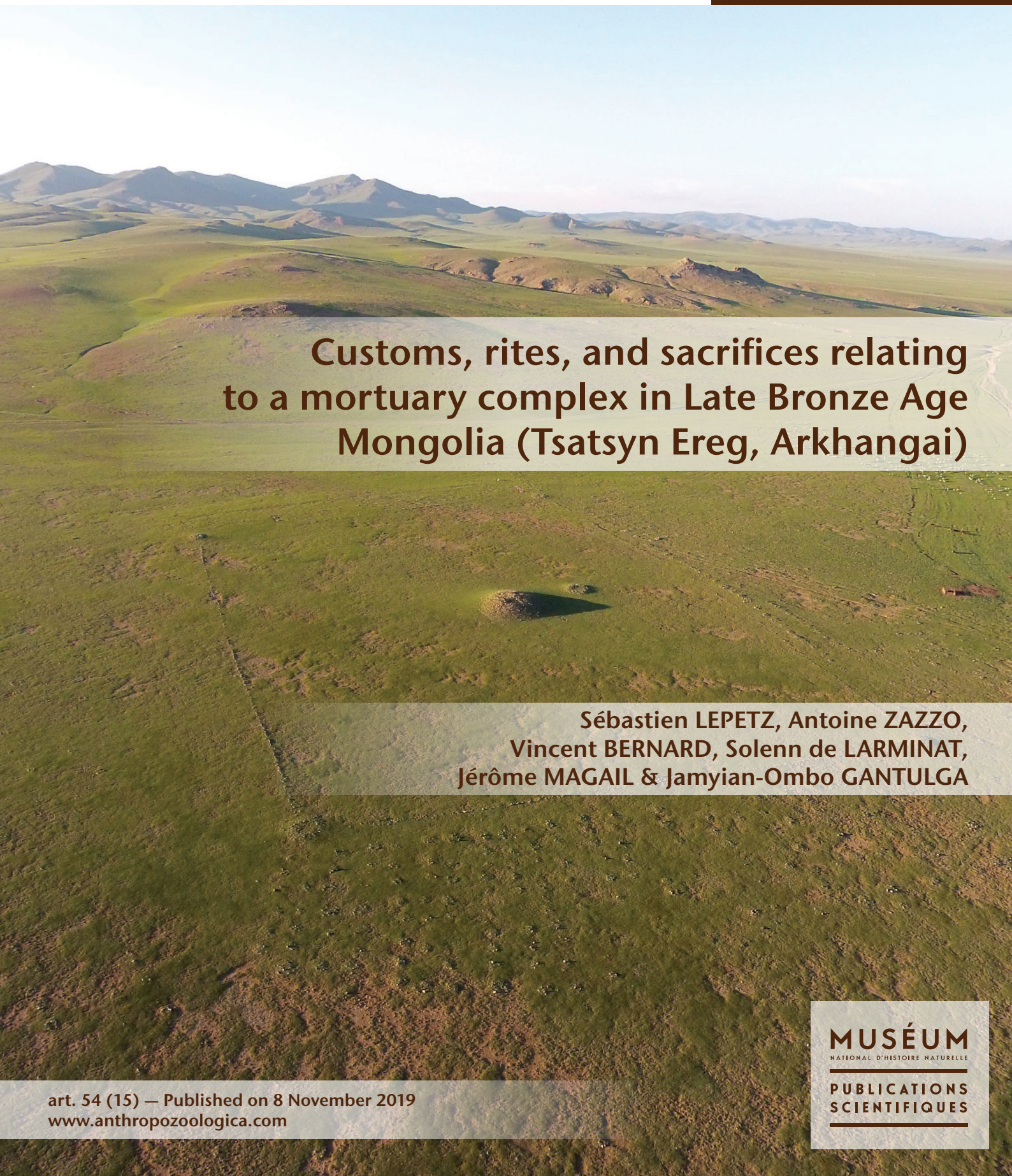
anthropozoologica
2019 • 54 • 15



Customs, rites, and sacrifices relating to a mortuary complex in Late Bronze Age Mongolia (Tsatsyn Ereg, Arkhangai)

Sébastien LEPETZ, Antoine ZAZZO,
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art. 54 (15) — Published on 8 November 2019
www.anthropozoologica.com

MUSÉUM
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PUBLICATIONS SCIENTIFIQUES

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Vue du khirigsuur B10 à Tsatsyn Ereg (vue du sud-ouest). Photographie : J. Magail / *View of the khirigsuur B10 at Tsatsyn Ereg (view from the south-west). Photograph:J. Magail*.

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Anthropozoologica est une revue en flux continu publiée par les Publications scientifiques du Muséum, Paris, avec le soutien du CNRS.
Anthropozoologica *is a fast track journal published by the Museum Science Press, Paris, with the support of the CNRS.*
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Diffusion – Publications scientifiques Muséum national d'Histoire naturelle
CP 41 – 57 rue Cuvier F-75231 Paris cedex 05 (France)
Tél. : 33 (0)1 40 79 48 05 / Fax : 33 (0)1 40 79 38 40
diff.pub@mnhn.fr / http://sciencepress.mnhn.fr

ISSN (imprimé / *print*) : 0761-3032 / ISSN (électronique / *electronic*) : 2107-08817

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Submitted on 28 March 2019 | Accepted on 3 September 2019 | Published on 8 November 2019

Lepetz S., Zazzo A., Bernard V., Larminat S. de, Magail J. & Gantulga J.-O. 2019. — Customs, rites, and sacrifices relating to a mortuary complex in Late Bronze Age Mongolia (Tsatsyn Ereg, Arkhangai). *Anthropozoologica* 54 (15): 151-177. https://doi.org/10.5252/anthropozoologica2019v54a15. http://anthropozoologica.com/54/15

ABSTRACT
Deer stone and khirigsuur complexes are monuments that are characteristic of the Late Bronze Age (1200-700 BC) of the steppes of central and northern Mongolia. The khirigsuurs are made up of a large central mound around which are distributed peripheral structures: mounds and circles of stones. The peripheral mounds cover heads, vertebrae and phalanges of horses. At the centre of the circles of stones, the deposits consist of the burnt bones of caprines. This article discusses the ingredients that will allow us to better understand the gestures performed as part of the activities around the ritual monuments at Tsatsyn Ereg (Mongolia).

KEY WORDS
Khirigsuur,
deer stones,
stone circles,
monument,
horse,
caprine,
skull,
calcined bones,
pastoralism,
zooarchaeology,
Bronze Age.

The presence in certain mounds of a cranium and mandibles belonging to two different individuals reveals that the explanation for the horse deposits is more complicated than a simple action of *in situ* sacrifice. Analysis of age at death reveals that elderly animals are numerous. Males form a strong majority. The analysis of the almost 12 000 calcined remains recovered from the circles reveals that teeth and feet of caprines are disproportionately represented. The paper links the circles of stones that delimit the fireplaces with the action of purification. For the khirigsuur B10, the analysis of the alignment of the mounds and the stone circles and the orientation of the horses gives the impression of a herd of horses taking or pulling the deceased towards the rising sun. The communal aspect of the activities conducted around these large tombs is evident. We perceive all of the complexity of the deer stone and khirigsuur (DSK) phenomenon, which is simultaneously social and religious.

MOTS CLÉS
Khirigsuur,
pierre à cerf,
cercles de pierres,
monument,
cheval,
capriné,
crâne,
os calcinés,
archéozoologie,
âge du Bronze.

RÉSUMÉ
Coutumes, rites et sacrifices autour d'un complexe funéraire de l'âge du Bronze tardif en Mongolie (Tsatsyn Ereg, Arkhangai).
Les complexes de pierres à cerf et de khirigsuur sont des monuments caractéristiques de l'âge du Bronze tardif (1200-700 av. J.-C.) des steppes du centre et du nord de la Mongolie. Les khirigsuurs sont constitués d'un grand tertre central autour duquel sont réparties des structures périphériques : tertres et cercles de pierres. Les tertres périphériques recouvrent des têtes, des vertèbres et des phalanges de chevaux. Au centre des cercles de pierres, les dépôts sont constitués d'os brûlés de caprinés. Cet article discute des moyens de mieux comprendre les gestes menés dans le cadre des activités autour de monuments situés à Tsatsyn Ereg (Mongolie). La présence sous certains tertres d'un crâne et de mandibules appartenant à deux individus différents révèle que l'explication des dépôts des chevaux est plus complexe qu'une simple action de sacrifice *in situ*. L'analyse de l'âge à la mort révèle que les animaux âgés sont nombreux. Les mâles forment une forte majorité. L'analyse des près de 12 000 restes calcinés mis au jour dans les cercles indique que les dents et les pieds sont représentés de façon disproportionnée. L'article relie les cercles de pierres délimitant les feux à l'action de purification. Pour le khirigsuur B10, l'analyse des alignements de tertres et de cercles de pierres et de l'orientation des chevaux donne l'impression qu'un troupeau de chevaux prend ou tire le défunt vers le soleil levant. L'aspect communautaire des activités menées autour de ces grandes tombes est évident. Nous percevons toute la complexité du phénomène pierre à cerf/khirigsuur, simultanément social et religieux.

INTRODUCTION

Deer stone and khirigsuur complexes (DSK) are monuments that are characteristic of the Late Bronze Age (1200-700 BC) of the steppes of central and northern Mongolia, southern Siberia, and north-western China. There are a significant number of these complexes, which sit right beside a multitude of stone constructions covering vast expanses. While they are often modest in size, they can be very large, and therefore their analysis contributes to questions about the emergence of a centralised power in relation to nomadic pastoralism (e.g. Allard & Erdenebaatar 2005; Wright 2007, 2014, 2017).

These complexes exhibit architectural characteristics that are known about and widely described (e.g. Allard & Erdenebaatar 2005; Allard *et al.* 2007; Fitzhugh 2009a, b). The khirigsuurs are made up of a large central mound around which are distributed peripheral structures: mounds and circles of stones. The peripheral mounds cover horse heads (sometimes accompanied by cervical vertebrae and distal phalanges) and are located to the east of the main monument. Similar deposits are present around the deer stones. At the centre of the circles of stones, the deposits are different, because they consist of the burnt bones of caprines and bovids, in some cases accompanied by wood charcoal (Broderick *et al.* 2014a, b). The meaning of gestures involving horses and burnt bones is rarely addressed by the researchers who work on the khirigsuurs. In the context of a regional synthesis, Taylor (2016) presented an analysis of 25 horse heads from 12 deer stones and five khirigsuurs, synthesising data on the age and sex of the animals. The goal was to test whether or not they had been used for either riding or transport. In most cases, the researchers consider that the horses heads were the result of sacrifices that took place exclusively at this ceremonial location, to honour individuals being inhumated (Allard & Erdenebaatar 2005: 12; Fitzhugh 2009a: 194, 195; 2009b: 382; Taylor 2016: 272). For the circles of stones, Broderick *et al.* (2014b), based on descriptions of 13 circles of stones from three khirigsuurs, envision their function as altars used during a range of ritual activities involving the burning of pieces of meat, but they acknowledge the difficulty of understanding their true significance.

Thus far, the observations on and interpretations of these deposits rely on the integration of findings from excavations that were (by definition) incomplete (with only a few structures excavated per khirigsuur) and conducted by a variety of teams. In addition, it appears that field observations made during excavations are sometimes somewhat incomplete concerning very specific aspects, which did not necessarily attract the exca-

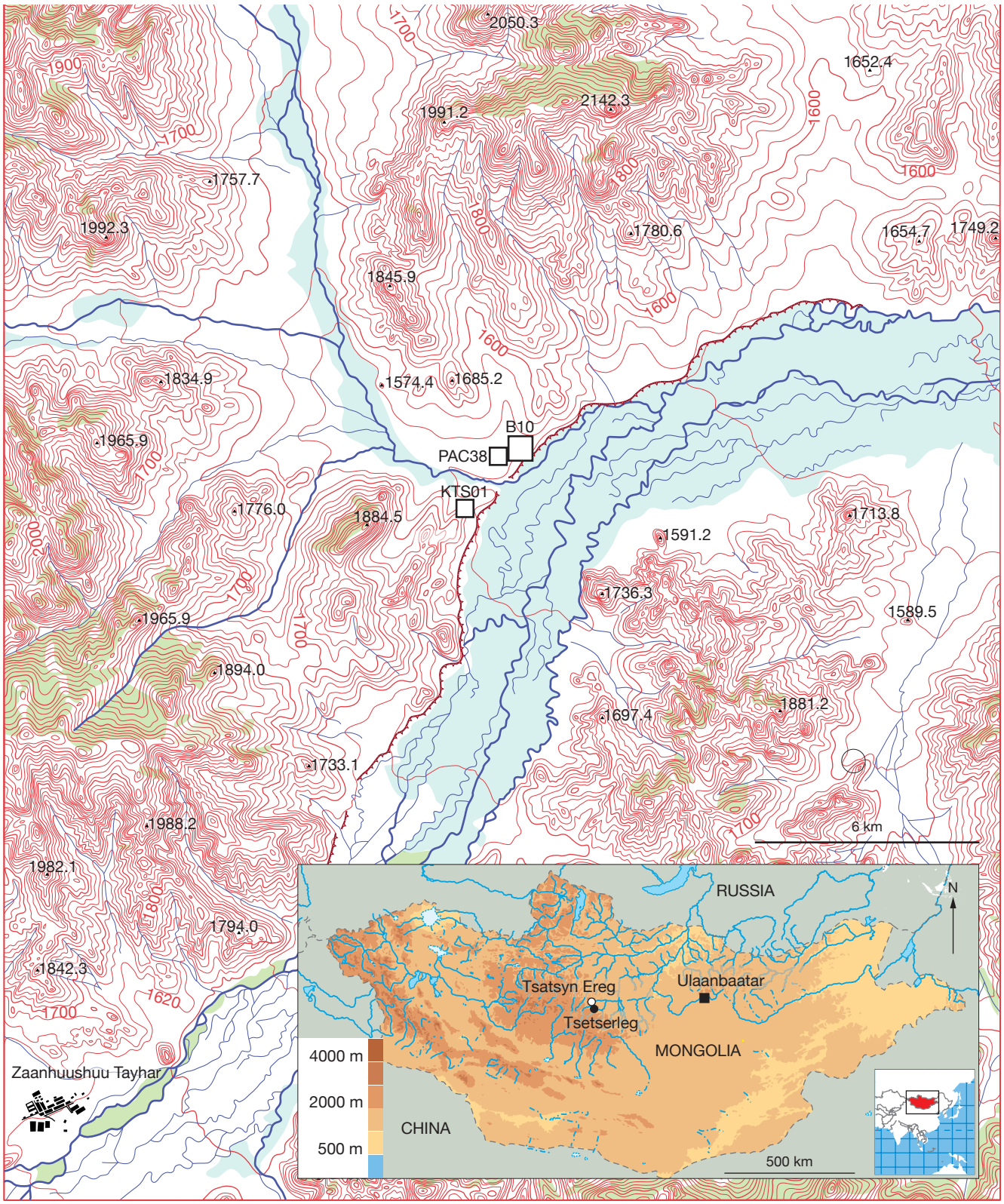

FIG. 1. — Location of Tsatsyn Ereg and the three ritual complexes discussed in the text: **B10**, large excavated khirigsuur; **KTS01**, small excavated khirigsuur; **PAC38**, structures associated with a deer stone; ○, archaeological site; ●, capital of Arkhangai province; ■, capital of Mongolia. Map base computer aided design: F. Burle.

vators' attention. It thus seems important to reopen the file, so to speak, based on a bigger body of data representing a single place and time. Based on the first major excavation at the same large khirigsuur, this article proposes to provide the ingredients that will allow us to better understand the gestures performed as part of the activities around these complex rites.

