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Knucklebones
An Archaeological and Ethnohistorical Inquiry into one of Tibet's Oldest Gaming and Divination Objects

John Vincent Bellezza

Abstract: Through archeological and ethnographic sources this article furnishes a comprehensive perspective on the Tibetan cultural purposes of the ovicaprid ankle bone called astragalus or knucklebone. It sets forth criteria for the identification of culturally significant astragali in Tibetan tombs and assesses the functional implications of examples in burials in other parts of Eurasia for comparison. A copper alloy astragalus of ostensible Tibetan origin is examined, also supplying some insight into the ancient cultural status of this bone on the plateau. The article also investigates the role of astragali in Tibetan gaming, divination, tallying, ritual traditions, and concepts of the sacred. Finally, attention is turned towards cross-cultural aspects of the utility and symbolism of ovicaprid astragali and what they might tell us about the nature and extent of transcultural exchange in Eurasia in the Late Prehistoric era (ca. 1200 BCE to 600 CE) and in historic times.

Introduction[1]

This article reviews the archaeology and ethnohistory of the ovicaprid knucklebone on the Tibetan plateau, one of the most enduring and widespread of cultural symbols.[2] The knucklebone is located in the tarsus of the rear legs of domestic sheep (*Ovis aries*), goats (*Capra hircus*) and other artiodactyls. It is a squarish bone that has been used for a variety of purposes by humans, its cultural associations having spread widely in Europe, the Middle East, Central Asia, and China by the Iron Age. That there are only two per sheep or goat lends the astragalus intrinsic value and its blocky form and high density make for a durable, tactile and visually appealing object. The work considers archaeological and ethnographic evidence regarding this storied implement and symbol, examining its ancient and contemporary functions in gaming, divination and protection in Tibet and other regions of Eurasia. By probing the material and abstract significance of the astragalus a new channel of inquiry into Tibet's place in the cultural map of the continent is opened. It is the author's hope that this preliminary study will stimulate further interest in the subject among historians, anthropologists and archaeologists working on the Tibetan plateau.

The astragali of sheep and goats and their facsimiles are one of the most widely distributed objects in archaeological and anthropological contexts in Eurasia, Tibet being no exception. They have been discovered in ancient settlements and tombs and served as popular gaming pieces in many places on the continent until well into the 20th century. It is generally believed that astragali are the precursors of jacks and dice, the etched markings on the latter sometimes matching those on knucklebones. The bone may also have contributed to the creation of other games such as boules. Recreational activities featuring astragali in the archaeological and ethnographic settings are mostly associated with children but adults participated as well and this is reflected in the premodern cultural scene of Tibet too. There are a number of gambling games using ovicaprid knucklebones that were traditionally played by adults in Tibet until the end of the last century. However, they have now disappeared or are in steep decline. Copper alloy imitations of astragali were cast in ancient Greece, Rome, central China, and probably Tibet. The wide distribution of knucklebones and knucklebone imitations in Eurasia is mirrored in cowries, a marine mollusk collected from the Indian and Pacific oceans, which also had

1 The writing of this article was supported by a grant awarded me by the Lumbini International Research Institute (LIRI), Lumbini, Nepal. I especially want to thank the acting director of LIRI, Christoph Cüppers, for his support of my work. I also heartily thank Prof. Huo Wei and Zhang Changhong for arranging my attendance at the Seventh International Conference of Tibetan Archaeology & Art, in Chengdu, October 19-21, 2018, and for the excellent hospitality I received whilst in Chengdu.

2 In English it is also known as astragalus/astragal (pl. astragali/astragals), talus (pl. tali), and huckle-bone. The term "knucklebones" also denotes games played with this bone.

Fig. 1 The four sides of ovicaprid astragali
Left: plantar; Middle left: dorsal; Middle right: lateral; Right: medial.

a broad array of functions, serving as ornaments, talismans and a medium of exchange for various Eurasian peoples, including Tibetans. Cowries were reproduced in Tibet and other locations on the continent using copper alloys and other substances.[3]

The astragali of sheep and goats are known by a variety of names on the Tibetan plateau (Fig. 1). In Khams and A mdo (eastern Tibetan plateau)[4] and in the Hor and A pha Hor regions of Nag chu, it is generally called *the ge*. In parts of A mdo such as Rnga ba the knucklebone is rendered *be ke*, a regional variant of *the ge*. In Lhasa and southern areas of the Tibet Autonomous Region, the astragalus is referred to as *A cug*. In Gtsang and Stod (including Ting ri, Skyi grong, Spu rangs and the western Byang thang) the astragalus is styled *long mo*, a constituent of the ankle joint (*long tshig/long rdog*). More generally, the knucklebone and ankle in Tibetan are called *long bu* and *Ong bu*. In Spiti (Spyi ti) a sheep or goat astragalus is known as *mug lo*. There are also more localized names for sheep and goat astragali in Tibet. For example, in the Gling tshang dialect of Sde dge, the bone is designated *sa ga*, while in Dkar mdzes and Brag 'go, located further east in Khams, it is the *A 'gram* (spelling?). There are likely to be other synonyms for ovicaprid astragali in sundry Bodic languages and dialects but more research is required to confirm this.

The Tibetan *the ge* and *long mo* appear to be older indigenous terms. *Long* as an initial syllable of Tibetan words is well attested and those having to do with the abdomen, intestines

