi [Hovsgol aimag, Alag Erdene sum]
Following the system used in previous years by the DSP, including for scanning activities in 2005 and 2006, the stones at the site are designated #1-#5, from south to north (**Fig.2**). The site was visited and some of the monuments photographed on 8 June 2007.

Tsatstain Khoshuu [Hovsgol aimag]
The primary stone monument, first recorded by the DSP in 2004 and test-scanned in 2005, is designated #1 (**Fig.3**). The site was visited and photographed on 9 June 2007.

Fig. 4 Ovoo at the Tsagaan Us pass, incorporating deer stone #1 (center) and #2 (left) [Beaubien, 11 June 2007]

Tsagaan Us ovoo ("White Water pass") [Hovsgol aimag, Renchinlumbe sum]
This site was visited by the DSP first on 16 June 2006, and again on 11 June 2007. The deer stones incorporated in the *ovoo* are designated #1 and #2 based on prominence; the latter had no obvious markings (**Fig.4**).

Fig. 5 Atviin deer stones: #1 (background), #2 (A and B), #3 (left) and #4 [Beaubien, 11 June 2007]

Avtiin [Hovsgol aimag, Renchinlumbe sum]
This site was initially investigated by the DSP in 2006; 4 deer stones (1 in two fragments) were excavated and the largest one was positioned vertically. They were not given numbers at that time. During documentation, including scanning, and excavation work at the site in 2007 (11-12 June), the MCI team designated them as #1-#4, based on size; the two fragments of #2 were assigned A and B (beginning with the upper one) (**Fig.5**).

Hort Uzuur ("Poison Corner") [Hovsgol aimag, Renchinlumbe sum, in Tavh Hills]
The site was first investigated by the DSP in 2006 (18-19 June); 6 deer stones were designated as follows: deer stone #1 (southernmost, standing), #2-#4 (in Locus 2, #3 excavated), #5 (in Locus 3, excavated), #6 (northernmost, excavated) (**Figs.6-7**). This numbering system was used during documentation, including scanning, and excavation work at the site in 2007 (13 June).

Fig. 6 Hort Uzuur deer stone #5 [Beaubien, 13 June 2007]

Fig. 7 Hort Uzuur deer stones: #1 in background and (left to right) #2-#4, looking south [Beaubien, 13 June 2007]

Khushuugiin Devseg [Hovsgol aimag, Alag Erdene sum]

Until 2007, the site had only two visible deer stones, designated #1 and #2 (south to north) by the DSP. Provisionally named Erkhel East 1 when the stones were scanned in 2005, it was renamed at the time of the DSP's 2006 excavations. Excavations by the DSP in 2007 uncovered a third fallen stone to the south, designated #3, which was erected in an approximate position, generally aligned with the others (**Fig.8**). Documentation in 2007 included 3D scanning.

Fig. 8 Khushuugiin Devseg deer stones: (left to right) #2, #1 and #3, looking south [Beaubien, 21 June 2007]

Khyadag – West Group [Hovsgol aimag, Buren Togtokh sum]

The site was briefly visited by the DSP in 2002, with no deer stone numbering system used. In 2007, the MCI team designated them #1-#4, moving clockwise from the tallest one (#1, southernmost of the group) (**Fig.9**). This system was used for documentation, included scanning, during excavation work at the site (18 and 21 June).

Fig. 9 Khyadag West Group deer stones: (left to right) #2-#4 and #1, looking east toward the East Group [Beaubien, 18 June 2007]

Khyadag – East Group [Hovsgol aimag, Buren Togtokh sum]

The site was briefly visited by the DSP in 2002, with no deer stone numbering system used. In 2007, the MCI team designated the prominent deer stone as #1, with the vertical stone in 2 fragments, nearby to the northwest, as #2A (upper) and B (**Fig.10**); other fragments in this group may be deer stone fragments, but were not numbered by the MCI team. These designations were used for documentation, including scanning, during excavation work at the site (18 and 21 June).