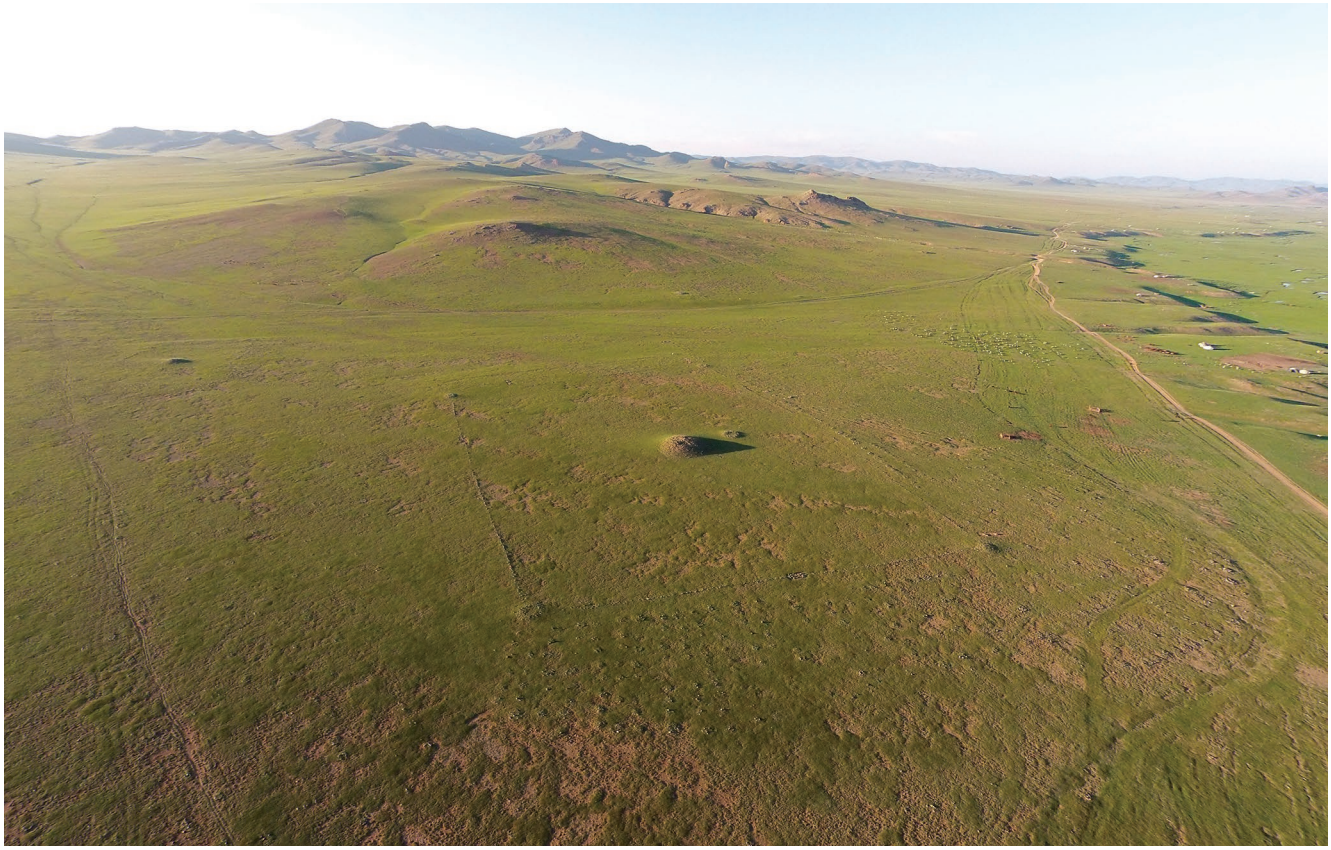

Fig. 2. — View of the khirigsuur B10 at Tsatsyn Ereg (view from the south-west). Photograph: J. Magail.

THE SITE OF TSATSYN EREG (ARKHANGAÏ PROVINCE, KHOID TAMIR VALLEY)

Since 2006, the joint Monaco-Mongolia mission has conducted research at the site of Tsatsyn Ereg (Arkhangaï province, Khoid Tamir Valley; Magail 2008, 2015). The study area encompasses 150 km^2, in which are concentrated many structures of different periods, most notably the Bronze Age. More than 2100 tombs, 110 deer stones, and 3000 petroglyphs have been inventoried for this period (Fig. 1). Several of these structures have been excavated: a small khirigsuur (KTS01), a large khirigsuur (B10), and structures associated with a deer stone (PAC38).

The large khirigsuur, B10 (Figs 2; 3), covers an area of 22 ha. It is characterised by a central mound 24 m in diameter, associated in its eastern part with another, smaller mound. None of these structures have been excavated, but it seems reasonable to assume that the central mound holds human remains, as is so often the case (Littleton *et al.* 2012). Around these large mounds is a square enclosure (with sides measuring 155 m [N and S]/195 m [W]/229 m [E]) consisting of a line of stones delimiting an empty space without any structures. Four taller mounds are situated at its four corners. Along the north side of the enclosure is a kind of road made of stones placed on the ground surface. Around the enclosure, 2361 peripheral structures have been noted, of which 1116 are mounds and 1245 are stone circles. The shape of the monument and the use of architectural elements make it an archetype of the grand khirigsuurs of the region, mirroring that of Urt Bulagyn, located about 50 km distant, excavated and published by Allard & Erdenebaatar (2005). Its size places it in the largest size class recorded.

The small khirigsuur, KTS01 (Fig. 4), takes the form of a central mound 10 m in diameter, flanked by seven other mounds, of which six yielded remains of horse. The mound covers the burial of an adult (rather male) about 30 years old. The body was placed on the ground, with the head pointing to the west, surrounded by a large stones box.

PAC38 (Fig. 5) is a deer stone associated with 144 mounds, of which three have been excavated.

MATERIAL AND METHODS

Between 2009 and 2016, a total of 60 structures were excavated at B10 (or approximately 2.5% of the total), comprising 22 circles and 38 mounds, whereas three mounds were excavated at deer stone complex PAC38 and seven at khirigsuur KTS01. For B10, the structures were selected in order to obtain good spatial coverage and to thus allow us to obtain the most representative sample possible of the deposits (in terms of both chronology and typology), in order to establish the variation among them. The sampling strategy was guided by our desire to establish a high-precision chronology for khirigsuur B10. The objective

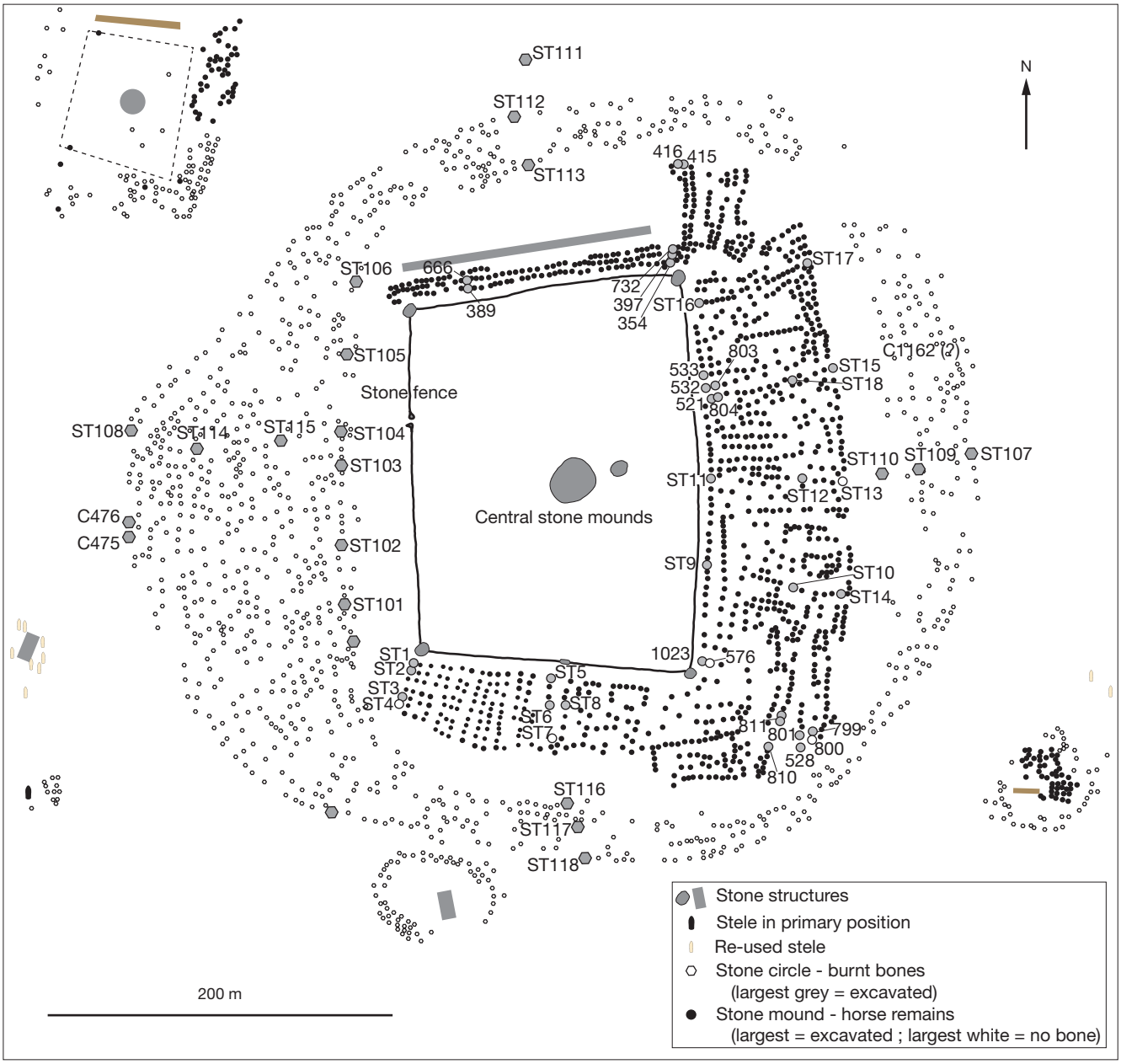

Fig. 3. — Plan of the large khirigsuur, B10, at Tsatsyn Ereg, showing the excavated structures. Computer aided design: S. Lepetz & J. Magail.

was to better understand the rate of deposition on this great khirigsuur, in order to establish whether the mounds were deposited over a period of few days, a few decades or several centuries. It was also necessary to define whether the different types of deposits were related to a particular topographic location. Since there is no stratigraphic relationship among the structures, it was necessary to select the elements to be dated from different places within the monument, in order to cover as much space as possible. Some of the mounds (n = 14) are located in the outer ring of the zone, whereas others are located close to the central enclosure (n = 18) and the intermediate zones (n = 6). Of the circles, seven are next to the central enclosure (along its west side), six are in the outer ring, and five are in the intermediate zones (Fig. 3).

The stone structures are visible at the surface. Soil sedimentation and erosion are very limited. The ground surface is covered by a fine layer of granitic coarse sand resulting from the decomposition of local rocks. The ground surface of the Bronze Age was about 15 cm below the modern ground surface.

The high-resolution chronology based on 100 radiocarbon dates allowed us to establish that the construction of khirigsuur B10 started during the second half of the 11th century BCE (1057-1007 cal BC, 95.4 % confidence) and ended during the first half of the 10th century BCE (1014-948 cal BC, 95.4 % confidence) and, thus, that it spanned less than 50 years in total (Zazzo *et al.* 2019). This work suggests that KTS01 is slightly older than both B10 and PAC38, which are contemporaneous with each other.

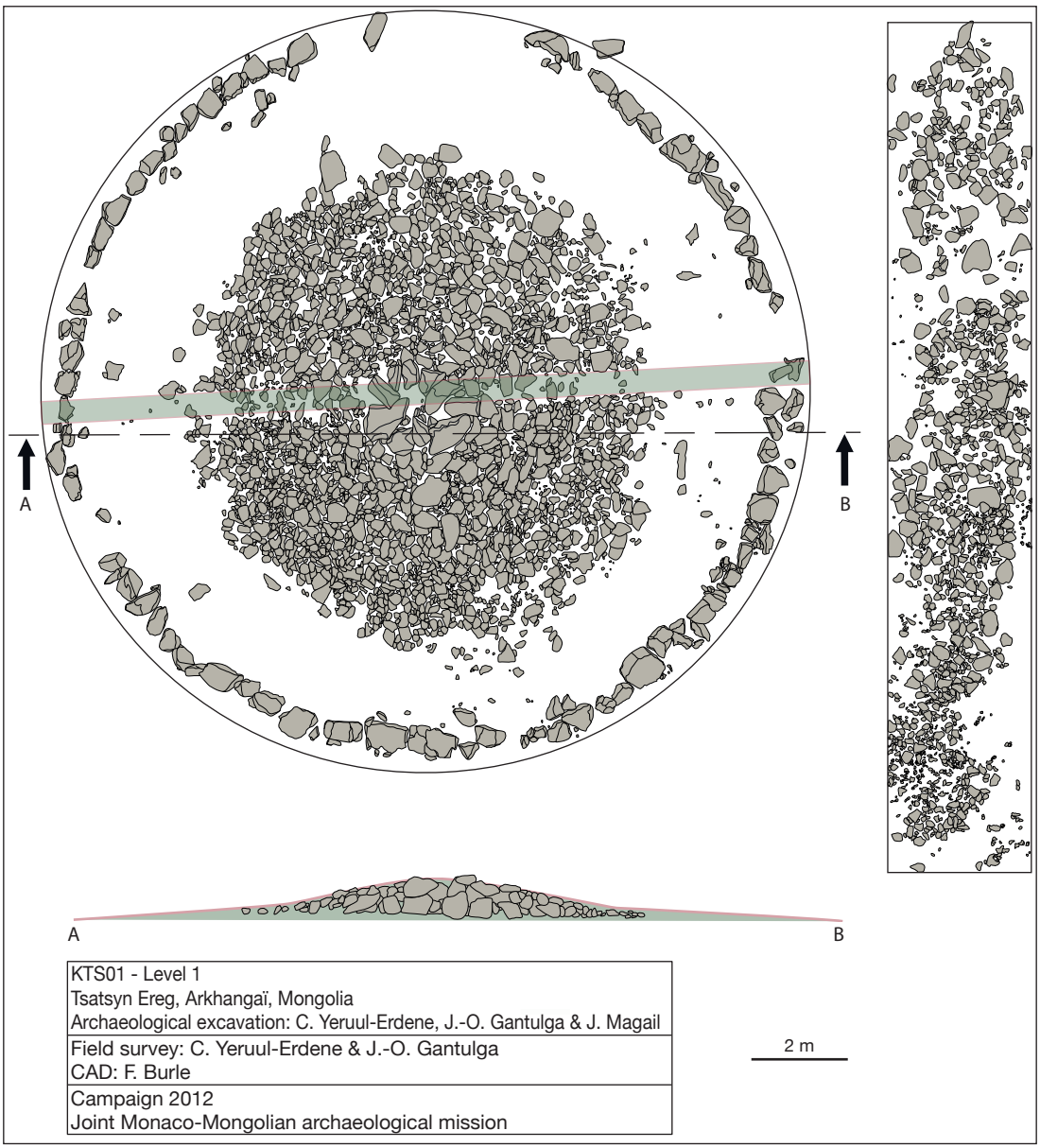

FIG. 4. — Plan of khirigsuur KTS01 at Tsatsyn Ereg and the excavated peripheral structures: **A-B**, stratigraphic cutting axis; **arrows**: gaze orientation to the stratigraphic cut. Abbreviation: **CAD**, computer aided design. CAD: J.-O. Gantulga & F. Burle.