3 For a preliminary study of both knucklebones and cowries in Tibet, see Bellezza 2014.

4 Incorporated into the Chinese provinces of Yunnan, Sichuan, Gansu, and Qinghai.

and bulging shapes probably share a root with *long mo/long bu*. This semantic cluster appears to be derived from the Old Tibetan language. *The ge*, by virtue of its orthography, also seems to be of ancient origins. It can be traced to either Old Tibetan or the Zhang zhung language (both *the* and *ge* occur in Zhang zhung lexicons). The term *the ge* and other common Tibetan names for the knucklebone do not seem to occur in the Dunhuang manuscripts. The reasons for this absence in extant Old Tibetan texts is a matter for deliberation. The restricted and highly fragmentary state of the corpus might indicate that it is simply left out by chance. Nevertheless, this common gaming object and symbol does not appear to play a part in the Old Tibetan funerary, healing and curative texts that have come down to us. In the Dunhuang text ITJ 739, the term *cho lo* (refers to dice or dominoes) is cited four times in the explication of the positive and negative outcomes of a divination ritual (*mo*).[5] While not explicitly mentioned in other Dunhuang divination texts, it is understood that dice were widely used in these rituals. Perhaps then by the time these divination documents were written down (ca. 8th to 10th century CE) manufactured dice had replaced natural astragali in divination, at least in more formal ritual settings. The Spitian word *mug lo* appears to be of Zhang Zhung linguistic origins and thus derived from an ancient linguistic source.[6] In various Turkic languages words for astragalus include *asyk*, *ashyk*, *chükö*, and the related Tajik word is *oshuq*. It is from one of these terms or an etymon that the Central Tibetan *A cug* is derived. The closest word phonologically to the Lhasa term is the Tajik *oshuq*, which may suggest that the Sogdians or Sassanians were responsible for the introduction of the term into the Central Tibetan vernacular during the Imperial period (ca. 650-850 CE).[7] The word *sa ga* is almost certainly borrowed from the Mongolian *shagai* (*šagai*; knucklebones). We might conjecture that the formation of the Mongol chiliarchy of Bi ri in the wider region in the 13th century CE may have influenced the adoption of this term in Sde dge. Etymological interconnections with north Inner Asian languages are reflected in parallel knucklebone games and the beliefs of Tibetans and speakers of Turco-Mongolian and Iranian languages.[8]

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5 On dice divination in Old Tibetan manuscripts, see Dotson 2015; Nishida 2018. On ancient forms of Tibetan dominoes (*sbag*) divination, see Norbu 2009: 204-10; on the Tibetan dice game of *sho*, see Murakami 2014.

6 On this term and its apparent Zhang zhung etymology, see Bellezza 2013a.

7 Modern Persian: *ashiq*; Modern Turkish: *aşık*. On the complex Indo-European etymological links for "knucklebone", "astragalus" and "dice", consult the relevant dictionaries. The Persian *band angusht* and Sanskrit *asthi aṅguṣṭha* (literally, knuckle bone) are linked through Indo-Iranian antecedents, the Persian more closely interrelated to the Turkic and Tajik words for astragalus. Neither the Persian nor Sanskrit term are directly related to the Tibetan *A cug*.

8 "North Inner Asia" as defined in this work is a geographic denomination encompassing eastern Kazakhstan, eastern Uzbekistan, Tajikistan, Kyrgyzstan, northeastern Afghanistan, Mongolia, southern Siberia, and northwestern PRC. The Tibetan Plateau and far northern Pakistan constitute south Inner Asia.

An archaeological review of knucklebones in Tibet and other parts of Eurasia

Knucklebones were employed in games, divination and cult practices over a wide swathe of Eurasia by the Late Bronze Age and Iron Age. There is still much lore attached to this most intriguing of animal bones in living cultures of Central Asia, Mongolia and Tibet. Some of the earliest examples of intentionally modified ovicaprid astragali as cultural objects comes from the northern Balkans and are thought to date to the middle and late Neolithic. At the Chalcolithic settlement of Gumelniţa, Iepureşti, southern Romania, a group of twenty-five ovicaprid astragali purposefully abraded and perforated were discovered in a burned house.[9] Other early mostly non-funerary sites in Romania have also yielded humanly modified astragali, some pigmented with red ochre or placed in ceramic pots alone or with other objects.[10] In the eastern Mediterranean and Anatolia ovicaprid astragali as gaming pieces and objects with religious and symbolic functions are traced to the Bronze Age. The oldest known occurrence of astragali as grave goods in Italy occurs in Tires, an alpine site in Bolzano dated to the end of the Bronze Age or the beginning of the Iron Age.[11] Astragali with worked edges and sacrificial sheep remains were found in the fortified settlement of Kamenny Ambar (Olgino) in the western Steppe belonging to the chariot-using and sheep-rearing Sintashta culture (ca. 2100-1800 BCE).[12] Astragali, including polished and pierced examples, were also widespread in the ancient Persian world,[13] particularly from the second half of the second millennium BCE and in children's graves.[14] Moreover, disarticulated astragali are regularly recovered from Late Bronze Age and Iron Age graves in the Altai, in tombs of the Slab Grave culture of Mongolia (ca. 11th to 5th centuries BCE), and in other regions of Inner Asia.

Ovicaprid knucklebones were widely used as gaming pieces in Eurasia.[15] It is commonly held that they are the historical antecedents to dice and jacks. The functions of knucklebones in the classical world are determined through archaeological, artistic and literary sources of

9 Kogălniceanu *et al*. (2014: 292-94) consider several possible functions for the twenty-five abraded and perforated ovicaprid astragali found in the Copper Age settlement of Gumelniţa in Romania: tools for making pottery decorations or leather working, gaming, markers of social status, amulets, and primitive currency.

10 Kogălniceanu *et al*. 2014: 294-98. Sidéra and Vornicu 2016: 381-82.

11 de Grossi Mazzorin and Minniti 2013: 372-74.

12 Koryakova *et al*. 2011: 68.

13 Muscarella 1974: 80 [n. 21].

14 Schädler and Dunn-Vaturi 2009.

15 A forthcoming volume of collected papers has been announced by the De Gruyter publishing conglomerate for publication in early 2020 under the title, *Astragalomania: New Perspectives in the Study of Knucklebones in the Ancient World*. According to the publisher's website, this volume will offer various perspectives on the archaeological contexts and actual and symbolic traditions of astragali.

evidence. Ovicaprid knucklebones are found in a variety of settings in the Mediterranean and Asia Minor, including houses, public buildings, temples, sanctuaries, tombs, and boundary markers. In addition to natural examples made of bone, replicas were fabricated from copper alloys, silver, lead, stone, glass, ivory, and terracotta. In an Egyptian tomb-painting a nobleman is shown playing his favorite game in the afterlife in which he gestures with an astragalus above a board arrayed with figures.[16] In ancient Italy astragali had ritual applications in divination, profane uses in gaming and metrology,[17] and functioned as protective devices for the dead during their journey to the netherworld.[18] Perego observes[19] that the magic connected to amuletic objects like ovicaprid astragali had important social functions as materializations of religious practices, class structures and gender differences, as well as relaying emotional experiences.[20] Ovicaprid astragali were central to a number of commonplace games in the Roman empire involving throwing and pickup, striking targets, playing boards, and gambling contests, which are attested in texts, paintings and sculptures.[21] The many astragali cached in elite tombs of ancient Italy may have been markers of wealth too, since they imply possession of considerable livestock, while the many astragali discovered in children's tombs frequently represent toys, a common plaything in the ancient Mediterranean. Astragali buried in the tombs of children, however, may also have functioned as amulets to protect the living from the untoward circumstances and bad luck associated with such deaths.[22] In the Iron Age Levant ovicaprid astragali also appear in modified forms and seem to have been used in wide-ranging ways as gaming pieces, instruments of augury, amulets, funerary and cult offerings, pious records of sacrifices, and

16 David 1962: 5, 18.

17 Roman authors state that astragalus games were played primarily by children and young women. The Greek poet Homer writes that when Patroclus was a child, he became so angry over a game of knucklebones that he nearly killed his opponent (David 1962: 4). Dobbs (2018: 33, 41) notes that this account in the *Iliad* depicts the severe consequences arising from destructive emotions unleashed in knucklebone games as well cosmic analogies concerning humans being the pawns of the gods.