Fig. 10 Khyadag East Group deer stones in the main cluster: (left to right): #1 and #2 (A and B), looking west toward the West Group [Beaubien, 21 June 2007]

Ushkiin Uver [Hovsgol aimag, Muren sum]
The deer stone designations follow those used by Volkov (2002) for Uushigiin Övör (Site 67), also used by Permanent Archaeological Joint Mongolian and Japanese Mission [PAJMJM], which has been investigating the site (called Ulaan Uushig I) since 1999. Deer stone #15, recorded intact by Volkov, had disappeared from the site at some point in the past, but two fragments recovered in 2005, and now in the Hovsgol Museum, are from this monument (**Figs.11-13**). The fragments were first photographed by the 2006 MCI team, after Ushkiin Uver's *in situ* deer stones had been scanned. The fragments were designated A (upper) and B (middle), for documentation and scanning in 2007.

Fig. 11 Ushkiin Uver deer stone #15 fragments at the Hovsgol Museum: A (right) and B [Beaubien, 26 June 2006]

Tumst [Hovsgol aimag, Alag Erdene sum]
The site was found by the DSP in 2007. The one standing stone was designated #1; the other two were arbitrarily designated #2 (larger) and #3 by the MCI team (**Fig.14**).

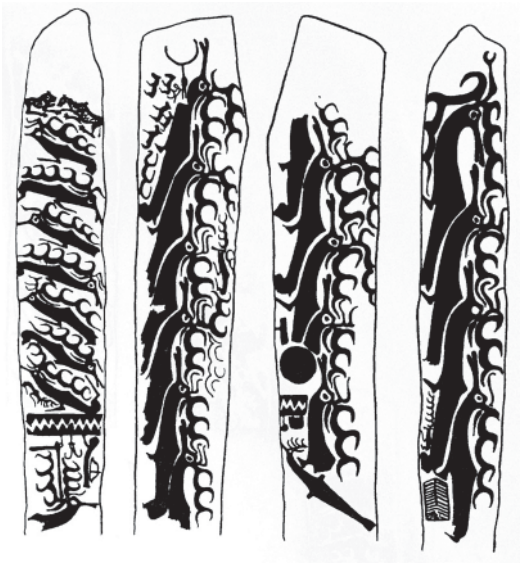

Fig. 12 Illustration of Uskiin Uver deer stone #15 (in situ) from Volkov [2002: 193, T 78]. The sequence of sides (front, right, left, back) corresponds to MCI sides 1-2-4-3.

Site (unnamed), between the Khunuy River and Ulaanbaatar
The sole standing stone at the site was designated #1 by the MCI team, and photographed (**Fig.15**).

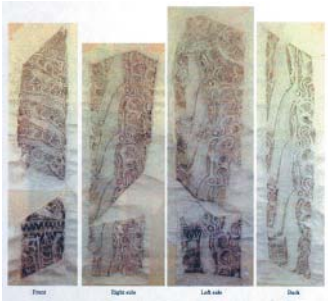

Fig. 13 Rice paper rubbing of deer stone #15 fragments [from PAJMJM 2005:85]. The sequence of sides follows Volkov (see Fig. 12) and corresponds to MCI sides 1-2-4-3.

Unknown provenience, now National Museum of Mongolian History, Ulaanbaatar
This deer stone was recently erected in front of the museum, and was photographed by the MCI team in 2007 (**Fig.16**).

Fig. 14 Tumst deer stones: #1 (background), #2 (right foreground) and #3 [Beaubien, 20 June 2007]

Fig. 16 Deer stone at the National Museum of Mongolian History, Ulaanbaatar [Beaubien, 25 June 2007]

General Documentation

Fig. 15 Deer stone at a site en rouge to Ulaanbaatar [Beaubien, 24 June 2007]

Individual worksheets were used in order to standardize the information being collected for each deer stone. Condition notes and measurements were recorded on sketch drawings of each side, noting features such as deep cracks, spalling cracks, areas of delamination, and losses; lichen, bird droppings and other biological accretions; stains from human applications and from animal rubbing; mineral crusts, concrete residues, and graffiti. Site location and elevation were recorded with a Garmin GPS device**.** Directional orientation of the footprints of erected deer stones were recorded with a compass on sketch plans. Any cleaning actions were also recorded, which included occasional removal of accretions using bamboo skewers and toothbrushes, and clearance of loose stones and plant growth at the bases prior to scanning. Digital photographs were taken of all accessible sides; these incorporated label, standard color and dimension scales whenever possible. Separate worksheets were also filled out for deer stones that were 3D scanned, to record scanning conditions, instrument settings, and file processing details.