EXCAVATION METHODS

The mounds were excavated using several methods over the years: excavation in opposing quadrants, by halves, or by taking apart the structure without obtaining a stratigraphic profile. Throughout, the objective was to maintain the integrity of the bones and their relationships to each other. It turned out that the remains were very poorly preserved, which made excavation long and difficult; the bone was often only present as a trace. Once the stones had been removed from their sediment gangue and removed, it took an average of 1.5 days for three people to excavate the bones of each satellite structure. Excavation also involved uncovering any particular configuration of the stones of the mound that may have formed a cist. Particular attention was paid to any signs of pit cuts. The adverse taphonomic conditions necessitated the intervention of a zooarchaeologist during excavation and during the lifting of the horse bones in B10. The presence of the zooarchaeologist (SL) allowed for the *in situ* observation of the exact position of the bones, as well as the portions represented, the sex, and the orientation. The integrity of the deposits was respected, and each one was photographed in place, in connection (e.g. Fig. 6). However, the bone elements and teeth completely disintegrated as soon as they were lifted from the deposit. The surface of the bones being very degraded, no observations could be made concerning possible traces of weathering or cut marks.

The excavation of the circles involved excavating a square that included the circle and all of its stones, with the size of the square depending on the diameter of the structure (with the sides ranging between 1.5 and 2 m). The goal was to understand the arrange-

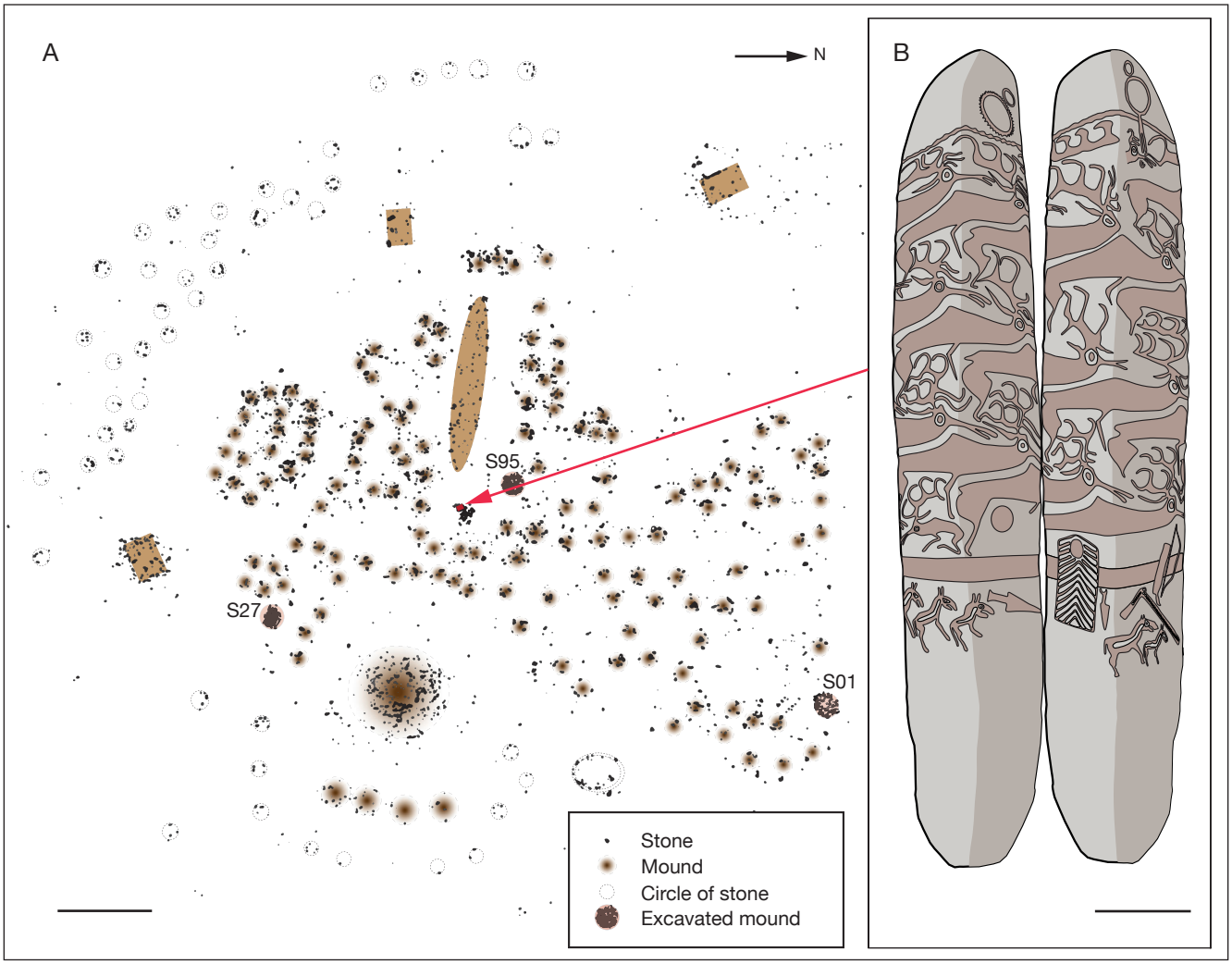

FIG. 5. — **A**, plan of deer stone PAC38 at Tsatsyn Ereg and the excavated peripheral structures; **B**, illustration of the stelae. Computer aided design: J. Magail. Scale bars: A, 8 m; B, 50 cm.

ment and to try to find out whether the remains were restricted to the interior of the circles or extended outside the circles. Many stones were lifted in order to establish the relative chronology of the succession of stones, burnt deposits, and bone deposits. Sieving of the sediment (on 3 mm mesh) was carried out on the vast majority of the deposits, allowing for full recovery of the bones.

ZOOARCHAEOLOGICAL IDENTIFICATION METHODS

The age and sex of the individuals were determined. For the heads, sex determination was based on the presence and size of the upper and lower canines. In females, this tooth is in generally absent; it can be present in old mares, but in those cases their size is reduced. This tooth erupts around 4.5 years, and as a result, it is not easy to sex animals younger than this. Sometimes observation of the alveoli or the buds of the canines before they have erupted allows for sex determination, but this does not work for really young animals. If the head is well preserved, sex determination is easy, but if the bone is very degraded and the teeth are broken, as at Tsatsyn Ereg, *in situ* observation is absolutely necessary, because very often fragments of enamel spall off during the lifting of the head, rendering any later analysis impossible. Under these conditions, the presence of the canine allows for a sex determination of male, whereas its absence is not sufficient to prove that the animal is a female.

Age determination in horses is based on dental eruption (of both the deciduous and the permanent teeth) and the amount of wear on the incisors, once all of the dentition has been recovered. The height of the tooth, its shape, and the shape of the folds of the enamel and the dentine will depend on the amount of abrasion which depends on diet and environment. Dental eruption tables are based on the data published by Schmid (1972), whereas the evaluation of wear stages on the incisors is based on the study by Cornevin & Lesbre (1894). The limitations of these tooth wear tables are well known. Adverse taphonomic conditions will make it more difficult to observe these characteristics.

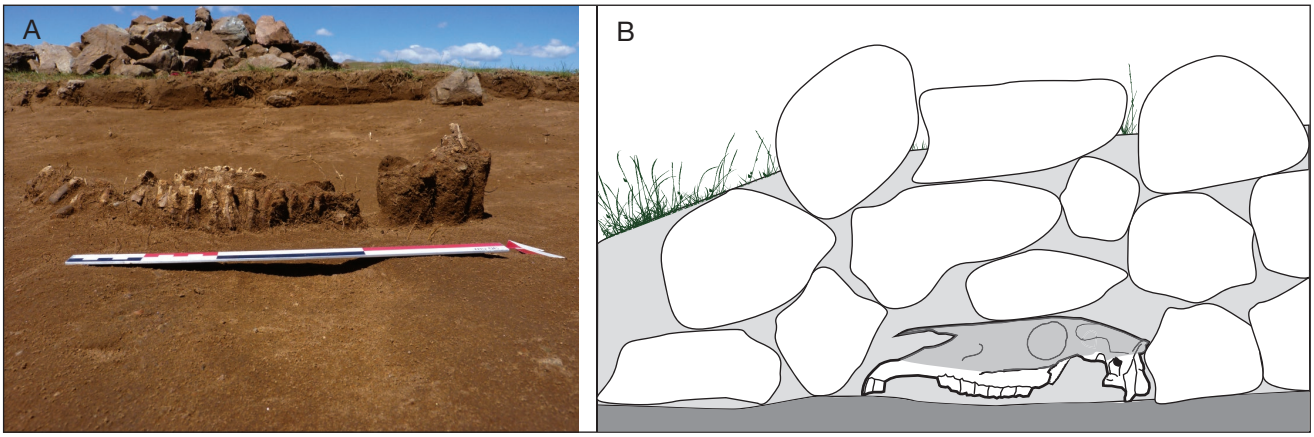

FIG. 6. — **A**, example of the state of preservation of the horse cranium (without the mandibles) in SAT799 at Tsatsyn Ereg; **B**, cross-section drawing of the location of the bones on the ancient ground surface and the stones covering them. There are no signs of ancient digging. The upper portion of the cranium (in grey) has been destroyed as a result of taphonomic processes. Photograph & Computer aided design: S. Lepetz. Scale bar: 30 cm but the perspective does not give the good size of the head.

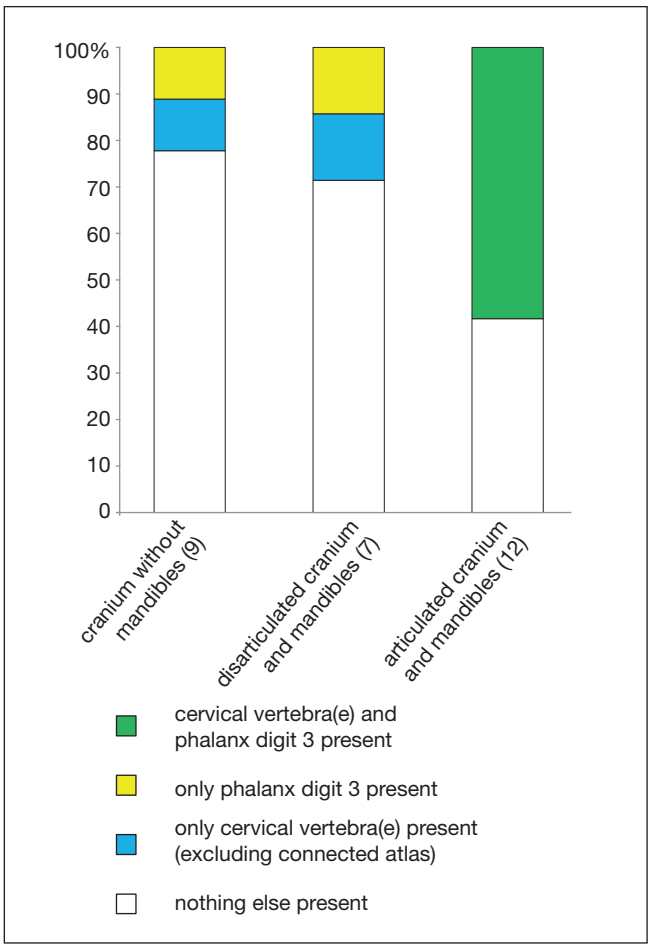

FIG. 7. — Distribution of the different anatomical parts among the remains recovered from the mounds at Tsatsyn Ereg (the numerals in parentheses correspond to the number of mounds).

The burned bones were identified on site by SL. No comparative collection was available to distinguish the small ruminants. Taxonomic identification therefore relied on the accumulated expertise of the archaeologist. Despite the high fragmentation rate and the deformations of the skeletal remains, the visible diagnostic criteria allowed for a taxonomic identification to subfamily *Caprinae*.

THE MOUNDS AND THE HORSES

Of the 34 mounds excavated at B10, 29 yielded bones and teeth of horses. At PAC 28, three of the three mounds excavated did so, and at KTS01, six of the seven mounds excavated did so. Sometimes a stone cist can be perceived around the human remains (Allard & Erdenebaatar 2005). No such fittings have been observed around the remains of the horses; the stones have been deposited directly on top of the remains. In addition, the excavations clearly show that no pit was dug beforehand. The base of the stones is at the same level as the base of the bones (Fig. 6). The very shallow depression (of 1 cm) that is sometimes observed is due to the weight of the blocks, which have locally compacted the sediment, or possibly to preparation of the area by means of a light scraping, but which cannot be considered as digging. The sagging of the structure has encased the bones and the stones, and infiltrating soil has sealed the ensemble. Sedimentation was minor and root action was strong. The bones are therefore in a very poor state of preservation, and some heads are represented only by their dentition. It is probable that many of them have completely disappeared. This is more than likely the case for the five mounds at B10 that were devoid of bones (SAT576, SAT800, ST4, ST7, ST13). We cannot entirely discard the hypothesis that there never was a deposit under the stone, but it is more likely that there was and that it disappeared as a result of physical and chemical activity in the sediment.

When remains are present, these always relate to the head, and sometimes also to the neck and the distal phalanges. In the majority of cases at B10 (n = 24), the mounds yielded a cranium of a single individual, but in four cases (T811, T1023, ST5, ST8), they yielded two crania together.

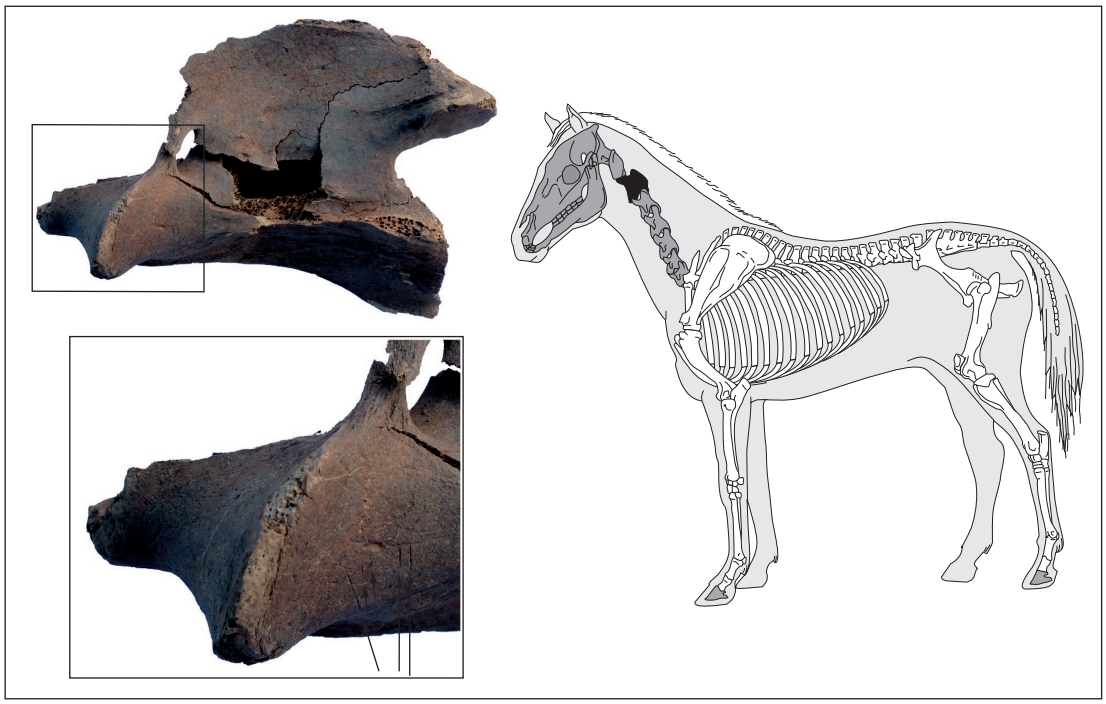

Fig. 8. — Cutmarks on the second cervical vertebra of the horse from ST62 at the khirigsuur of Burgast (Mission archéologique française dans l'Altaï). Photographs & computer aided design: S. Lepetz.