18 de Grossi Mazzorin and Minniti 2013.

19 Perego 2010: 67-68.

20 Pindar (5th century BCE) records that divination took place at Greek temples by casting astragali (Lebo 2016: 423). In his *Guide to Greece*, Pausanias (2nd century CE) mentions the practice of astragalomancy in a sanctuary dedicated to Heracles (Affanni 2008: 84, after Pauli and Wissowa 1924). Cicero (106-43 BCE) in his *De Divinatione* famously refers to games of chance such as those played with astragali as characterized by luck and recklessness. In the *Lives of the Twelve Caesars* by Suetonius (died 126 CE), Emperor Tiberius is recorded as flinging several golden knucklebones into a spring to learn of his future (Sidéra and Vornicu 2016: 380). David (1962: 15, 16) describes oracular functions employing four or five astragali in Greek and Roman temples. They were also common votive objects at Greek and Roman temples and shrines (Lebo 2016: 423). For a review of temple excavations in Turkey where astragali are thought to have been used in divination, see Tahberer 2012: 9-10.

21 On coins of the classical Mediterranean world embossed with images of astragali, dating to the 5th to 3rd centuries BCE, see Tahberer 2012.

22 Perego 2010: 78, 69, 80. de Grossi Mazzorin and Minniti 2013: 377.

primitive money.[23] The multifarious functions and structural modifications of astragali attested in the archaeological record in Eurasia quite closely matches traditional practices in the Tibetan ethnographic record.

It is as grave goods that the earliest ritualistic uses of ovicaprid astragali in Inner Asia are attested. While the deposition of knucklebones in Inner Asian tombs may have been envisioned as objects for amusement in the afterlife, they also appear to have had specific functions in funerary rites as auspicious offerings, apotropaic instruments and eschatological signs. Ovicaprid skeletal remains including astragali occur in burials in most regions of the Tibetan plateau. They have been found in tombs of all ancient cemeteries professionally excavated in western Tibet and Mustang except for Chokhopani.[24] These tombs are broadly dated from ca. 600 BCE to 800 CE.[25] As Aldenderfer notes, the earliest known ovicaprid depositions in western Tibet are represented in burials at Rgyal gling thang and Chu 'thag.[26] Sheep bones were also found in shaft tombs excavated outside Lhasa by Aufschnaiter in 1950.[27] A perusal of Chinese archaeological literature would uncover many other instances of this burial practice on the plateau (many hundreds of tombs have been excavated since the 1980s). Nonetheless, there

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23 Affanni 2008: 83-87. On the archaeological context of the gaming and ritual functions of worked (smoothed, perforated and weighted) and unworked ovicaprid astragali in the Levant and eastern Mediterranean, also see Gilmour 1997. For ovicaprid astragali (including perforated specimens and glass and lead models) found with Aramaic divination ostraca dating to the second half of first millennium BCE, compelling evidence of the former being used in cleromancy (divination by lots) in Maresha, Shephelah, Israel, see Eshel and Stern 2017. On criteria for determining primitive forms of money and their economic and relgious functions, see Holmgren 2004: 215-18.

24 Aldenderfer 2018: 133. Thirteen mummified sheep and goat heads were found in burial contexts at Me brag (ca. 450 BCE to 100 CE), and ovicaprid skulls and other parts of the skeleton at Bsam rdzong (ca. 400-650 CE). See Aldenderfer 2013: 304, 305.

25 On ovicaprid bones deposited in substantial numbers in the tombs of Chu 'thag, Gu-ge, see Institute of Archaeology, CASS and Cultural Relics Conservation Institute of Tibet Autonomous Region 2014, 2015. Ovicaprid bones have also been identified in a burial in Malari (3300 m), Uttarakhand, India (Bhatt *et al*. 2008-2009: 5). The presence of a gold burial mask in this shaft tomb links funerary traditions of Malari with Transhimalayan sites in Mustang and Gu ge where such masks have also been discovered.

26 On the basis of the extant evidence, Aldenderfer (2013: 310, 311) holds that the mortuary tradition of including ovicaprid remains in Tibetan tombs probably does not predate 500 BCE. Nonetheless, controlled excavations in western Tibet predating that period have not been carried out, or if they have, they are not adequately dated. Given the growing body of evidence for the wholesale adoption on the Tibetan plateau of cultural and technological traditions via north Inner Asia beginning in the Late Bronze Age, it may yet be shown that the internment of ovicaprid skulls and bones in upper Tibet predates 500 BCE. On Late Bronze Age and Iron Age customs and traditions introduced on the Tibetan plateau originating in or transmitted through north Inner Asia and the interactive processes underlying them, see Bellezza forthcoming-a, forthcoming-b, 2017, 2016, 2008. Lu 2015. On a tomb in the western Byang thang dated to ca. 10th to 9th century BCE, see Bellezza 2017, 2008: 91-92, forthcoming-a.

27 Aufschnaiter 1956: 81. On the possible dating of these tombs to the second half of the first millennium BCE, see Bellezza forthcoming-a.

is still very little information available regarding differentiation of ordinary ovicaprid bones from their role as artifacts.

Despite ovicaprid skeletal remains being a common element in burials on the Tibetan plateau in the Iron Age (ca. 600-100 BCE) and Protohistoric period (ca. 100 BCE to 600 CE), little is known yet about their osteological, molecular and stable isotope characteristics. This deficit in archaeological study obscures a picture of sheep populations, diet, health, and rearing practices in ancient Tibet. Detailed inventories of bones and their spatial relationship (planar and stratigraphic) with each other and other tomb materials are also mostly absent from archaeological studies carried out to date. To obtain spatial data the location of each bone or bone fragment and other grave goods are pinpointed on a three-dimensional grid, permitting an assessment of the configuration of interments and how these may have changed since the time of burial due to geomorphological, waterborne, and anthropogenic disruptions. The general lack of findings concerning the nature and location of ovicaprid entombment in Tibet impedes a determination of whether they were deposited as whole animals, heads only and/or as specific parts of the post-cranial frame. While ovicaprid astragali are often part of larger skeletal assemblies, their numerical proportions as compared to other types of bones must be ascertained on a tomb by tomb basis. Also, it is crucial to determine whether bones were intentionally altered by scoring, bisection, abrading, polishing, perforation, painting, or heating. Without a solid understanding of the physical state, placement and quantity of buried ovicaprid bones little can be said about their potential mortuary functions.