3D Scanning

Scanning Equipment
A Breuckmann triTos (GmbH) structured light system was used for scanning in 2007, based on a successful field season of use in 2006. Its components include the tripod-mounted sensor bar (in this case 30 cm long) with projector and camera, and the controller, safely transported within a custom-made hard case (**Fig.17**).

The camera lenses are interchangeable to give varying fields of view; in this case, 675 mm lenses were used, which allowed a field of view of 67 cm on the diagonal for each "patch," with a working distance of 1.085 m. The scanner's projected light patterns are calibrated using optical calibration plates, housed separately in a hard case. The triTos system software was run on a Hewlett-Packard Pentium IV laptop computer. The computer and scanner were powered in the field by a Honda EU1000i generator developed specifically for use with precision equipment, used during the previous two field seasons and stored in the interim in Ulaanbaatar.

Scanning Process (general)
A 3D file for the object is constructed from "patches" of data that are stitched together during the scanning process. For each patch, the proper working distance is established by aligning two laser dots on the object's surface, and then a series of organized patterns of structured light is projected in quick succession (**Figs.17-18**). The patterns are simultaneously photographed using a digital camera that is aligned with the projector. The photographic images capture the edge distortion of the projected light pattern as it strikes the object, as well as color information. The system software processes

the distortion and color information to generate 3D point cloud data. Because the point cloud's (XYZ) range and (RGB) color values are recorded together, the color information is registered exactly with its corresponding 3D point. After the light sequence is completed, the patch of new data

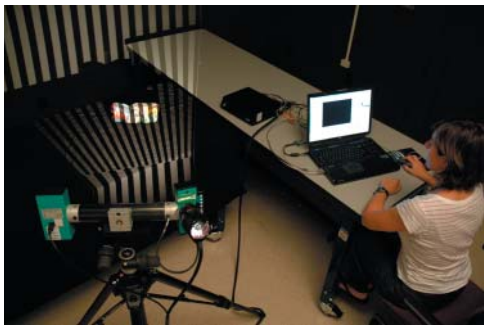

Fig. 17 Scanning set-up at MCI, showing the tripod-mounted camera and projector, the controller on the table with the computer, and the graphic display of scan data in progress on the computer screen [2007]

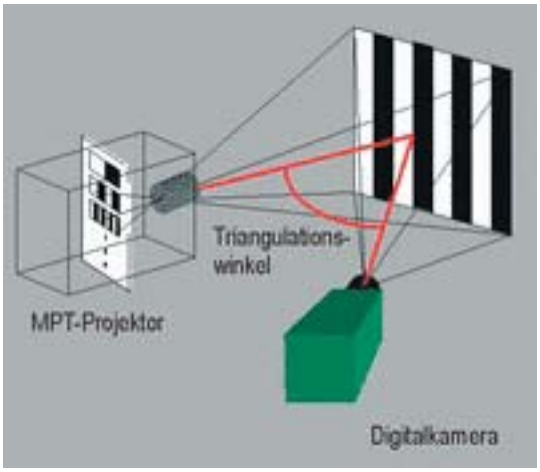

Fig. 18 Diagram of the triangulation method used to measure edge distortion in the projected light pattern [http://www.beuckmann.com, 2007]

is displayed graphically on the computer screen; it can be added to the previously acquired data by aligning several overlapping surface feature details. The data file can be temporarily closed and reopened, which allows the scanning process to be carried out in more than one phase if necessary.

The triTos system has a triangulation angle of 20 degrees, which allows for fewer scans and better data capture on objects with complex geometry, e.g., areas of high relief, although the tripod mounting can also inhibit access to some surfaces. Even with the lowest resolution lens, the resolution is 15-20 microns.

Field Procedures

The structured light scanning system is somewhat sensitive to light conditions, which can affect contrast in the light patterns projected onto the object. Day-time scanning required that temporary shade shelters be built over the deer stones, large enough to accommodate the working distance between the tripod-mounted sensor bar and surfaces to be scanned. Fortunately, the Breuckmann scanner was not adversely affected by cold temperatures, so we were also able to scan at night. Night scanning proved to be the most effective arrangement, obviating the need for a shelter and providing ideal light-contrast conditions to produce excellent data (**Fig.19**). This approach was used to scan the deer stones at the sites of Khushuugiin Devseg and Khyadag, which were easy to access by van; the nearly 3-meter deer stone (#1) in the Khyadag West Group would have otherwise been extremely difficult to shade adequately.