The head can be represented by just the cranium or the cranium and two mandibles, as well as the first cervical vertebra (atlas). The mandible halves can be either in articulation with the cranium or deposited beside it. When the rest of the neck is present, it includes a varying number of cervical vertebrae in anatomical articulation, usually between three and five, but sometimes all seven. The number of distal phalanges included ranges between zero and four (Appendix 1).

Excavation of the structures has revealed three overarching categories: cranium without mandibles (nine cases for B10 and two cases for PAC38), cranium and mandibles deposited side by side (seven cases for B10), and cranium and mandible in articulation (12 cases for B10, one case for PAC38, and at least four cases for KTS01) (Fig. 7). When the head includes the cranium and the mandible, the neck and the phalanges are often present (60% of cases for B10, n = 7/12), whereas if cranium and mandible are not in anatomical articulation, the cervical vertebra and the phalanges are more rarely represented (one case each) and never together.

These variations and associations reveal that we are dealing here with deposits of a different nature.

First, the mounds in which we found vertebrae in articulation and the entire head are strongly suggestive of deposition of pieces of fresh meat. Removal of the head in most cases involved separating the first cervical vertebra from the second. The axis (first cervical) thus remained attached to the cranium. For ST14 and ST18, the separation was between the occipital condyles and the first vertebra, which thus remained with the rest of the neck. The adverse preservation conditions prevented the observation of cut marks. At sites where preservation is better, Fitzhugh (2009b) pointed out traces of dismemberment. Elsewhere, at excavations on a khirigsuur by the French mission in the Altai, at Burgast (Aimag of Bayan-Ulgii, Sum of Nogoonnuur), fine knife marks on the axis illustrate this separation (unpublished data, see Fig. 8). The fact that the vertebrae remain in anatomical position is logical if we envisage that the part containing the cervical vertebrae would have been removed in fresh condition and then deposited beside the head, which itself would have been in fresh condition. The presence of the distal phalanges can be interpreted the same way, because these reflect the original presence of the keratinous hoof covering, which has not survived archaeologically. In mound ST10, a large sesamoid, which is the bone located at the join of the intermediate phalanx (phalanx 2) and the distal phalanx (phalanx 3), was found in anatomical position. Disarticulation of the foot consisted of passing a blade just above the hoof covering, cutting the skin and the ligaments (Fig. 9), a cut made when the bones were still fresh and being held in place by the surrounding soft tissue.

The situation in the mounds of KTS01 was unusual in that the heads had the mandibles and atlas in anatomical articulation. They also had the distal phalanx, but the other vertebrae were generally absent, with the exception of one deposit in which one of them had been placed beside the head. This peculiarity may be specific to this structure or to the excavation conditions.

Second, the mounds containing crania without mandibles or with mandibles placed beside the cranium are more difficult to interpret (Fig. 10). In effect, it is always difficult to argue based on the absence of remains that may be the result of taphonomic artefacts/bias. ST415 presents a rare

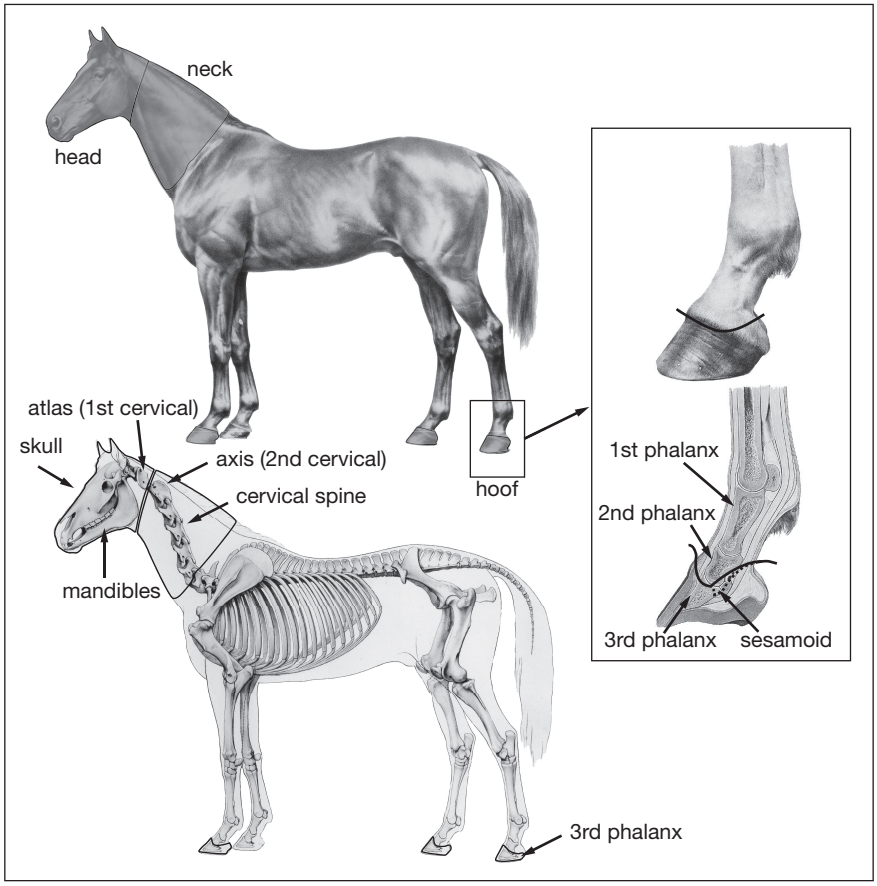

Fig. 9. — Schematic showing the anatomical position of the horse skeletal elements recovered at Tsatsyn Ereg and the location of the disarticulations. Photograph & computer aided design: S. Lepetz based on illustrations from Ellenberg *et al*. 1911.

case where the three items (the cranium, the mandibles, and the neck) are deposited side by side. One could imagine that the neck had been deposited in fresh condition, but what about the cranium and the mandibles? It is possible that these were deposited fresh but disarticulated. The disarticulation of the mandible is different for ST799, for example, where the atlas remained connected to the skull and the mandibles are absent. Conversely, the great rarity of necks in association with isolated crania (that is, without mandibles) permits us to envisage a different scenario: it is possible that in these cases the cranium was not deposited immediately after the slaughter of the animal but, rather, that it was deposited later, in defleshed and/or dry condition. This hypothesis has already been proposed by Fitzhugh (2009a). Sometimes, as with ST389 and ST397, neither the neck nor the distal phalanges are present, and although the cranium appears to have been placed on the mandibles, one gets the impression that they have shifted since then, having remained in contact but no longer fully connected, as if the ligaments and muscles were no longer present or no longer as strong, so that they were no longer able to keep the entire head in one piece. The absence of rapid clogging up by soil may explain the movement of the stones and bones after decomposition, but this process may have been accelerated by deposition of disarticulated bones.

This impression of the assemblage is supported by two facts. The first concerns the mounds that yielded two crania. T1023, for example, contains no mandibles whatsoever. In mounds T811 and ST8, the mandibles are present for only one of the two individuals represented by the crania, while the other lacked them. It therefore seems that in this case there was one entire head (fleshed?) and one partial head originally.

The other revealing aspect is the presence in certain mounds of a cranium and mandibles belonging to two different individuals. Analysis of the teeth revealed two cases (SAT803 and ST12) of disagreement in age between the two anatomical parts. Mound SAT803 (Fig. 11) presented an intact maxilla positioned slightly anterior to but in contact with a mandible. The maxilla contained the three deciduous premolars, the first permanent molar erupted but not yet in wear, and the second permanent molar erupting. This horse was therefore at most 1.5-2 years old. The teeth of the mandibles belong to an adult animal. The presence of the canine makes it at least 4.5 years old. Therefore, it cannot belong to the same animal as the cranium. Another case exists in mound ST12, where the mandible belongs to an adult male (in excess of 4.5 years of age), while the cranium belongs to a horse of about two years. It is possible that these are not the only cases, but it has not been possible to confirm this, either because the state of preservation of the teeth does not allow it or because the deposits concern adult individuals and pairing is therefore more difficult.

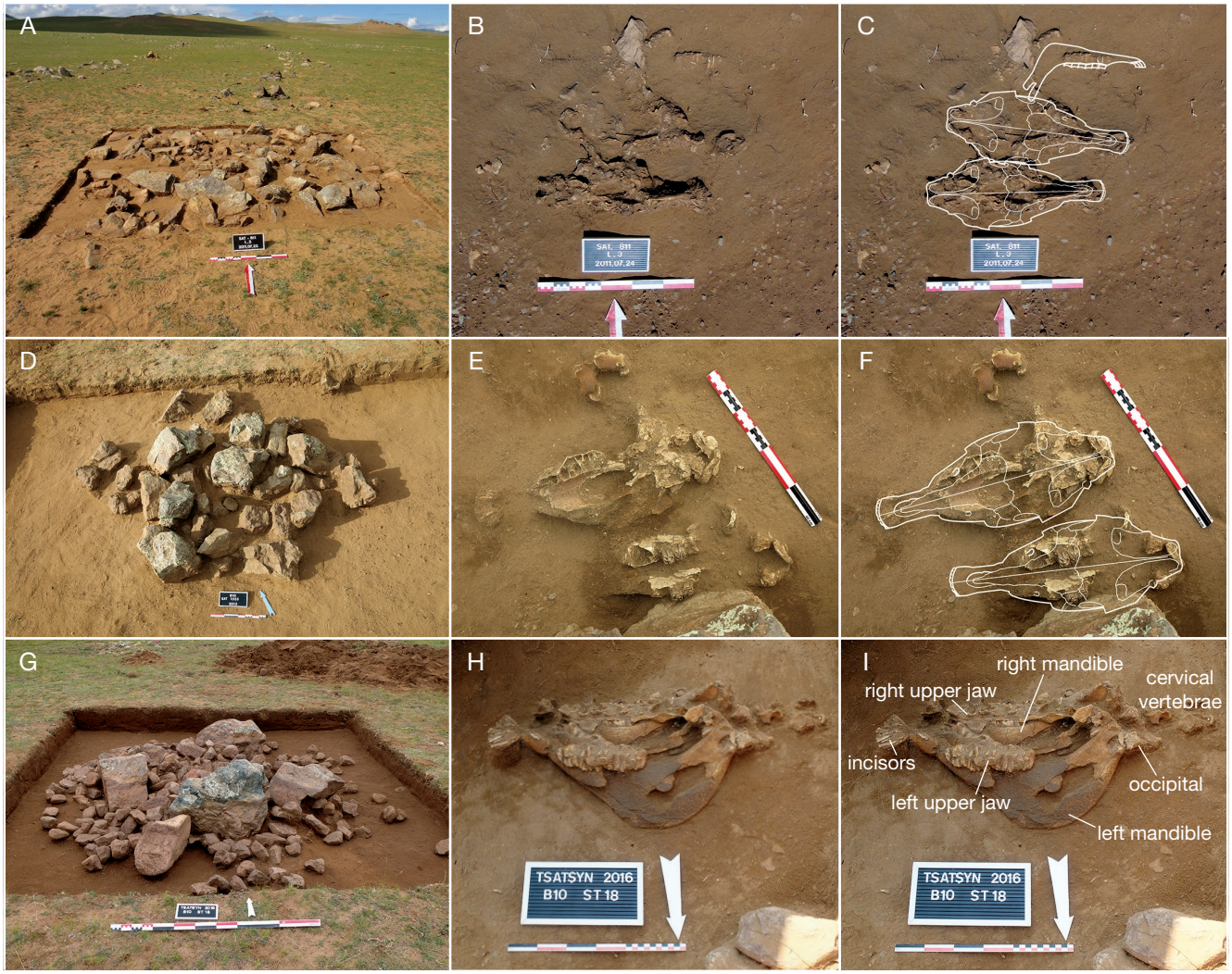

FIG. 10. — Three mounds at Tsatsyn Ereg representing different situations: **A-C**, SAT811 has mandibles disconnected from the crania; **D-F**, SAT1023 has two crania without mandibles; **G-I**, ST18 has the cranium placed in anatomical position on the mandible; the head has tilted slightly to the right, and the cervical vertebrae are present. Photographs: S. Lepetz. Scale bars: A-C, 50 cm; D-F, 40 cm; G, 100 cm; H, I, 30 cm.

In both cases, the cranium and mandibles were separate. They may have been placed side by side originally, or they may have been subject to a montage originally, with the cranium being placed on the mandible in order to reconstitute a head. The absence of ligaments and muscles and the poor connection of the articulation (which could not be perfect because it involved articular surfaces of two individuals) may have made it more likely that the upper part (the cranium) would slide under the weight of the stones and thus become fully disconnected from the mandible. The condition of the bones does not allow us to analyse this further and also does not allow us to, for example, prove that the cranium and mandibles were defleshed, even though, in our opinion, this is probable.

We can ask ourselves about the origin of these treatments. Had people deliberately wanted to associate two different individuals? Or is it a case of disparate elements deriving from defleshed remains of horses that were available or obtained at the time of the ceremony (around the habitation, on the ground surface) and no longer necessarily present as specific and defined individuals? Perhaps the important gesture was to position the head elements, without a strict rule applying in the case of animals killed for some time.

The spatial organisation of the remains under the mounds shows some variation. The cranium may be positioned on the mandibles (13 cases for B10) or beside the mandibles (eight cases for B10). The atlas may be connected to the cranium (three cases for B10) or connected to the rest of the neck (three cases for B10). In two cases (ST14 and ST18), the neck had been placed on the ground surface anterior to the head. The most interesting aspect in all of these deposits is undoubtedly the positioning of the cervical vertebrae. In each instance where observation was possible (five cases for B10, one case for PAC38), we noticed that the neck had been placed in a position that was the reverse of anatomical position: the last cervical vertebra was positioned close to the back of the head, while the first cervical vertebrae lay next to the nasals. The objective, therefore, does not seem to have been to reconstruct a neck, nor to simulate a part of a horse,

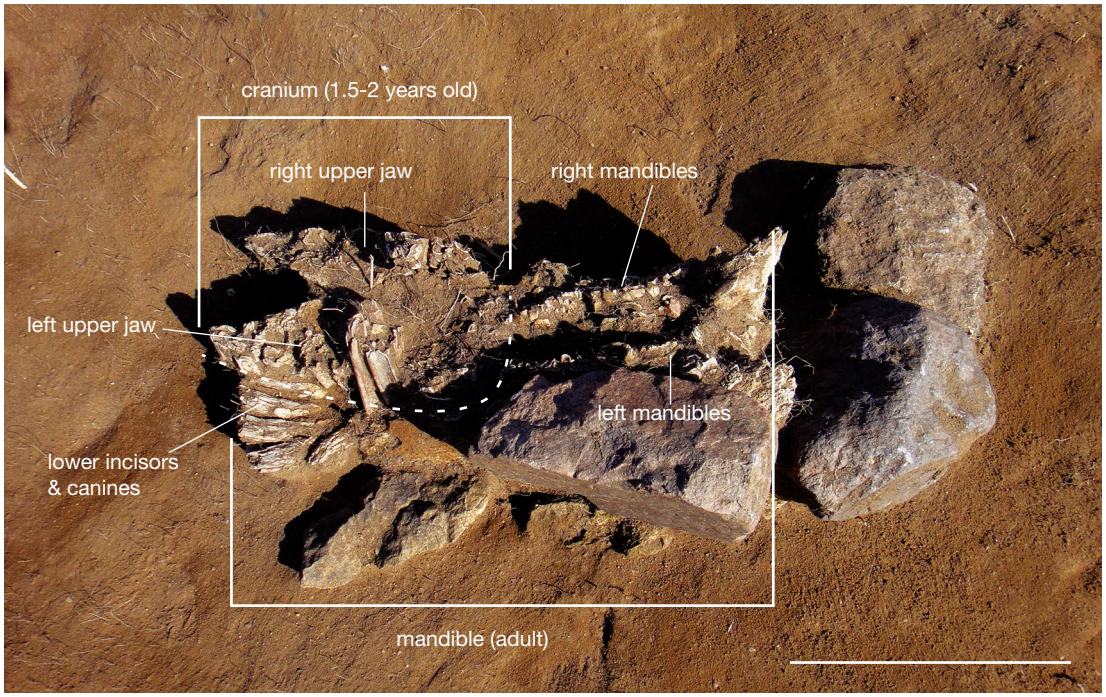

Fig. 11. — Deposit SAT803 at B10 at Tsatsyn Ereg. The mandible and the maxilla are not the same biological age, indicating that that this deposit derives from two different individuals. Photograph & Computer aided design: S. Lepetz. Scale bar: 20 cm.

but, rather, to facilitate the compaction of the whole; the base of the neck, being bigger, can be more easily accommodated in the place left free by the muzzle. Moreover, the hooves are most often positioned under the head and are therefore no longer visible at the time of the placing of the stones, thus seeming to indicate that the shape of the deposit and the staging are important.