The collection and analysis of spatial and qualitative data takes on added significance as archaeologists in China open more and more graves. Generally speaking, isolated deposition of ovicaprid astragali, especially when cached in large numbers, is evidence for cultic and ritual functions. The deliberate placement of astragali with manmade objects may also be an indication of specialized religious functions, the lineaments of which might be inferred by the kinds of burial goods in the assemblage. From the plans of Tibetan tombs in Chinese publications it appears that animal remains (ovicaprid, equid and bovid, etc.) are often arrayed in different groups across the floor of shaft tombs, at various levels of a tomb structure, and in subsidiary spaces such as shelves and niches in the walls of burial chambers. The complex arrangement of ovicaprid bones in tombs may indicate variable functions as part of funerary traditions with elaborate ideological and procedural components.

Tibetan archaic funerary texts furnish a complex picture of death rituals pertaining to the use and sacrifice of sheep.[28] However, these texts do not specifically mention exploitation of ovicaprid astragali in funerary rites. The three major functions of sheep in Tibetan archaic

28 For detailed information on the funerary function of the sheep in Tibetan funerary ritual literature, see Bellezza 2008, 2013b. Also see Stein 1970, 1971. Macdonald 1971: 373-75. Lalou 1953: 357 [n.3]. Haarh 1969: 370, 373, 376-78.

funerary literature can be summed up as follows: 1) as provisions (food and livestock) for use in the afterlife, 2) offerings to appease demons interfering with the passage of deceased to the afterlife, 3) psychopomps aiding the deceased in the journey across the land of infernal spirits to the afterlife.[29] Although none of these texts can be dated before the 8th century CE, they appear to have considerable bearing on Late Prehistoric (ca. 1200-600 BCE) as well Early Historic (ca. 600-1000) burials on the Tibetan plateau and have some relevance to mortuary practices in other regions of Inner Asia. One of the most pronounced examples of carryover from the prehistoric archaeological record to the Tibetan literary record is the use of horned headdresses on psychopomp horses. They first manifest in so-called Scytho-Siberian burials (Pazyryk, Tuketa, Berel, etc.) of the mid-first millennium BCE and feature much later in Old Tibetan funerary ritual manuscripts. The inclusion of ovicaprid remains in tombs has been documented for many agri-pastoralist cultures in north Inner Asia commencing in the Late Bronze Age. One of the most widespread occurrences is in tombs of the complex of Central Asian cultures known as Andronovo (ca. 1800-900 BCE), whose economy was based on sheep and cattle rearing, members of which practiced tin-bronze metallurgy and may have spoken Indo-Iranian languages.[30] In addition to the sequestering of astragali (sometimes in ceramic vessels), positioning on or near corpses, integration with other objects in tombs, and evidence for their modification through filing and drilling indicate specific functions in burial rites and in the host culture more generally.[31] Moreover, the recurring of astragali with specific types of inhumations (e.g., juvenile, female, etc.) may also offer some insight into their cultural purposes. Some progress in identifying the possible functions of ovicaprid astragali has been

29 Goats are also specifically noted in four Old Tibetan funerary manuscripts: *Rnel drī 'dul ba'i thabs sogs, Sha ru shul ston rabs,* PT 1134, and ITJ 731r. See Bellezza 2013b: 149, 99, 205, 06, 23, 37.

30 For a review of the spread of domesticated sheep from their putative source in eastern Anatolia in the 8th millennium BCE across the entire steppes by the Late Bronze Age, one accompanied by the theoretical spread of Indo-European languages, see Anthony 2007.

31 The drilling of holes in and the filing down of astragali are widely attested in Eurasia. Ancient bone astragali in the Middle East frequently have holes drilled in them for suspending from a cord, which appear to have chiefly functioned as children's toys but may have also been worn as pendants and amulets (British Museum n.d: 36). Astragali with holes found in the Veneto region of Italy dating to the Iron Age are hypothesized to have possibly functioned as amulets, ornaments or gifts to the dead (Perego 2010: 78). Numerous studies note that Greek and Roman ovicaprid astragali were modified by being filed, filled or cut for gaming and amuletic purposes. For tallies and an analysis of astragali that were perforated and smoothed in various ways from Iron Age sites in northern and central Italy, see de Grossi Mazzorin and Minniti 2013. It is noted that the smoothing of the lateral and medial or plantar and dorsal sides may be related to different functions, gaming among them (de Grossi Mazzorin and Minniti 2013: 378). It has been demonstrated that some astragali with smooth faces were employed in ancient Italy in leather working and ceramic making (Perego 2010: 78, after Riedel and Tecchiati 2001). Closer to our area of study, ovicaprid knucklebones with drilled holes have been found in a tomb of the Bohai culture, eastern Mongolia, dated to the 11th century CE (Kradin and Ivliev 2008: 441, 42 [fig. 4.3]).

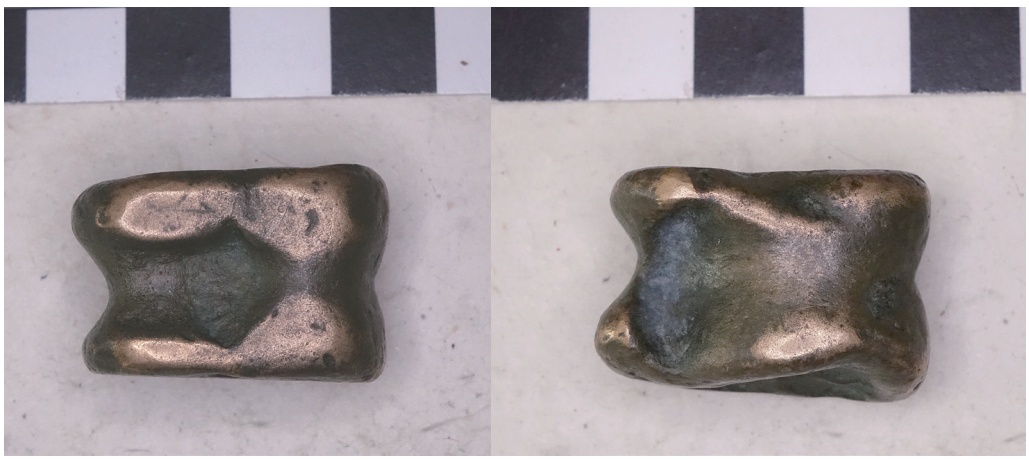

Fig. 2 Left: Copper alloy ovicaprid astragalus (dorsal side) obtained in Tibet (3.2 cm in length). Right: Plantar side of the same object (Late Shang Nyima Collection).