Fig. 19 Khushuugiin Devseg deer stone #1 being scanned at night [Beaubien, 21 June 2007]

Day-time scanning was carried out when schedules needed to be synchronized with the archaeological team, such as at Avtiin and Hort Uzuur, or with staff at the Hovsgol Museum. At these locations, shelters were constructed using medium-weight canvas (40 m, sewn into a 10 m x 6 m panel), draped on a structure constructed using 5-meter

wooden poles borrowed from nearby animal corrals (**Fig.20**), or – at the museum – over the metal cages (**Fig.21**).

Our procedure typically included mechanical removal of dimensional accretions (mostly bird droppings) and intrusive grass or stones around the base, prior to scanning. Bathow calibrated the scanner at the beginning of each session, recalibrating only if environmental conditions changed dramatically; she operated the computer during scanning, while Beaubien handled the tripod. The scan process for each deer stone was completed within a single session, with the exception of one that was interrupted by rain. The time needed for scanning ranged from just under 0.5 to over 3.5 hours (see the table for specific times). Given time and logistical constraints in the field and computer memory requirements, the processing phase (outlined below) is currently taking place at MCI.

Fig. 20 Atviin deer stone #1, with shelter being set up for day-time scanning [Bathow, 12 June 2007]

Fig. 21 Ushkiin Uver deer stone #15 fragments at the Hovsgol Museum, being sheltered for day-time scanning [Beaubien, 19 June 2007]

Data Processing (on-going)

The raw data files from structured light scanning are very large, but can be stored on the laptop computer; they are generally of excellent quality and relatively unflawed. The minimal noise arises from overlaps and alignment during scanning, and is easily filtered out during processing. This is being done by B. Vicky Karas at MCI in two steps, which is expected to take approximately 6 hours per deer stone data file, based on previous experience with the 2006 data.

In the first step, the triTos system software (Optocat 2006) is used to convert the raw data files into STL and PLY files. The PLY format, in particular, is designed to store 3D data with a variety of properties, such as color information, surface normals and texture coordinates; these features allow the front and back sides of the surface data's polygonal mesh to have different properties. These are exported to Rapidform (XOS or 2006) 3D graphic software, used in the second step for all further processing. This includes alignment and merging, and filling holes. The software allows the operator to select the particular holes to fill and creates a fill by extrapolating curvature from the data mesh surrounding the hole. The fills are displayed as a uniform mesh (in mesh view), or as a smooth patch for larger fills (in solid view), so that fills are always detectable. The fully processed data files are saved as new STL and PLY files (formats that can be exported to a variety of software applications). These files are archived at MCI under site-specific project numbers, and can be copied to CD with a free viewer program for distribution.

Summary of Documentation Activities in 2007: The following table summarizes the types of information produced by the MCI team.