Analysis of age at death has revealed that old and very old animals (those older than 15 years) are numerous (Fig. 12), representing approximately half of the individuals where we could assign an age (n = 16). Approximately one quarter (n = 9) are individuals under three years of age, and one quarter are young adults and adults (between four and 15 years). The spatial distribution of the horses by age or sex does not reveal any particular pattern (Fig. 13), unlike what was observed by Taylor *et al.* (2016) at other sites. Males form a strong majority among the adults (19 males vs four females). One can immediately think of several situations that may explain such a profile.

The age distribution may be explained by slaughter of young animals in order to consume their meat and of adults that have been retired from being ridden or being used for traction. In this sense, the profile is close to that observed for modern horse rearing, as established through analysis of horse crania deposited in contemporary ovoos, which are human-constructed stacks of stones on which contemporary breeders place the cranium of horses they have killed (Marchina *et al.* 2017; Fig. 12). This presence of young animals has been noted by Taylor (2016) for other khirigsuurs. It is therefore possible that these animals derive from domestic slaughter. But the mortality profile of the horses of B10 distinguishes itself by a strong representation of very old animals, which then allows us to envisage a selection of certain animals.

This hypothesis is confirmed by the imbalance in the sex ratio. The overrepresentation of males, which has already been observed for other khirigsuurs (Taylor 2016), could, in theory, be explained by the presence of a majority of females among the juveniles (whose sex cannot be determined). If we add the juveniles under four years of age to the females, we end up with a total of 13 females (sex-determined and potential) vs 19 males. This re-alignment of the ratio, even if it is only partial, allows us to imagine that slaughter for subsistence was organised in such a way that people preferentially slaughtered (very) young females and essentially adult and elderly males. This explanation is, however, unlikely in that we do not understand why people would prematurely kill so many females (it does not make sense in terms of herd management: breeders prefer to keep adult females for breeding), but in the context of religious practices, the choices may potentially have been different from those followed in the context of purely domestic practices. An alternate hypothesis would envisage an imbalance in the sex ratio in the herd, which might be explained by trade or exchange that consisted of exporting females or importing males. But one can see the limitations of this reasoning for ancient societies, where the amount of exchange among herds was likely less important than today, no form of extensive trade should be envisaged. It is the more likely that choices were made at the time of slaughter or at the time of deposition. Either these animals were killed specifically for deposition in the khirigsuurs and people preferentially

selected male animals for slaughter, or they were among animals killed for other reasons, at the habitation sites, and people preferentially retained the heads of the males so that they could include them in the ritual deposits. But both scenarios involve human choice.

Using ancient material to analyse the mortality profile of the animals, cross-reference it with the sex determinations, and thus try to define the constants with the aim of deducing hypotheses in terms of herding practices and organisation of production (milk, meat, labour) is very adventurous, and the results must be taken with caution. The approach has to be adapted to the temporal and geographic window concerned. Despite the time devoted to the excavation and study of the horses from B10, for example, the horses recovered represent just 3.4% of those that were originally deposited (estimated in relation to the number of mounds). We therefore have to ask ourselves how representative they are. In addition, the deposits were made over several decades by different communities or families, whose logic surround herding and slaughter may have differed or change over time. If we compare the different DSK, we must not forget that they may have been left there by social groups separated in time by several hundreds of years or separated in space by several hundreds of kilometres, and who adapted to local conditions. The apparent similarity among the deposit must not prevent us from imagining a heterogeneity of uses and traditions and of religious and pastoral practices. The remains we study are only a faint reflection of past reality and diversity.

In terms of herd management, animal slaughter, and ritual deposits, we can not be certain of anything. We know, but this is a truism, that meat, milk, riding, and the labour force were all based on pastoralism, but on the other hand, we do not know anything about exchange of animals among groups of humans, details about dietary practices, and the choices that guided the slaughter of animals and their deposition in the khirigsuur. The number of unknowns is immense. Establishing herding management models based on osteological assemblages is not really doable unless one is working with coherent data that, if not exhaustive, are at least sufficiently complete and understood, to be able to integrate the totality of the *chaîne opératoire* that produced the remains. Mortality profiles and sex ratios are based on remains that are food waste and those that are not. It would also be necessary to know and take into account the choices and selections, the anthropic aspects that are not strictly economic (that is, rites). We are not certain of the links between the horses whose remains have been found in the DSK and their owners. Are these all or only a portion of the horses killed in a given period by family groups related to the deceased or belonging to the same community? Was a choice made about which animals to kill (based on sex, age, position in the herd, sacredness, or, rather, neglect)? Even though slaughter profiles are easy to establish, those interpreting them must not forget to be cautious in the face of the complexity, the diversity, as well as the evolving and polysemous character of systems of thought and action.

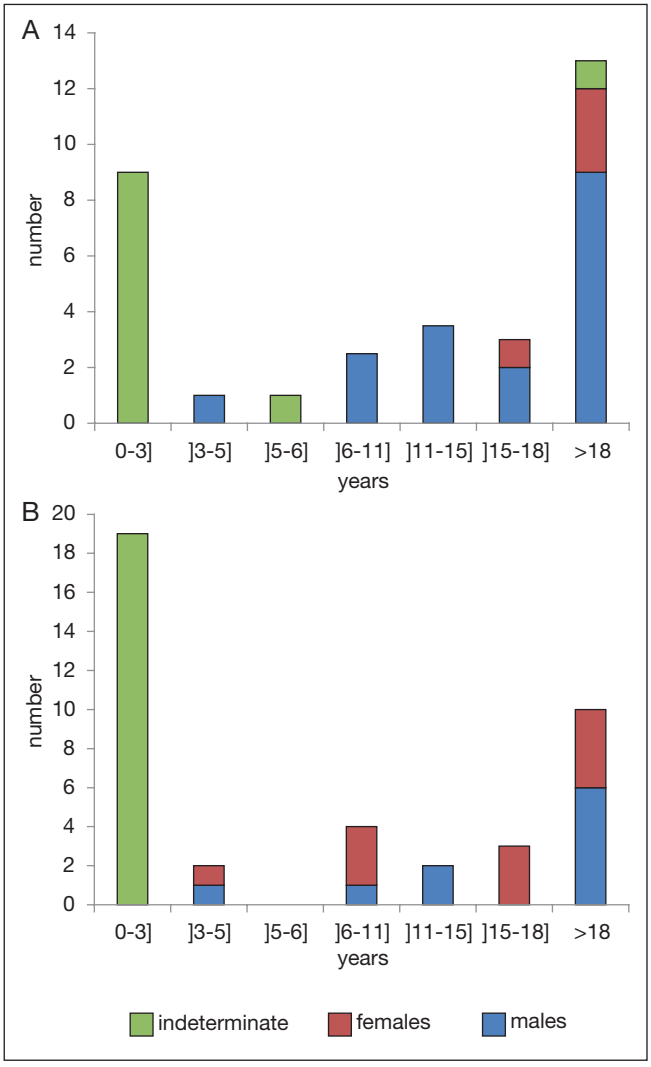

Fig. 12. — Comparison between age and sex distribution of the horses recovered from **A**, B10 at Tsatsyn Ereg; and **B**, modern Sambuu ovoo in the Tsatsyn region (Marchina *et al.* 2017).

CIRCLES OF STONE AND BURNT ANIMAL BONES

More than 1200 circles have been recorded at monument B10. They slightly outnumber the mounds. They are very similar in shape, being made up of one to 12 large stones laid out in a circle on the Bronze Age ground surface, which is 15-20 cm below the current ground surface (Fig. 14). Small pieces of burnt bone and traces of wood charcoal were uncovered on the ancient ground surface. Of the 22 circles excavated, 20 yielded material (bone and wood charcoal) that has been dated (Zazzo *et al.* 2019), and 17 yielded bones, which have been studied.

The bones are either black (8%) or white (92%) in colour and extremely fragmented. They were recovered by hand and through sieving. The quantity of bones per structure varies considerably (Fig. 15). The least rich are ST115, which yielded none, and ST106, which yielded only four. At the other extreme, structures ST102 and ST104 furnished more than 1800 items each. This variation in quantity is difficult

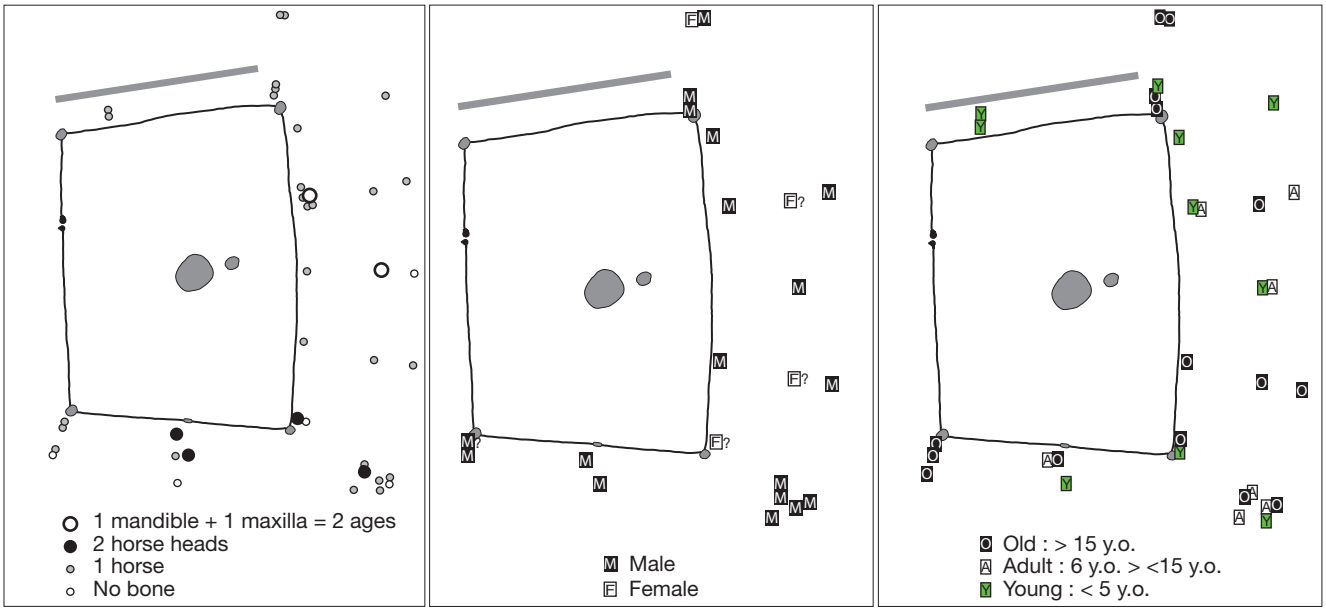

Fig. 13. — Spatial distribution of equid remains according to the number of elements under the mounds, age and sex. Abbreviation: **y.o.**, years old.

to explain. It is possible that the size of the initial deposits or the amount of post-depositional destruction was variable. In total, more than 11 617 zooarchaeological items have been analysed, for a total mass of 430 g, which works out to an average weight of less than 0.04 g per structure.

The fragmentation and colour of bone are generally good indications of the intensity of the heat source to which they were subjected. Combustion causes a loss of organic matter, and the distortion and shrinkage of the osseous component causes loss in the mineral component that has a direct impact on fragmentation. Bone is subject to a gradation of colours as the temperature of the fire increases. The colour ranges from yellow, which is the natural colour of fresh bone, to white, which occurs between 500° and 600° C (Shipman *et al.* 1984), passing through the stages of brown, black, and light grey. In this case, the heat must have been intense, and the characteristics of the bone are not compatible with traces left by a cooking fire. Without prejudging their origin (pieces of meat that were or were not consumed), we can say that the bones were purposefully reduced by fire.

The remains are mostly contained within the area defined by the stones, but their position can vary. In the majority of cases, the concentrations of bone and ash are not in the centre of the circle of stones but, rather, slightly off to one side (for example ST114, ST116). In four cases, blackened concentrations and bone were found underneath the stones (ST104, ST111, ST117). In one case, bones were found outside the stone circle (ST111, n = 25). In two other cases, carbonised residue of wood and bone was revealed in small pit about 10 cm deep (ST103, ST109). For circle ST103, this depression may be the result of the entrenchment of this heavy stone into the ground, but in all cases, both the pits and the remains within them were sealed by the blocks of stone.

All these observations aid in establishing a chronology of events: the stones were put in place after the burnt bone and charcoal. The deposits do not, apparently, involve a spreading out of bone or ashes inside a circle of stones that had been created at some time prior, but, rather, the placement of stones in a circle in the location where an event had already taken place. The question is to discern the nature of the event. Are we talking here about discard of ashes and bone originating from elsewhere? One might think of a collective sacrificial fire where officiants had access to a specific place or of a domestic hearth that was emptied here. Or are we talking here about a fire that burnt *in situ*? Unfortunately, the sediment (made up in part of granitic coarse sand) is unfavourable for recording traces of combustion, and the absence of reddening of the soil does not constitute proof of absence of fire, nor does the lack of significant amounts of wood charcoal.

We must not forget that the activity took place on the original ground surface and that nothing indicates that there was any covering of the ashes with soil. Quite the contrary: one might think that the stones were placed with the aim of delimiting a space left visible. Rain, wind, traversing by animals, and, later, root action, physical-chemical soil action, and the totality of taphonomic phenomena took place and reduced the burnt remains to almost nothing. Just 10-15 cm of soil served as protection against 3000 years of pedological activity. We should not be surprised by the modest amount of material brought to light; instead, we should be surprised that it was preserved at all.

Another aspect that can aid in interpretation is the presence of concentrations of degraded charcoal, trapped by the stones or in the small pits, or present in the form of soil stains. In the case of secondary deposits, the presence of carbonised wood would indicate that the transport did not involve just a handful of burnt bone, but all or part of a hearth that would

FIG. 14. — Examples of three circles at Tsatsyn Ereg that yielded burnt bone. **A**-**C**, SAT 116, the bones are situated on top of the soil; **D**-**F**, SAT 104, a burnt deposit including burnt bone has become trapped under one of the stones; **G**-**I**, SAT 109, a pit has been dug and partly covered with a stone. Photographs: S. Lepetz. Scale bars: A, D, E, G, 100 cm; B, C, F, 20 cm; H, I, 30 cm.