made in Xinjiang.[32] A good example of ovicaprid astragali in a ritualized context in Inner Asia is afforded by a non-burial mound excavated at Beiram, Uvs aymag, in the Mongolian Altai.[33]

Linguistic, ethnographic and archaeological evidence allude to the deeply ingrained status of ovicaprid astragali in gaming and divination on the Tibetan plateau. Archaeological findings from other parts of north Inner Asia suggest that this bone was already accorded particularized cultural functions in Tibet in the Late Prehistoric era. Another piece of evidence suggestive of ancient knucklebone ritualism and/or talismanic functions in Tibet is a copper alloy facsimile in the collection of the late Shang Nyima, Kathmandu (Fig. 2). All major anatomical features of the bone are discernable in this copper alloy replica. Other than it being purchased in Tibet in the 1980s or early 1990s, no other information on its provenance could be obtained from its owner. Versed in the old material culture of Tibet, Shang Nyima highly prized this object

32 The discovery of sheep knucklebones in tombs of the early phase of the Shamirshak culture (attributed to the Bronze Age), northern Xinjiang, suggests ritual and other functions (Jia and Betts 2010: 298). For ovicaprid astragali in specialized contexts in burials of Xinjiang in the late second and first millennia BCE, see Chen and Hiebert 1995: 262, 63, 71, 81.

33 Large numbers of sheep, bovid and wild ungulate astragali were discovered at this site, which is estimated to date to the mid-first millennium BCE based on structural and artifactual parallels with Saka burials. The Beiram mound is thought to have been constructed for ritual or other religious purposes. In the center of the mound there was a wooden box containing five sheep astragali and other votive objects but no human remains. In total, 3192 sheep astragali were recovered from Level 1 of the Beiram mound. The astragali cached in large numbers at the site are believed to have been used in divination. Also, a sheep astragalus with a swastika carved on it and one pierced by a hole were found at the site. The hole was probably for suspending, possibly indicating it was worn as an amulet. On this site, see Davis-Kimball 2000: 91, 92, 97.

and believed it was of ancient manufacture. However, its age and place of production have not been verified, obscuring its significance to the cultural disposition of ovicaprid astragali. The lack of corrosion, a well-developed patina and heavy wear are indicative of an heirloom passed down over the generations (rather than it being buried in the ground for a long time). The object differs in stylistic details from European and Chinese bronze astragali, reinforcing attribution to Tibet. Metallurgical analysis might help pinpoint its place of manufacture or at least differentiate it from those made in other parts of Eurasia.

Antique small copper alloy objects in Tibet are known as *thog lcags* and *thog rde'u* and were well distributed among the population. They are believed to fall from the sky with lightning strikes and to offer their owners protection and good luck. In reality, *thog lcags* are a heterogenous class of manmade objects originally functioning as amulets, horse tack, implements, insignia, etc. They appear to be of considerable age and mostly cast between the Late Bronze Age and 1500 CE.[34] As a *thog lcags* the Shang Nyima astragalus can probably be viewed as "ancient". However, it is one of only three examples of an astragalus in this body of artifacts to have come to my attention. In addition to these specimens, those fabricated from rock crystal, nephrite and ivory are known in Tibet. Furthermore, pieces of turquoise and coral were carved into the shape of an astragalus and used as settings in rings. These rings are still worn by Khams pa today.

Bronze ovicaprid astragali are rare as compared to natural bone specimens. They were produced in classical Greece and Rome but these are found buried and lack the fine patina of the Shang Nyima specimen.[35] A copper alloy pendant from the Caucasus mountains in the form of a life-size astragalus with a hole for suspension, dated to 11th-7th centuries BCE, is in the British Museum. It is comparable to another copper alloy specimen with a holed drilled in it from the Koban necropolis.[36] Bronze ovicaprid astragali were also produced in mainland

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34 On *thog lcags*, see, for example, Bellezza 1998. John 2006. Lin 2003. Weihreter 1998, 2002. Tucci 1973.

35 There are numerous archaeological works illustrating bronze astragali from Greece and Rome. For example, see Davidson 1952: 222 (no. 1755), pl. 100. Doyen 2018. For online images of Greek and Roman imitation bronze astragali, see the *Metropolitan Museum of Art* website: bronze astragalus, circa 3rd century BCE to 2nd century CE, Greek or Roman, 2.6 cm in length (http://www.metmuseum.org/collections/search-the-collections/256765); *Harvard Art Museums* website: bronze astragalus, Greek, 400-300 BCE, 3.2 cm in length (http://www.harvardartmuseums.org/art/304304), copper alloy knucklebone, Greco-Roman, 5th to 1st century BCE (https://www.harvardartmuseums.org/art/178245); *British Museum* website: Greek or Roman copper alloy astragalus: (https://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=464118&partId=1&searchText=Gaming+piece&sortBy=imageName&page=1), also see http://archaeologicalmuseum.jhu.edu/the-collection/object-stories/archaeology-of-daily-life/childhood/knucklebones/. Note: I have selected links to online images of copper alloy astragali that have been stable for more than five years. For the famous giant bronze astragalus (37 × 21 cm × 23 cm) with a Greek inscription indicating that it was from the sanctuary of Apollo at Didyma before being looted by the Persians and taken to Susa, see, for example, Luce 2011.

36 British Museum n.d: 36, after Chantre 1885-87.

China.[37]

The ritual, divinatory and talismanic uses of ovicaprid astragali as well as the production of imitations in Tibet are bracketed by Eurasian cultures to the west and the Han culture of the Central Plains to the east. If the copper alloy astragalus obtained in Tibet postdates the 11th century CE, its manufacture may possibly be related to those made in China dated ca. 1000-1600 CE. However, should the Tibetan astragalus prove older, as appears likely, other cultural sources for its creation must be sought. A Protohistoric attribution (100 BCE to 600 CE) could possibly permit it to be related to those of the ancient Greek and Romans; its creation perhaps inspired by trade or other exchanges. As an Early Historic period (600-1000 CE) artifact, the Shang Nyima astragalus could either represent a relict cultural trait or be an example of Tibetan cosmopolitanism ushered in by international contacts and conquests during the Imperial period.