KHUSHUUGIIN DEVSEG, east of Lake Erkhel (Hovsgol aimag, Alag Erdene sum)			
KD.01	Vertical, complete to top	2007: photos 4 sides, top (HFB 18-21jun07); condition record [2005, as EE1.01: see *MCI 5974*, *6086.1*, and Deer Stone Archives Report 1, filed under *MCI 5945*]	Complete raw data file of above-ground portion (21jun07) – scan time 1 hr.15 min.; see *MCI 6086.2*
KD.02	Vertical, complete to top	2007: photos 4 sides, top (HFB 18-21jun07) [2005, as EE1.02: see *MCI 5974*, *6086.1*, and Deer Stone Archives Report 1, filed under *MCI 5945*]	–
KD.03	Excavated, complete; erected in 2007	2007: photos 4 sides, top, bottom (HFB 18-21jun07); condition record, footprint/orientation (after positioning), cleaning notes	Complete raw data file of entire object (20jun07) – scan time 1 hr.15 min.; see *MCI 6086.2*
KHYADAG – West Group, south of Lake Erkhel (Hovsgol aimag, Buren Togtokh sum)			
KW.01	Vertical, complete to top	2007: photos 4 sides (HFB 18,21jun07); condition record, footprint/orientation; cleaning notes	Complete raw data file of above-ground portion (22jun07) – scan time 3 hr.40 min.; see *MCI 6158*
KW.02	Vertical, complete to top	2007: photos 4 sides, top (HFB 18,21jun07); condition record, footprint/orientation, cleaning notes	Complete raw data file of above-ground portion (20jun07) – scan time 1 hr.15 min.; see *MCI 6158*
KW.03	Loose, complete to top	2007: photos 2 sides, top, bottom(HFB, 18,21jun07); condition record, cleaning notes	Complete raw data file of entire object (20jun07) – scan time 1 hr.10 min.; see *MCI 6158*
KW.04	Vertical, complete to top	2007: photos 4 sides(HFB 18,21jun07); condition record, footprint/orientation, cleaning notes	Complete raw data file of above-ground portion (19-20jun07) – scan time 1 hr.55 min.; see *MCI 6158.*
KHYADAG – East Group, south of Lake Erkhel (Hovsgol aimag, Buren Togtokh sum)			
KE.01	Vertical, complete to top	2007: photos 4 sides (HFB 18,21jun07); condition record; footprint/orientation, cleaning notes	Complete raw data file of above-ground portion (21-22jun07) – scan time 1 hr.30 min.; see *MCI 6158*
KE.02A	Loose fragment, top portion	2007: photos 4 sides, top(HFB 18,21jun07); condition record	–
KE.02B	Vertical, lower portion	2007: photos 4 sides, top (HFB 18,21jun07); condition record, footprint/orientation	–
USHKIIN UVER (Hovsgol aimag, Muren sum) – now at **MUREN, Hovsgol Museum**			
UU.01 to UU.14, UU.x1 to U.x3	Various: Vertical (complete to top, incomplete), Loose fragmants	2007: not photographed [2005, 2006: see *MCI 5974*, *6047*, *6084.1* and *6089*] [Also: Volkov 2002:78-83, 187-194 Tables 72-79]	–
UU.15A	Loose fragment, from near top	2007: photos 4 sides, top and bottom breaks (HFB, CB 19jun07) [2006: photos 4 sides, top, break (HFB, 26jun06)] [Also: Volkov 2002:193-Table 78; PAJMJM 2005:73-74 Fig.21 – photo: R side, 85 Pl VIII – rubbings 4 sides, details; Shu *et al.* 2006:75, 102 Pl 20.2, drawings 4 sides]	Complete raw data file of entire fragment (19jun07) – scan time 1 hr.50 min.; see *MCI 6084.2*
UU.15B	Loose fragment, from middle	2007: photos 4 sides, top and bottom breaks (HFB 19jun07) [2006: photos 4 sides, 2 breaks (HFB, 26jun06)] [Also: Volkov 2002:193-Table 78; PAJMJM 2005:73-74 Fig.21 – photo: R side, 85 Pl VIII – rubbings 4 sides, details; Shu *et al.* 2006:75, 102 Pl 20.2, drawings 4 sides]	Complete raw data file of entire fragment (19jun07) – scan time 40 min.; see *MCI 6084.2*
TUMST, east of Lake Erkhel (Hovsgol aimag, Alag Erdene sum)			
DS.01	Vertical, complete to top	2007: photos 4 sides, top (HFB 20jun07)	–
DS.02	Loose, nearly complete	2007: photos 4 sides, bottom break (HFB 20jun07)	–
DS.03	Loose, nearly complete	2007: photos 3 sides, bottom break (HFB 20jun07)	–
Site (unnamed) (XXXX aimag, XXXX sum)			
DS.01	Vertical, complete to top	2007: photos 4 sides (HFB 24jun07)	–
Site (unknown) - now ULAANBAATAR, National Museum of Mongolian History			
DS.01	Vertical, complete to top	2007: photos 4 sides, top (HFB 25jun07)	–