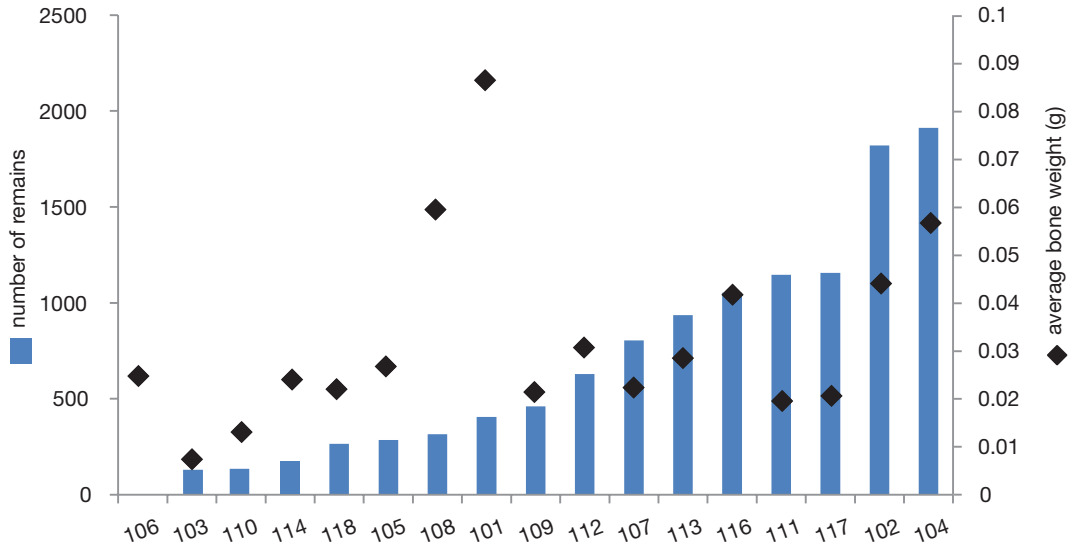

FIG. 15. — Relationship between the number of burnt remains (bars) and the average weight of the remains (black diamonds) for each of the structures at Tsatsyn Ereg.

Fig. 16. — State of preservation of the burnt remains by anatomical part in the assemblage from ST102 at Tsatsyn Ereg. Photographs and computer aided design: S. Lepetz. Scale bar: 1 cm.

have burned elsewhere, with the charcoal and wood ash that go with it (and which we also found). Given their volatility, we would then have to envisage the transport of the ashes or embers in some kind of container (a bag? a plate?). Clearly, such a scenario is not impossible, but in our opinion, it is not the most likely, given the taphonomic characteristics outlined above. The most likely scenario (and contrary to what Broderick *et al.* [2014b] propose) is that the fire was set *in situ* and then circumscribed by the stones. It is also possible that the stones encircled elements other than a fire, such as plant remains and wooden containers. This would explain the lack of centring of the bone concentrations, leaving space for other potential deposits.

The almost 12 000 bones and teeth recovered from the circles of stone belong to small ruminants, probably all either sheep or goat. We can discount the possibility that they include wild animals (such as antelope). In any case, there are no large animals, neither horse nor cattle (although cattle may have been found elsewhere [Broderick *et al*. 2014b]). With a few exceptions, the condition of the bones did not allow for a distinction to be made between sheep and goat, which are very similar anatomically. The few elements that do allow for this indicate sheep, but we cannot know whether that is the only taxon of small ruminant present. Only 1% (n = 110) of the remains could be identified to anatomical element. All body parts are present: head, vertebrae, ribs, limbs, and feet, indicating that there was no strict selection of the parts to be burned. But it does appear that the teeth and, in particular, the feet are disproportionately represented.

The longbones of the front and hind limb are very fragmented, and it is probable that some of them were not recognised among the millimetre-sized splinters (Fig. 16). The same goes for the ribs and vertebrae. In the case of the head, bones from the cranium are almost absent, while the teeth are much better represented (Fig. 17), mirroring what has been observed in the Khanuy Valley (Broderick *et al.* 2014a). Their natural abundance in the live animal could explain the phenomenon, but we should note that the tooth roots show the highest rate of preservation, and this can be explained by their being encased in the bone of the mandible or maxilla, which would have afforded better protection against the destructive action of the heat.

The bones of the feet are certainly small and dense, which would have acted in their favour in terms of resistance to the flames, but the imbalance seems too great for that to be the

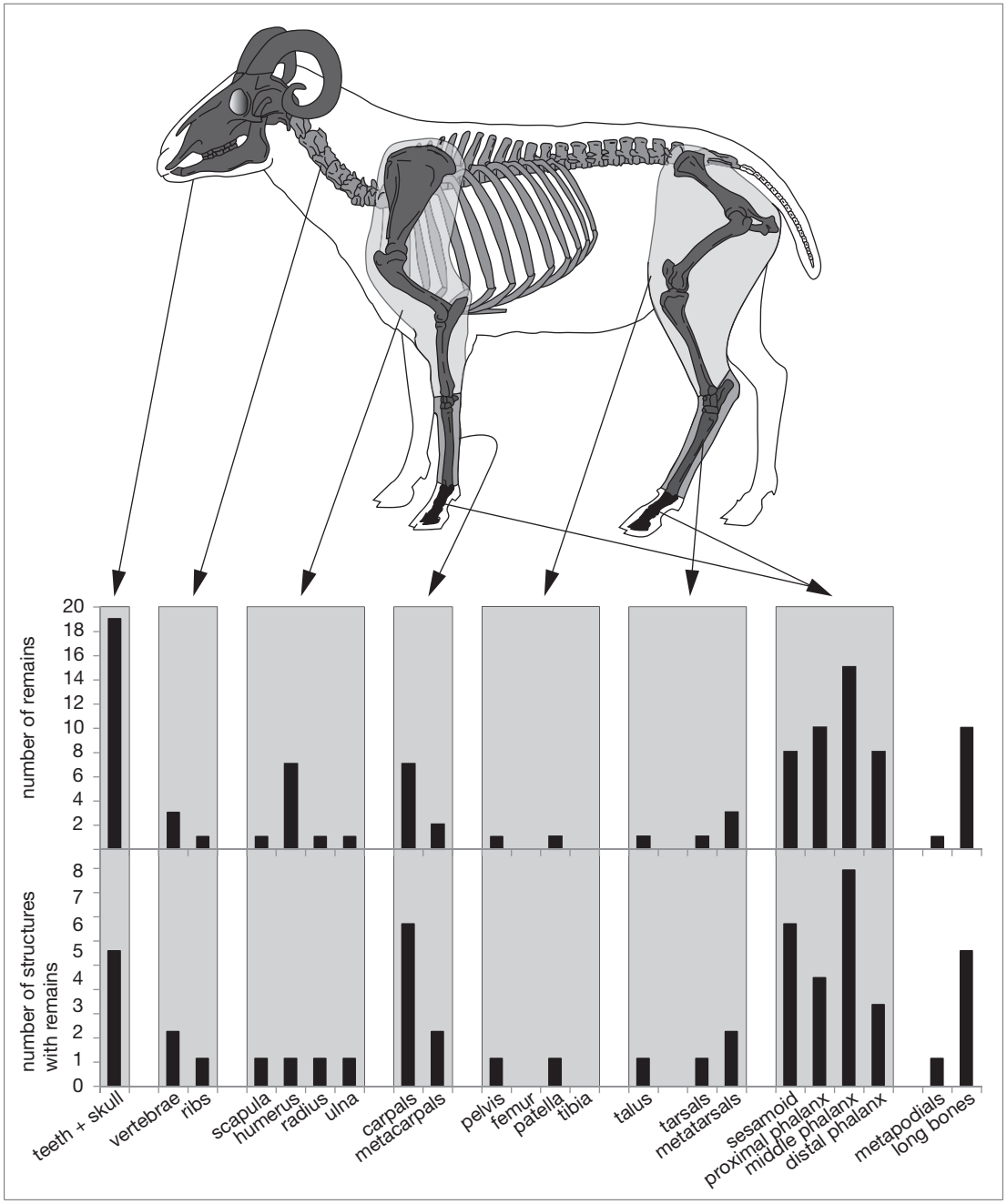

Fig. 17. — Distribution of the burnt remains by anatomical part for all the circles combined at Tsatsyn Ereg. Computer aided design: M. Coutureau & S. Lepetz.

only explanation. Rather, we think that feet were particularly numerous in the fires originally. The presence of multiple sesamoids (the small bones associated with phalanges one, two, and three) shows that all the bones of the feet must have been present, possibly in articulation and not defleshed. It also suggests that the fur, the skin, the tendons, and the hoof coverings must have been present to protect the bone and that these body parts were therefore quite probably thrown into the fire intact. This was probably not the case for the other anatomical segments, of which we only found small and damaged skeletal elements. These segments must have been thrown in as smaller bits, perhaps after being cut up and divided into pieces. That leaves the question whether the adhering meat was consumed prior to the fire. No cut marks were discerned, and the question therefore remains open. The combination of this information, and the fact that no spatial organisation of the bones was observed, indicate that the cremation did not involve whole animals but, rather just portions of animals, from different sources (cooked remains of meals? raw bits?).

This raises questions about the origin of these bones. Bones are an excellent source of fuel (Théry-Parisot & Costamagno 2005), which, thanks to the fat they contain, were used in ancient times in domestic fires as a complement to wood or dried dung, and which may also have been used more

extensively for fuel in collective buildings in ancient times (Fournet & Lepetz 2014). It is therefore possible that animal bones found in fires are nothing more than fuel residue. For the Xiongnu period, Miller *et al.* (2018) also questioned the origins of the bones found in fires associated with graves, but they concluded that, given the context, it was much more likely that the animal bones had been used for sacred or ceremonial purposes. We believe that the same holds for the remains found in the stone circles of the khirigsuurs.

TOWARDS THE CENTRE AND THE EAST: THE DOUBLE ORIENTATION OF THE DEPOSITS

The spatial organisation of structure B10 shows multiple similarities with that of other khirigsuurs in Mongolia. These are characterised by a central mound, a circular or quadrangular enclosure, and a relatively consistent orientation on a west-north-west/east-south-east axis (Allard & Erdenebaatar 2005), or almost north-south/east-west in the case of B10. Mounds are present on the north, south, and east sides of the enclosures and circles of stones are essentially present on the west size. In the case of the largest of the monuments, the circles may completely surround the enclosure. Sometimes other structures are present, such as paths. If present, human corpses are interred with the head to the west or north-west. The horse heads are turned to face the south-east, on a similar axis as the monument.

Before the development of differential GPS and drones, although data relative to the general orientation of the monuments were accessible, it was very difficult to accurately map the ensemble of structures peripheral to the great khirigsuur and to thus bring attention to their organisation. For B10, survey with the use of a drone (Magail *et al.* 2017) has allowed us to draw up maps of the structures and to reveal evidence of alignments, thus providing precious information about the process involved in creating these monuments.

The central mound forms the centre of the monument; it is positioned in the centre of the open space delimited by the quadrangular enclosure. At eye height, this layout highlights the mound as the focal point. An observer or officiant standing at the edge of the enclosure and looking over at the tomb has an unimpeded view. This phenomenon is intensified by the layout of the mounds and circles of stones surrounding this central area. The mounds show two different alignments (Fig. 18). Some alignments parallel the sides of the enclosure, whereas others radiate out from the central mound. There is no doubt that these mounds were constructed in reference to the centre of the monument. The hearths, on the other hand, are arranged in concentric circles encompassing the ensemble of other structures and thereby reinforcing the impression that everything is organised around the tomb containing the human.

We have to add to this description the orientation of the horse heads and point out that these are not turned towards the tomb. As has previously been described by Allard & Erdenebaatar (2005), they are oriented to the east or south-east or, more rarely, to the north-east. Two thirds of the animals are oriented with the head facing between 90° E and 110° E, 17% between 45° E and 90° E, and the remaining 17% between 110° E and 135° E (Fig. 19). This is quite different from, for example, the Neolithic royal tombs of Sudan, where the crania of bovids, present in their hundreds, are laid out in concentric circles around the deceased and facing the deceased (Chaix *et al.* 2012). In the khirigsuur, the horses face another direction, somewhere between north-east and south-east, regardless of their position in relation to the central mound.

How could we interpret this preferential orientation? Because of the angle of the axis of the Earth, the sun rises in the East only on the equinoxes. During the remainder of the year, it rises in the south-east (September to March) or the north-east (March to September). If the people at the khirigsuur desired to accurately direct the horse heads towards the sunrise at the moment of deposition, we could interpret the differences in angle as the result of the variability in the direction of the sunrise over the course of a year. In that case, and if there is really a connection to the rising sun, we would come to the conclusion that the deposits took place with a preference for autumn and winter. This trend may have been dictated by a ritual calendar, which established a preferential attendance at this place at this time of year, or, as already considered by Allard *et al.* (2007), it may have been linked to the domestic calendar, which organized the slaughter of horses mainly during the cold season, as is also the case in Mongolia today.

No matter what the connection was, we can also think more prosaically, about the difficulty officiants would have faced in precisely respecting a particular cardinal direction. Perhaps an orientation in the general direction of the rising sun sufficed.

Thus, these horses only partially participate in this general movement directed towards the centre of the khirigsuur, since they all face east and they resolutely orient the ensemble towards the east. Moreover, the heads are never located in the western part of the enclosure. Thus none of the heads face the centre.