Knucklebones in Tibetan cultures

This section of the article explores the recreational, practical and sacral functions of ovicaprid astragali on the Tibetan plateau. Findings are based on fieldwork carried out by the author in Tibetan communities since 2014. The study reviews salient features of this bone in gaming, divination and other traditions. Nevertheless, this is a vast topic of which it is only possible to give an introduction in an article-length work.[38]

The astragali of sheep and goats are known all over the Tibetan plateau as children's toys. They remained very popular until the proliferation of manufactured goods in the last two or three decades. Nowadays, with mandatory schooling, modernization and extraneous cultural pressures, knucklebones are rapidly disappearing in Tibet. Still, it is not uncommon for children in pastoralist ('brog pa) communities to use ovicaprid astragali as imaginary livestock in miniature play camps.[39] There is much nostalgia surrounding this recreational tradition among middle-aged and elderly Tibetans interviewed for this article. The small, compact astragalus of sheep and goats makes an ideal gaming piece and appears to be one of the oldest and most ubiquitous diversions in Tibet. That these naturally occurring objects have ancient cultural

37 For Chinese bronze and iron astragali dated 1000-1600 CE, see: http://www.anythinganywhere.com/commerce/relic/chin-misc.htm; for more heavily stylized Chinese bronze astragali possibly dating to the Han dynasty, see http://www.anythinganywhere.com/commerce/relic/chin-chuanweights.htm. Note: I have selected online images of copper ally astragali from a commercial site with URLs that have proven stable for more than five years.

38 Tibetan language publications that examine astragali cultural functions would constitute an important additional avenue of study. However, no such publications were available to me at the time of writing this study.

39 Use of astragali as toys in Tibet is noted in Rinjing Dorje 1987. Tibetans often equate them to horses. In his *Historia Animalium*, Aristotle describes the astragalus as resembling a small sculpture of a sheep (Affanni 2008: 85).

underpinnings is supported by a widely shared belief in Tibet assigning them to antiquity.

As in other parts of the world, knucklebones are probably the precursor of still popular dice games in Tibet (*cho lo, sho*). In both Tibetan knucklebones and dice, the outcome of each throw is determined by the assigned value of the face that lands upright after a throw. In modern Tibet *sho* has almost completely replaced knucklebones as the gambling game of choice for men. Nevertheless, as is often the case with ancient traditions, knucklebone games are much broader in scope and have ceremonial and symbolic dimensions that dice do not possess. While both dice and knucklebones are exhilarating and emotive pastimes, the latter has acquired a deep cultural significance that the former lacks. Elders report encouraging the playing of knucklebones among youth, claiming that it was superior to *sho* or *mahjong* (of Chinese origins), games that Tibetans consider morally questionable.

There are many different knucklebone games in Tibet, each with its own rules and customs. They are variously played by adults and children, male and female. The games deviate from region to region and are particularly popular among pastoral sections of the population. The basis of all games is the competitive tossing or shooting of astragali. This is referred to as "to throw" (*rgyab/rgyag*), "to strike" (*'khrab*) and "to race" (*rgyug*). In places like Snyan-rong in Hor and Skye rgu mdo in Khams, entire villages come out in their best clothes to enjoy knucklebones during the New Year (Lo gsar) celebrations.[40] Traditionally, residents of Yul shul prefecture would gather in public places and play knucklebone games during the fourth and fifth day of the holiday (Figs. 3-5). Reportedly, this tradition is still observed but to a much smaller extent than before. [41]

In all Tibetan regions and knucklebone games each of the six sides of the astragalus is assigned a special name and value. In some instances, the four flatter faces are equated with the cardinal directions. Most commonly in Tibet, the six sides of the bone are identified with animals and other metaphorical representations as follows:

- Dorsal side-goat: second-most inferior face. This side with the hollow is also called *stong pa* and *ltogs*, as in an empty stomach.
- Plantar side-sheep: second-most superior of the four main faces. This arched side is also known as *gang, brgyags* and *'grang*, as in a full stomach after eating.

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40 According to Tucci (1966: 153), beginning on the third day of the New Year celebrations and continuing for some days afterwards, residents of all ages in Skye rgu mdo played a knucklebone game called "goat astragalus sheep astragalus" (*ra the lug the*) with colored bones.

41 A single man in Yul shul has acquired more than 1000 old astragali used for gaming and divination, the largest collection in the prefecture according to him. He believes that some in his possession are more than 100 years old. The owner, an avid player in his youth, reports that the average person possessed twenty to forty astragali. Through winnings, the best players could attain more than one hundred pieces. Knucklebones is now much reduced in Yul shul, as the accumulation of so many by a single person indicates. Also, the keeping of sheep is much less prevalent in Yul shul today, making replenishment of gaming pieces more difficult.

Fig. 3 Bronze sculptures of Tibetans playing knucklebones, central Skye rgu mdo.

Fig. 4 A close-up of the same installation of sculptures showing a player poised to flick an ovicaprid astragal at others on the playing board.

Fig. 5 A Tibetan man teaching the rudiments of a popular knucklebone game to the author in Skye rgu mdo.

- Lateral side-horse: most superior face. This side has a pronounced rim and is also called the "front" (*kha*).
- Medial site-donkey or mule: most inferior face. This flatter side is also called the "base" (*gsham*). [42]
- The proximal surface with two keeled extensions (tibial trochlea): horned eagle (*khyung*). In Hor regions these protuberances are styled "fingernails" (*sen mo*). In certain games this is the best of the six sides of an astragalus.
- The distal surface with two rounded ends (trochleated head) has various names in Tibetan. In parts of Khams it is referred to as the dog's hind-end (*khyi rkub*). In Hor regions it is called the "rear end" (*Ong*). In pastoral regions of western Tibet, it is the "tiger" (*stag*). In some knucklebone games this is the worst of the six sides of the bone.

For gaming the lateral and medial sides of astragali were sometimes filed and polished, giving them smoother and more regular surfaces and a more cubic form. The proximal surface was occasionally filed down as well. By working an astragalus in this manner it becomes faster and will flip, spin and slide in a less erratic manner. I have seen sleek astragali gaming pieces with rich patinas that have hardened with age, as moisture is slowly lost and perhaps through chemical treatment as well. The decorated cloth or leather sack in which gaming and divinatory astragali are stored is called *the khug*.