KHUSHUUGIIN DEVSEG, east of Lake Erkhel (Hovsgol aimag, Alag Erdene sum)			
KD.01	Vertical, complete to top	2007: photos 4 sides, top (HFB 18-21jun07); condition record [2005, as EE1.01: see *MCI 5974*, *6086.1*, and Deer Stone Archives Report 1, filed under *MCI 5945*]	Complete raw data file of above-ground portion (21jun07) – scan time 1 hr.15 min.; see *MCI 6086.2*
KD.02	Vertical, complete to top	2007: photos 4 sides, top (HFB 18-21jun07) [2005, as EE1.02: see *MCI 5974*, *6086.1*, and Deer Stone Archives Report 1, filed under *MCI 5945*]	–
KD.03	Excavated, complete; erected in 2007	2007: photos 4 sides, top, bottom (HFB 18-21jun07); condition record, footprint/orientation (after positioning), cleaning notes	Complete raw data file of entire object (20jun07) – scan time 1 hr.15 min.; see *MCI 6086.2*
KHYADAG – West Group, south of Lake Erkhel (Hovsgol aimag, Buren Togtokh sum)			
KW.01	Vertical, complete to top	2007: photos 4 sides (HFB 18,21jun07); condition record, footprint/orientation; cleaning notes	Complete raw data file of above-ground portion (22jun07) – scan time 3 hr.40 min.; see *MCI 6158*
KW.02	Vertical, complete to top	2007: photos 4 sides, top (HFB 18,21jun07); condition record, footprint/orientation, cleaning notes	Complete raw data file of above-ground portion (20jun07) – scan time 1 hr.15 min.; see *MCI 6158*
KW.03	Loose, complete to top	2007: photos 2 sides, top, bottom(HFB, 18,21jun07); condition record, cleaning notes	Complete raw data file of entire object (20jun07) – scan time 1 hr.10 min.; see *MCI 6158*
KW.04	Vertical, complete to top	2007: photos 4 sides(HFB 18,21jun07); condition record, footprint/orientation, cleaning notes	Complete raw data file of above-ground portion (19-20jun07) – scan time 1 hr.55 min.; see *MCI 6158*.
KHYADAG – East Group, south of Lake Erkhel (Hovsgol aimag, Buren Togtokh sum)			
KE.01	Vertical, complete to top	2007: photos 4 sides (HFB 18,21jun07); condition record; footprint/orientation, cleaning notes	Complete raw data file of above-ground portion (21-22jun07) – scan time 1 hr.30 min.; see *MCI 6158*
KE.02A	Loose fragment, top portion	2007: photos 4 sides, top(HFB 18,21jun07); condition record	–
KE.02B	Vertical, lower portion	2007: photos 4 sides, top (HFB 18,21jun07); condition record, footprint/orientation	–
USHKIIN UVER (Hovsgol aimag, Muren sum) – now at **MUREN, Hovsgol Museum**			
UU.01 to UU.14, UU.x1 to U.x3	Various: Vertical (complete to top, incomplete), Loose fragmants	2007: not photographed [2005, 2006: see *MCI 5974*, *6047*, *6084.1* and *6089*] [Also: Volkov 2002:78-83, 187-194 Tables 72-79]	–
UU.15A	Loose fragment, from near top	2007: photos 4 sides, top and bottom breaks (HFB, CB 19jun07) [2006: photos 4 sides, top, break (HFB, 26jun06)] [Also: Volkov 2002:193-Table 78; PAJMJM 2005:73-74 Fig.21 – photo: R side, 85 Pl VIII – rubbings 4 sides, details; Shu *et al.* 2006:75, 102 Pl 20.2, drawings 4 sides]	Complete raw data file of entire fragment (19jun07) – scan time 1 hr.50 min.; see *MCI 6084.2*
UU.15B	Loose fragment, from middle	2007: photos 4 sides, top and bottom breaks (HFB 19jun07) [2006: photos 4 sides, 2 breaks (HFB, 26jun06)] [Also: Volkov 2002:193-Table 78; PAJMJM 2005:73-74 Fig.21 – photo: R side, 85 Pl VIII – rubbings 4 sides, details; Shu *et al.* 2006:75, 102 Pl 20.2, drawings 4 sides]	Complete raw data file of entire fragment (19jun07) – scan time 40 min.; see *MCI 6084.2*
TUMST, east of Lake Erkhel (Hovsgol aimag, Alag Erdene sum)			
DS.01	Vertical, complete to top	2007: photos 4 sides, top (HFB 20jun07)	–
DS.02	Loose, nearly complete	2007: photos 4 sides, bottom break (HFB 20jun07)	–
DS.03	Loose, nearly complete	2007: photos 3 sides, bottom break (HFB 20jun07)	–
Site (unnamed) (XXXX aimag, XXXX sum)			
DS.01	Vertical, complete to top	2007: photos 4 sides (HFB 24jun07)	–
Site (unknown) - now ULAANBAATAR, National Museum of Mongolian History			
DS.01	Vertical, complete to top	2007: photos 4 sides, top (HFB 25jun07)	–