DISCUSSION

The terms implied and used in descriptions of the activities that took place around the khirigsuur, the deer stones, and the tombs – or any other gesture that can be recognised archaeologically, in places outside Mongolia and for eras other than the Bronze Age – actually cover very different notions. The terms *rite*, *ritual practice*, *religious practice*, *sacrifice*, *sacred*, and *profane* are polysemous and can convey infinite nuances, depending on the culture, its age, and its origin; the school of thought; the scientific discipline; and the individual researcher. Sometimes this polysemy makes discussions and interpretations relating to the remains difficult, for several reasons. First, our modern way of thinking sometimes falls into anachronistic projections or *clichés*. Further, we have not even an approximate idea of the beliefs of the era, of what the

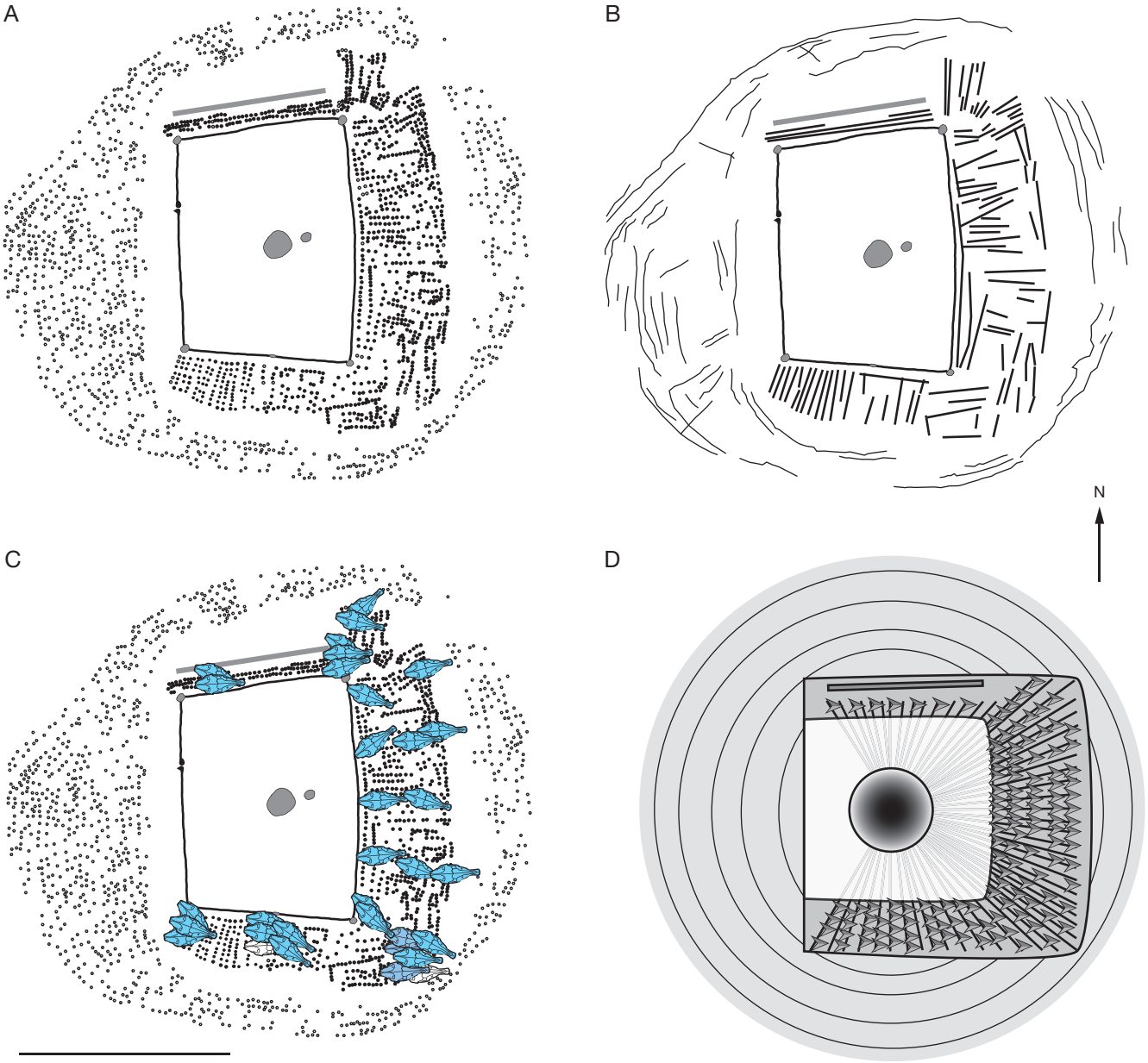

Fig. 18. — Arrangement of the structures at B10 at Tsatsyn Ereg. **A**, distribution of structures; **B**, alignments of mounds and stone circles; **C**, orientation of the horse heads; **D**, schematic representation of the dynamics of the movements produced by the different orientations and alignments. Computer aided design: S. Lepetz. Scale bar: 200 m.

gestures, and the challenges involved in implementing them mean (the emic approach being impossible, because the actors are no longer there and we have no texts concerning them to help us). Finally, the lack of explanation of the meaning of the terms used in the analyses carried out on these issues makes it impossible to know exactly what others are talking about.

In order to understand, explain, and interpret phenomena as complex as these, it is necessary to define the terms used. It is not a question of developing an epistemological or theoretical approach, of entering into an anthropological debate, or of discussing the legitimacy of lexical choices relating to sacrificial or religious vocabulary. It is simply a question of stating the meaning that we give to the words used by religious historians or anthropologists and that allow us to describe archaeological data.

Undoubtedly the most neutral term for describing the actions performed around the khirigsuur and the deer stones is *practice*, meaning the totality of gestures, religious or otherwise. Thus funerary practices may include prayers, washing of the corpse, slaughter of animals, and sharing of a meal, as well as the interment of the deceased and construction activities. These practices, which we initially think of in technical terms, may

have been left to the discretion of the officiants, the family, or individuals, and may have taken place only episodically.

These practices may also have been part of customs that were repeated as a habit, but without necessarily being codified or structured, without becoming compulsory (Augustins 1991), and without any meaning being expressed by them.

Talking about *rite* is more complicated, because this word has no canonical definition (Segalen 1998), because there is a lot of variation in the use of this term, and because it is "*engoncé dans une nébuleuse d'autres termes utilisés de façon interchangeable et donc démultiplié par l'ajout d'adjectifs visant à spécifier l'utilisation qui en est faite*" [engendered in a nebula of other terms used interchangeably, and thus multiplied by the addition of adjectives to specify the use being made of it] (Mariot 1995:148; see also Kyriakidis 2007). Brück (1999: 336) goes so far as to argued that the notion of ritual should probably be abandoned, since this concept has resulted in a fundamental misunderstanding of the nature of prehistoric rationality. One of the fundamental principles of rites is that they are intended to be repeated whenever circumstances demand (Smith 1991). They can thus be periodic or occasional, and linked to the life of the collective or to that of the individual. In the context of our work, we consider rites to be something that develops as soon as the ensemble of gestures and words are prescribed and organized by some authority or group that formulated a code for these gestures and words and are in possession of their meaning (Fabre 1987). The difference between rites, on the one hand, and customs or traditions, on the other, relates to this meaning; the meaning of rites is known by the community, but that of customs and traditions is not defined. For the practices of the Bronze Age, and indeed for those of all pre-literate cultures, we have to recognise that we do not know anything about this meaning, even though we can imagine that there must have been a meaning. We also have to consider that rites are not necessarily religious, and that the social and communal dimensions may have prevailed. In addition, we have to assume that these rites were regulated, structured, and tied to a particular time and cultural setting.

A major aspect to take into account in this definition is that of the rites' interpretation. Even in the most ritualistic of religions, such as that of the Romans, for example, a certain amount of freedom can be exercised during practices without impacting the literal value of that rite (Scheid 1998). For that to happen, the rite cannot be distorted, and its major gestures, the words that are spoken and the basic attitudes, must be maintained.

The result in terms of the manifestations of the rite (and its archaeological evidence) is a variety that is then a matter of individual interpretation, which, although charged with meaning, may resemble an original practice, thus further complicating the interpretation of data from archaeological excavations. But we must not feel helpless in the face of these variations that are not the result of different rites, but of a different interpretation of these rites, and which can manifest themselves all the more frequently in pre-literate cultures.

The organisation and architecture of the khirigsuurs no doubt relate to ritual practice, as does the placement of the circles, hearths, mounds, and remains of horses, of which it is impossible to imagine that they would not have some kind of meaning, so much so that the reproduction of the same form at the same time over a vast territory seems repetitive. The nature of these deposits follows a rule (a head, a neck, hooves), but their exact composition (including anatomical elements) and their origin (fresh or not recent) are subject to variations, some of which may be due to the interpretation or layout of the rite. Yet these variations can inform on the rite itself. In this way, the fact that certain heads were not fresh indicates that slaughter did not necessarily take place at the khirigsuur itself.

The rites are thus modes of action, and these actions were mostly registered in a calendar that may have been liturgical, astronomical, seasonal, or related to the cycle of life (birth, death). They may have been periodic or occasional. The large number of deposits around the khirigsuurs raises questions about this calendar. Radiocarbon dates taken at B10 indicate that deposition was spread out over several decades. The rhythm and the seasonality of these deposits remains difficult to access, even if the variability in the orientation of the heads in relation to the sunrise suggests the possibility that deposition took place at different times of the year (but especially in autumn and winter). The existing data on the age of the animals do not permit us to discern a preferred season for slaughter. Similarly, it is complicated to determine the sequence in which the structures were erected. We note that B10 includes approximately the same number of mounds and circles. One might think that each human intervention was characterised by two gestures: placing one or more horse heads and lighting a fire.

Another question is how we define these deposits. Are these crania, mandibles, necks, hooves, and burnt bones sacrificial remains? Offerings? The remains of a meal? This is again a question of terminology. But beyond that, there is the need to define the sequence of the rite and to better understand its different aspects. A sacrifice is often at the heart of cult, and thus religious activity. We can define *sacrifice* as a ritual offering made to a divinity and characterised by the destruction (real or symbolic) or the discard of the item. One of the fundamental points of a sacrifice is the need for the sacrificed object, person, or animal to be transferred or moved, that is, to be passed from the hands of the sacrificer to the recipient of the sacrifice.

Sacrifice thus has a three-fold structure, and we therefore have to put aside cases in which the death of the animal or the burial of the object are part of a dual relationship. An example is the accompanying dead ("*les morts d'accompagnement*"; Testart 2001), whereby a horse is killed and then deposited in the tomb of its deceased owner. In such cases, there does not seem to be any renouncement, because the rider leaves this world with the horse, and the horse, unless proven otherwise, is not destined for a divinity. A simple offering also differs, in that the object is not destroyed, although there, too, the definition can appear to be a moving target. The definition is

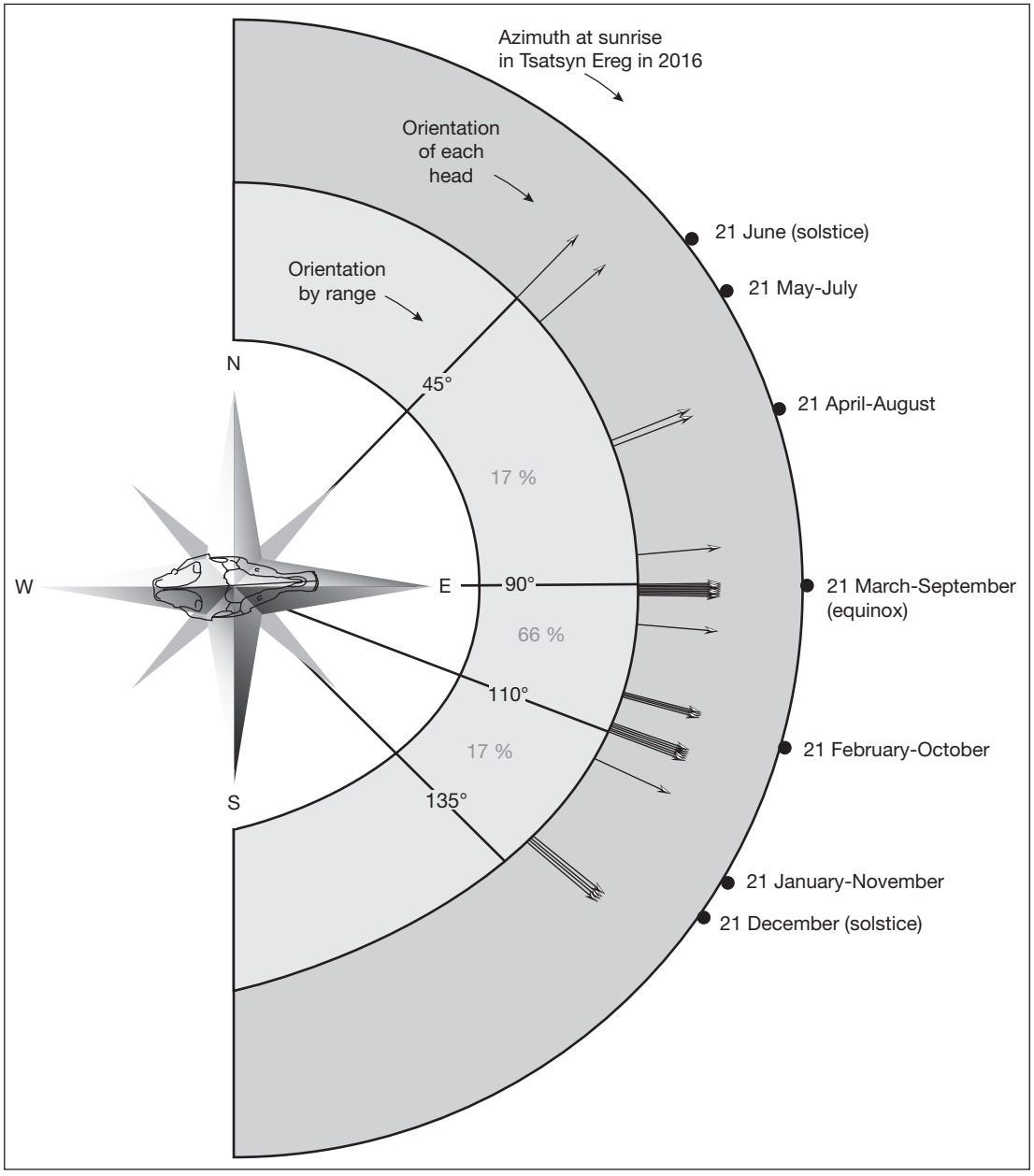

Fig. 19. — Orientation of the horse's heads in B10 at Tsatsyn Ereg (n = 30). Data in Appendix 1. Computer aided design: S. Lepetz.

simple to understand in the case of the erection of a monument, which may be offered, but it is more difficult to understand in cases where objects are placed in a fire or buried with the deceased. The objects that belonged to the deceased can be considered accompanying objects, but the ornaments or deposits of food have a status that is less clear. One could envisage paying homage to the deceased by arranging and furnishing the interior of the tomb for the purpose of prestige, without the objects being placed in it being offered to anyone. This is therefore a policy of deposit (Testart 2001).

To return to sacrifice, the destruction and thus the divine offering may consist of killing an animal; exposing its cadaver or part thereof to the elements; burning its flesh or bones on an altar; burning vegetal matter; breaking objects, ceramics, or weapons; burying them, etc. In the case of a sacrifice of an animal or of plant matter, once the item has been offered to the gods, a sacrificial meal may take place – involving the officiants, the family, and members of the community, and sometimes the divinities, or the deities representing the deceased, made up in part or entirely of what remains of the edible foodstuffs. In such cases, there is a policy of distribution.

But we can definitely also envisage a whole series of gestures that archaeology is unable to reveal: prayers, songs, vows, etc. The same goes for beliefs and codes. Yet other gestures may be perceived archaeologically, but we have to search for them, describe them, and decipher them before we can interpret them. We were aware of this need during our interpretation of the results from khirigsuur B10.

Our results indicated that at khirigsuur B10, the horse heads were not buried but, rather, deposited on the ground surface. In contrast to most of the funerary traditions involving horses in other time periods or other regions of Eurasia, the deposits in the khirigsuurs are often accompanied by two other elements: a neck and hooves (of which we recover the distal phalanges). We are not dealing here with entire horses, and the distal extremities do not include the metapodia and the three phalanges, as one encounters in Bronze Age tombs in Southern Russia or Kazakhstan (e.g. Outram *et al*. 2011), or, later in time, in the Xiongnu tombs (e.g. Lepetz & Decanter 2013). At Tsatsyn Ereg, the heads are protected by mounds whose purpose it is to mark their presence, to signal their existence. Undoubtedly a *pars pro toto* for the entire animal, together they possess a force, a property, a power, and a vitality, and they are facing the same direction, as might living animals. They have been arranged around the tomb because they have a relationship to the tomb, but they are looking in a different direction, not towards the tomb, because they have a use and they play a role, maybe a psychopomp role, one that is in all cases symbolic and related to the deceased; they take the deceased to the rising sun, as would horses pulling a chariot and its charioteer or driver. It is, moreover, likely that some of them performed this function of pulling a chariot in life (Taylor *et al.* 2015, 2016).