Traditionally, astragali only became available with the slaughter of goats and sheep, limiting the available supply. Their value was further accentuated by specially preparing the bone in a variety of ways. These included chemical treatments and ornamental alterations. Occurring naturally as light-colored bones, astragali were processed and colored by Tibetans using a variety of techniques, a noteworthy demonstration of household ingenuity. Many colored astragali are given names from Tibetan horse terminology because this bone when resting on its lateral side is said to have the shape of a horse. Some names of the different colored horses used to describe astragali can be traced to Old Tibetan literature.[43] An epithet for the astragalus found in some western Tibet pastoral regions is the "horse rider astragalus" (*rta pa long mo*). According to the cultural luminary Tshe ring chos 'phel, pointed microliths (*rdo mdung rtse*; stone spearpoint), which are quite common in upper Tibet, served as the horseman placed on top of an astragalus in children's games. Another epithet for this bone in western Tibet is "full-hungry" (*'grangs ltogs*), as in the stomach before and after eating. This

42 The relative values given to the four main sides of an astragalus in Tibet have substantial correspondence with those in ancient Greece and Rome. From a study of classical writings, scholars of the Italian Renaissance computed that in knucklebones the planar side is counted as four, the dorsal side as three; the lateral side as six and the medial side as one (David 1962: 7).

43 On horse fur coloration and patterns in the Old Tibetan mytho-ritual funerary text PT 1060, a particularly fecund source, see Bellezza 2005: 468 (n. 154), 2013b: 44 (n. 65).

nickname reflects the variable outcomes, positive and negative, in gaming and divination. During games there are different verses spoken for each type of astragalus. This more or less formalized speech is known as the "calling of the astragalus" (*the 'bod*). The lines spoken, some of which are of ancient origins, vary from place to place and region to region. This constitutes an important Tibetan oral tradition that deserves far more scrutiny than it has received so far.

According to elders from various parts of Tibet, among the many types of astragalus gaming pieces are the following:

- *Bsag-pa* (literally, ochre one): an astragalus thickly coated in red ochre and named after a reddish horse.
- *Rta ngang pa* (goose-horse): an astragalus upon which ochre is lightly applied. It is then covered in mud and gently heated in a fire until assuming an orange tint. It is named for a horse with orange highlights.
- *Rta rgya bo*: this gaming piece is made by covering an astragalus in yak manure and gently heating it in fire. It is named for a horse with brownish coloring and yellowish face markings.
- *'Ol ba rting dkar*: an astragalus darkened by the application of manure but in such a manner that the rounded distal surface is left white. It is named after a black horse with white fetlocks.
- *Rrgya bo gdong dkar*: a dark-colored astragalus but with the horn-like proximal tips left white. This nomenclature denotes a brownish horse with yellowish face markings and a white spot on the forehead.
- *Rta gro dkar*: an astragalus with dark lines painted along the edges. It is named for a gray horse with white markings.
- *Bsag khra* and *dmar khra*: astragali and horses with red and light-colored markings.
- *Sngo ril* and *ser ril*: a blue astragalus and a yellow astragalus respectively. These names reflect the manner in which the bones are rolled in dye to give them color and the way in which they spin during gaming.
- *Ja bzos mdog* (literally, tea-cooked color): a purplish astragalus created by boiling the bone in a very strong solution of tea.
- *Sog dkar* (literally, white shoulder blade): an astragalus with the arched part of the plantar side left white on an otherwise darkened bone. This white spot is said to resemble a shoulder blade (*sog pa*).
- *Ong do* (literally, buttocks): a white astragalus darkened on its rounded distal surface.
- *Sbus the* (literally, "swollen astragalus" in the Hor dialect of Nag chu; equivalent of the Tibetan *'bur*): astragali from immature sheep and goats. The less defined features of the juvenile bone are thought to make them look like they are swollen.

Astragali are also classified as to whether they come from castrated sheep (*shab zan* [spelling?]) or stud rams (*lug rub bzang/lug thug*). These astragali are called *shab the* and

rub the respectively. Astragali are also classified as mother (*mo*) and father (*pho*) bones, reflecting their bilateral arrangement in ovicaprid anatomy. In the "father astragalus" (*pho the*) the proximal or horn-like extension faces outward when the goat face is rested against the right palm. In the "mother astragalus" (*mo the*) the horns or fingernails (tibial trochlea) point outwards in the left palm.

Fancier types of knucklebones were created by adults for gaming. One of these is the *mtho ril*, an astragalus in which lead studs are placed in small holes bored in one or more of the four main sides.[44] The proximal horn-like extensions and rounded arch on the sheep side of the bone may also be filed down in this kind of knucklebone. These actions create much faster playing pieces and ones more likely to land with the superior sheep and horse faces upright. Sometimes a turquoise was inserted into the hollow on the goat side of the astragalus. The relatively balanced squarish configuration of an astragalus is ideal for the randomization of sequences in throwing events. However, as the four faces vary in size and form, the probability of landing on any one of them in each throw is unequal. The most frequent outcomes from throwing an astragal on a flat surface is for it to land upright on one of the four main faces (goat, sheep, donkey, or horse) sides. The righting of a piece on its proximal (*khyung* horns) or distal (butt) surfaces facing upwards is far less common but the incidence increases when there are many pieces on a playing board and astragali become propped up by others.

In Yul shul the most popular knucklebone game of men and boys is largely one of chance in which pieces are wagered with each throw. I provide a rough outline here of this fast-moving activity. At least two players are needed but larger groups (up to ten players) add much intensity and excitement to the proceedings. Each player begins with a pile of thirteen astragali and takes turns tossing three pieces on the playing surface (any flat expanse will do). If a matching pair is thrown (e.g., two sheep), the next player engages in a shootout, trying to hit one of the pieces in the pair with the other to make it jump, while not touching any other astragalus on the board. If the strike is successful the active player takes possession of the piece hit, adding it to his or her pile. This procedure lends an element of skill to the game. As pieces are lost and acquired, each player's stock rises or dwindles until there are no more bones left on the board. Larger throws of four to six astragali commonly take place and if several pairs appear on the board at one time, multiple pieces can be won in a single hand. Throws of up to nine pieces are possible. The stakes are raised further when a player betters the result of the last player, potentially allowing him to add all the pieces on the board to his pile.