Linking wagons, carriages or carts with funeral practices is a fairly easy exercise for periods or steppe regions yielding graves containing vehicles, horses, harness elements, and/or wheels. For the Bronze Age, the very famous examples from the Pontic Caspian steppe or Kazakhstan (Anthony 2007; and e.g. Cherlenock 2006; Kuznetsov 2006; Outram *et al*. 2011; Chechushkov & Epimakhov 2018), and their large number, reveal the important role that the cart has played in Eurasian steppe societies and their very common involvement in funeral practices. In Mongolia, there have been no discoveries of wheeled vehicles in graves dating to the Bronze Age. By contrast, there are very many images of chariots from the 2nd millennium BCE on the rocks of the Altai mountains (Jacobson-Tepfer 2012). For Jacobson-Tepfer, it seems very likely that these representations relate to death, specifically the death of an individual and their transport to a parallel world. It is possible that wheeled vehicles were used to transport the body to a sacred place and that the depictions on rocks of these chariots were used by the community to commemorate their dead (Jacobson-Tepfer 2012: 8). While we must be careful not to transpose to central Mongolia the analyses carried out on the petroglyphs of the Altai, where khirigsuurs are rare, it is possible that, with the khirigsuurs, we are in the presence of a variation on the funerary chariot theme.

We can also make the connection with the figures on the deer stones (Fig. 5), which show a cortege of deer rising to the sky, towards the sun (if one imagines that the circles on the upper part of the stele represent the sun). This role of transmitter to the afterlife proposed by Magail (2008) is echoed here at ground level, by the horses. While the repertoire and the species are different (images vs bones; deer vs horses), we can agree on the similarity of the movement traced by these figures.

It is difficult to know whether the horses were sacrificed. Certainly, the meat of the individuals killed in that location could have been shared among the guests, eaten in part on the spot or taken home. But what part was reserved for the divinities? It does not show up in the hearths inside the circles, since the burnt bone is all sheep. Their part could concern a bit of blood, or some pieces of meat thrown to the wild animals. But the horse head was neither buried nor destroyed. Instead, it was given a role by making it part of the scene.

And what rules applied to the horses killed elsewhere (and at another time?), of which only certain anatomical parts were brought to the khirigsuur and deposited? The crania may have commemorated a sacrifice conducted in a different place, or they may have been an offering. This raises the question of the link between the animal, the humans and the divinities. Did not all of the meat consumed derive from sacrificed animals (and did it even include meat from horses eaten in the settlement)? Clearly, we have no way of answering this question. But in any case, the overrepresentation of males indicates that not all of the animals that were eaten are represented at the khirigsuur, and we are therefore far from being able to understand the succession of gestures and their integration into the pastoral system.

Funerary rituals are rites of passage *par excellence*, because they are used to confer on the deceased a new status and new properties (Van Gennep 1981). They have as objective to permit the person to depart the world of the living and gradually enter that of the dead, to assure the best journey possible to the hereafter, and to install the deceased in their new status. They can also consist of interceding on behalf of the deceased with the divinities that have taken him/her.

The ensemble of gestures surrounding death also have a social role – that of support for the family and tightening of community bonds. But this destruction of the corpse is most often experienced as a defilement by the family and the entourage of the deceased, who therefore submit to purification rites (that may be coupled to rites of protection). They can present in different forms, depending on the population and the culture (Bernand 1991), notably fires, being sites of purifying sacrifices, used to burn animal flesh and vegetable matter, and around which the living can share a meal. It is tempting to link the circles of stones delimiting the fires lit around the tomb of the deceased with the action of purification. At Tsatsyn Ereg, people burnt parts of sheep, notably the feet, undoubtedly still fleshed and with the skin and the hoof coverings still in place, that is, the unconsumed bits of animals undoubtedly killed for the occasion and shared among a family. Elsewhere, this can involve bits of cattle (Broderick *et al.* 2014a, b), and the consumption waste joins the bits not eaten in the flames. Sheep are most often used and cattle much more rarely, but never horses, which establishes a clear separation among these species, the former two being part of cremations and the latter being part of the deposits of unburnt heads. These altars, whose role was envisaged by Broderick *et al.* (2014a), were not all put in place at the time of the funeral, but, rather, over a period of years, very likely in the context of

commemoration of the deceased. Initially established in the western portion of the monuments, they eventually no longer remained limited to just one side of the monument but, for the large khirigsuurs, encircled the tomb and the horses, thus allowing for a complete and ideal architectural program to be finalised.

CONCLUSION

The objectives of this article were to describe the practices of a human community, at the scale of one or two generations, recorded on the same khirigsuur from detailed excavations carried out on a large number of structures. The data, which are very coherent spatially and chronologically, make it possible to better understand the habitual or exceptional nature of gestures and to propose an interpretation in terms of rites.

The new information gained from the analyses is as follows:
– most often, the mounds contained remains that could be accommodated in a single horse, but these remains sometimes derive from more than one individual;
– some of the mounds contain assemblies of anatomical parts from two or more different individuals (a skull of one individual with a mandible of another, or other combinations);
– it is clear that some of the pieces of horse were deposited fresh and unaltered (that is, with the adhering meat), shortly after the death of the animal, and that other pieces, all of them cranial elements, were deposited after post-mortem exposure;
– not all of the horse remains represent animals that were killed on the spot. As far as the meatless remains are concerned, it is difficult to know whether these reflect a (simple) discrepancy between the location of death of the animal (killed in the housing unit) and the location of its deposit (which occurred after a delay) or whether there was a ritual desire to expose the head. It is therefore necessary to be wary of thinking that a sacrifice is necessarily at the origin of the death of (all of) these horses;
– the analysis of age at death revealed a selection for old and very old males, which are in the majority;
– there is no patterning in the distribution of horses around the grave according to age and sex;
– the remains of the horses were not buried, but, rather, were placed on the soil surface and covered with stones;
– there is variability in the orientation of the skulls, but there is a tendency towards the east and southeast that may be related to the azimuth variations of the rising sun at different times of the year;
– the position of the heads around the grave and the direction in which they face give the impression that the horses are pulling the khirigsuur, echoing the representations in the Altai rock art of a cart being used to transport a deceased person;
– fires were regularly lit (probably in situ) around the grave. It is possible that these may have been community purification rites. Caprine bones (and meat?) were burned. All anatomical parts are represented, but these are dominated by feet, which are present as articulated units;
– information from radiocarbon dating conducted by Zazzo *et al*. (2018) shows that the construction and deposits do not constitute a single event but were, instead, spread out over a period of approximately 50 years. We calculate that, at a rate of one mound and one fire per family over a period of 50 years, 25 families would have sufficed to build these (approximately) 1200 mounds and light these (approximately) 1200 fires, without the need to draw on other human and animal resources than those locally available.

These data enrich our knowledge of ritual practices in the Bronze Age by revealing those observed around the most imposing complexes. It is noteworthy that the architecture of the massive funerary complexes of the Bronze Age, their size, their uniformity of form and organisation, and the quantity of peripheral structures contrast with the numerous other, contemporary tombs that are not flanked by satellite deposits. The practices of depositing anatomical elements of horses and burning bits of sheep are linked to only certain tombs. The communal aspect of the activities conducted around these large tombs is evident. They undoubtedly had the objective of reaffirming group cohesion (e.g. Wright 2015). We can also think that, mirroring modern-day ovoos, the Bronze Age structures, being a kind of inverted ovoo, also marked that the family belonged to a community and that the community belonged to a space of life, the native country (the *törsön nutag* of modern-day Mongolians; Charlier 2016). In that sense, the link with the deceased, because the deceased is linked to a territory, could be of that nature. But this type of action, although not being mutually exclusive with, could also be part of the process of transformation of the deceased, not just into spirits but also into ancestors (Krauskopff 1991). These "close" ancestors were defined based on a real genealogy; present underneath the central mounds, they might be accompanied by mythical ancestors, being transcendental figures, that one could identify with the deer stones and the totemic animals (that is, deer) engraved upon them. This bipolarity of the recipients of the rites may thus explain similarities: purifying fire and horses deposited in both types of complexes.

We thus perceive all of the complexity of the DSK phenomenon, simultaneously social and religious, and the difficulty of properly discerning this phenomenon based on archaeological remains, despite their recurrence over a vast territory. But beyond gestures that seem identical, each head deposited, each mound erected, each stone placed, each fire lit and fed, and each piece of meat thrown into the flames possesses and reveals a different history – that of an individual, a family, or a small community. We must not forget about these individualities. They are the reason why, even if these structures develop within a community of thought and a community of action, it is important to approach each of them, no matter how modest, as witnesses of unique actions, each with its own social, symbolic, or ritual charge, a charge that is renewed each time. We thus have to view these structures through two sets of eyes – those that allow us to describe in the smallest detail each of the archaeological facts and those, with a wider gaze, that give meaning to these individual gestures.

Acknowledgements
We thank all the members of the Monaco-Mongolia Archaeological Mission. We are particularly thankful to the members of the 2016 mission, who excavated a large number of the dated structures. Fieldwork was supported by the Monaco-Mongolia Archaeological Mission (director Jérôme Magail) and the French archaeological mission in Mongolia (CNRS, MNHN, MAEDI, director Sébastien Lepetz). We thank William Taylor and the anonymous reviewer for their helpful comments. We thank Suzanne Needs-Howarth for the translation and copy edit.

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Submitted on 28 March 2019;
accepted on 3 September 2019;
published on 8 November 2019.

Appendix 1. — Data on horse remains under the mounds of B10, PAC 38 and KTS 01 at Tsatsyn Ereg.

Khirigsuur identifier	N° of structures	Year of excavation	Horse identifier	Direction faced by horse's head	Age of horse	Sex of horse	Cranium	Mandible halves	Maxilla and mandible in articulation?	Atlas	Atlas and cranium in articulation?	Axis	Other cervical vertebrae (C)	Neck positioned facing in opposite direction to head?	Thoracic vertebrae	Distal phalanges	Notes
B10	SAT 389	2013	–	90°	juvenile?	?	1	2	yes (displaced)	–	–	–	–	–	–	–	completely destroyed
B10	SAT 666	2013	–	110°	2 years	?	1	2	no (displaced)	–	–	–	–	–	–	–	–
B10	SAT 732	2013	–	110°	2-2.5 years	?	1	2	yes	–	–	–	–	–	–	–	–
B10	SAT 397	2013	–	90°	old	male	1	2	yes (displaced)	–	–	–	2 (C3? and C4)	–	–	1	–
B10	SAT 354	2013	–	70°	very old, 18-20 years?	male	1	2	yes	–	–	1	5	–	1	1	–
B10	SAT 415	2013	–	45°-60°	very old	male	1	2	no (side by side)	1	no, but atlas articulated with axis	1	3	–	–	–	neck, cranium, and mandible side by side
B10	SAT 416	2013	–	105°	very old	female	1	2	yes	–	–	–	–	–	–	–	–
B10	SAT 528	2013?	–	–	3 years	?	1	1	–	–	–	–	–	–	–	–	–
B10	SAT 576	2013	[no bone]	–	–	–	–	–	–	–	–	–	–	–	–	–	no faunal remains
B10	SAT 799	2011	–	115°	?	male	1	–	–	1	yes	–	–	–	–	–	–
B10	SAT 800	2011	[no bone]	–	–	–	–	–	–	–	–	–	–	–	–	–	no faunal remains
B10	SAT 801	2011	–	95°	adult	male	1	–	–	–	–	–	–	–	–	–	–
B10	SAT 803	2010	–	45°	1.5-2 years (maxilla) and adult (mandible)	male	1	1	no	–	–	–	–	–	–	–	–
B10	SAT 810	2011	–	90°	around 8 years	male	1	1 (2?)	?	–	–	–	–	–	–	–	very, very degraded
B10	SAT 811	2011	A	90°	very old	male	1	1 A or B?	–	1	no; in correct alignment but displaced	–	–	–	–	–	–
B10	SAT 811	2011	B	110°	around 13-15 years (maybe older?)	male	1	–	no	–	–	–	–	–	–	–	–
B10	SAT 1023	2013	A	130°	very old, cf. 18-20 years	female ??	1	–	–	–	–	–	–	–	–	–	–
B10	SAT 1023	2013	B	130°	2-2.5 years	?	1	–	–	–	–	–	–	–	–	1	–
B10	ST1	2016	–	130°-135°	very old	male ?	1	2	no	–	–	–	–	–	–	–	–
B10	ST2	2016	–	90°	very old	male	1	2	yes	1	yes	–	–	–	–	–	–
B10	ST3	2016	–	110°	very old	–	1	1 (2)?	no	–	–	–	1	–	–	1	–
B10	ST4	2016	[no bone]	–	–	–	–	–	–	–	–	–	–	–	–	–	no faunal remains
B10	ST5	2016	A	105°	5.5-6 years	–	1	2	yes	–	–	–	5 (close to B)	–	–	1	–
B10	ST5	2016	B	105°	very old, 18 years	male	1	2	no (disturbed?)	–	–	–	–	yes	–	–	–
B10	ST6	2016	–	–	–	–	–	fragments	–	–	–	–	at least 1	–	–	–	–
B10	ST7	2016	[no bone]	–	–	–	–	–	–	–	–	–	–	–	–	–	no faunal remains

Appendix 1. — Continuation.

Khirigsuur identifier	N° of structures	Year of excavation	Horse identifier	Direction faced by horse's head	Age of horse	Sex of horse	Cranium	Mandible halves	Maxilla and mandible in articulation?	Atlas	Atlas and cranium in articulation?	Axis	Other cervical vertebrae (C)	Neck positioned facing in opposite direction to head?	Thoracic vertebrae	Distal phalanges	Notes
B10	ST8	2016	A	–	2	–	1	2	no (side by side)	–	–	–	several in articulation	–	–	–	–
B10	ST8	2016	B	130°/ 135°	–	male	1	–	–	–	–	–	–	–	–	–	just 2 petrous portions
B10	ST9	2016	–	85°	very old, 18 years	male	1	2	yes	1	yes	1	5	yes	–	1	–
B10	ST10	2016	–	110°	very old	female ??	1	2	yes	1	–	1	3	yes	–	4	phalanx and its sesamoid
B10	ST11	2016	–	90°	–	–	1	–	–	–	–	–	fragment	–	–	–	small fragments
B10	ST12	2016	–	105°	2 years (maxilla) and adult (mandible)	male	1	2	no	–	–	–	–	–	–	–	–
B10	ST13	2016	[no bone]	–	–	–	–	–	–	–	–	–	–	–	–	–	no faunal remains
B10	ST14	2016	–	90°	very old	male	1	2	yes	1	no	1	5	yes	–	1	unusual position of atlas
B10	ST15	2016	–	90°	12-15 years	male	1	2	yes	–	–	–	–	–	–	–	–
B10	ST16	2016	–	110°	4.5 years	male	1	–	–	–	–	–	–	–	–	–	mandible halves not deposited in anatomical connection
B10	ST17	2016	–	70°	1-2 years	–	1	1	yes	–	–	–	–	–	–	–	left maxilla and left mandible
B10	ST18	2016	–	90°	old, 15-17 years	female ??	1	2	yes	1	no	1	5	yes	–	1	neck positioned in front of the head
PAC38	SAT01	2011	–	130°	very old, >20 years	female ?	1	2	yes	1	no	1	4	yes	–	–	atlas positioned in the extension of the neck
PAC38	SAT27	2011	–	136°	adult	?	1	–	–	1	–	–	–	–	–	–	–
PAC38	SAT95	2011	–	115°	adult	?	1	–	–	1	–	–	–	–	–	–	very, very degraded
KTS01	S1	2012	–	–	–	?	1	?	–	–	–	–	3	–	–	–	–
KTS01	S2	2012	–	–	adult	?	1	2	–	1	–	–	1 (C3?)	–	–	1	–
KTS01	S3	2012	–	–	very old	male	1	2	more or less yes	–	–	–	–	–	–	3	–
KTS01	S4	2012	–	–	15-18 years	male	1	2	more or less yes	1	more or less yes	–	–	–	–	3	–
KTS01	S5	2012	–	–	?	male	1	?	–	1	–	–	–	–	–	2	–
KTS01	S6	2012	–	–	3.5-4.5 years	?	1	2	–	1	–	–	–	–	–	1	–