I will now describe briefly several other knucklebone games as has been communicated to me by Tibetan players. I have not observed any of these games firsthand, thus my

44 The practice of filling a hole in an astragalus with a piece of bronze, copper, iron, or lead was widespread in the ancient Mediterranean world (Lebo 2016: 425).

characterization of them is bound to be imperfect. There are probably dozens of different knucklebone games on the Tibetan plateau, the survey given here an introduction to their flavor and diversity. It is reported that there is a game in Yul shul where players (male and female) attempt to toss astragali into a bowl. According to my informants, one of the most universal games of children in Tibet is called "knucklebone strike" (*the ge rgyab*) or "knucklebone race" (*the ge rgyug*). This game is likened to a horserace. The players begin by each tossing an astragalus on the ground. Those that come up on the horse side are the last ones in the race. The remaining astragali are tossed, excluding those landing on the horse side, until only two pieces remain. Their players begin striking each other's pieces to prevent one from remaining on the horse side. The winner of the horserace is the last astragalus to stay on the horse side after a round of striking.

Another common Tibetan knucklebone pastime is called *the spu rgyab*. This fast-moving enterprise entails the striking of opponent's astragali, in order that one's own piece stays in the most advantageous position (horse and sheep sides). In a series of rounds, players try to capture all the astragali of their rivals. The game of *the sho*, is played just like the Tibetan game of dice.

An elaborate Tibetan knucklebone game is *dmag the* (army knucklebones), where a large playing field is set up with groups of astragali piled up in different ways by players to represent a king, two ministers and eight generals. The king is set in the most protected position in the rear of the playing field, in front of which are placed the ministers and then the generals. In addition to these arrays of astragali, there are many individual pieces representing soldiers (*dmag mi*). The players flick army men with their fingers in order to upset the king, ministers and generals. The player possessing the last king standing is the winner. This energetic game is very challenging because soldiers tend to increasingly obstruct the playing field, forcing shooters to adopt special offensive and defensive strategies. Tibetans report that in addition to other knucklebone games, there are variations on the few I have covered.

Besides recreation, ovicaprid astragali have a number of other functions. These alternative applications also appear to be of ancient origins. In Tibetan astragalomancy (*the mo*) the six sides of the knucklebone possess the same names as they do in gaming (Fig. 6). According to the way in which a tossed astragalus falls, it is thought to auger a certain outcome or destiny.[45] In some forms of astragalomancy four or five bones of different colors were used, representing the elements, cardinal directions, families of spirits, etc. Unlike gaming, astragali in divination must be thrown on a table or other clean surface and not on the ground. Well-formed astragali that have not been used for other purposes are employed. The application of astragali in Tibetan divination appears to have preceded forms of prognostication with dice and dominoes.

45 The cubic shape of an astragalus lends itself to dualistic equations such as life and death, yes and no, and good and evil, etc., useful in an instrument of divination (Holmgren 2004: 217).

Fig. 6 Five different colored antique Tibetan ovicaprid astragali, such as those used for divination. Collected by a Khams pa and used in Khams.

Another function for the ovicaprid astragalus was as a calculating tool for keeping accounts. In the system explained to me an astragalus is equivalent to one hundred units of something in weight or number. Small tally sticks called *bcu shing* were used to represent ten units of something. These accounting devices were stored in a sack and consulted over the long-term to determine one's financial position.

The sacred and ritualistic qualities of sheep are epitomized by the astragalus, one of the most distinctive and portable symbols of the animal. Astragali are strung together to form long garlands (*the star*) in Tibet. These are hung in kitchens and on the "father pillar" (west pole) of the black yak hair tent as harm repulsing and good-fortune bestowing instruments. In pastoral areas it is thought that this garland of bones prevents a tent from being struck by lightning and livestock from being eaten by wild animals. The theme of the retention of the good fortune potential (*g.yang*) of livestock emphasizes the talismanic value of knucklebones and invests them with a sacral quality. Ordinary sheep in Tibet have divine analogues, specially colored animals that function as offerings to elemental spirits and as their mounts and emanations. [46] The identity of these animals is marked by their color (e.g., white for the *lha*, reddish for the *btsan*, bluish for the *klu*). There is an entire pantheon of spirits in the form of sheep preserved by spirit-mediums (*lha pa, dpa 'bo*) in upper Tibet, which participate in curative and prosperity rituals.[47]

A special talisman consists of a particularly large sheep astragalus with a prominent horn-like proximal surface joined at the tips, called the "great fingernail" (*se chen*). Typically, a

46 On these divine species of sheep, see Bellezza 2008: 454 (n. 314); 2005: 456-72.

47 For the *lug lha* in the spirit-mediumship of upper Tibet, see Bellezza 2015: 18, 28, 29; 2011: 15, 19; 2012: 12, 13.

string was tied through the natural loop in the bone and it was placed in a good fortune sack (*g.yang khug*) or good fortune box (*g.yang sgam*) for safekeeping. Alternatively, it was added to the head of a garland of other astragali. Sometimes Tibetan children would wear this most precious of astragali for prestige and as a good luck charm when playing knucklebones. In the Hor region of Snyan rong (and possibly in other areas as well), there is a special astragalus called *mu the* (hunger astragalus). This astragalus comes from a big, healthy sheep with much fat. Typically, a few of these were carried on pilgrimage and other long journeys in case food became unavailable. It is believed that by placing one of these bones in the mouth hunger could be forestalled for long periods of time. It is reported in Mnga' ris that astragali may have been used in the marriage ceremonies of western Tibetan herders but this custom seems to have completely died out. Earlier practices and their ideological substructure may deviate from contemporary patterns, but the sacral status of ovicaprid astragali almost certainly predates the introduction of Buddhism to Tibet, a salient example of the persistence of archaic religious customs and beliefs. Although archaeological evidence is still pending, attributing the cultural functions of astragali on the Tibetan plateau to the Late Prehistoric era finds much resonance in traditions attested throughout much of Eurasia.

The cross-cultural dimensions of knucklebones

Even a cursory survey of knucklebone games in Eurasia, past and present, reveals many parallels with those on the Tibetan plateau. Striking knucklebones with others, aiming at targets from afar and games of chance are well represented on the continent.[48] The profane and sacred uses of astragali in ancient times constitute two overlapping categories of function and meaning. Aspects of recreation, myth, cosmology and cult were interrelated in Eurasian astragalus traditions. This is no less true of Tibet, where astragalus gaming, divination, protection, and symbolism were tied together in cultural expression.

The ancient Greco-Roman game of *pentalitha* (played with ovicaprid astragals from other animals thrown in the air, their value gauged by the side that lands upright) is still played in Turkey today and is known as *beş taş*.[49] Another game played in Turkey is *kuru*, where

48 A (blog) with colorful illustrations on the ancient and contemporary uses of astragali in gaming as well as a historical perspective on their recreational functions is entitled "Five Stones". It is found on the literary website *Poemas del río Wang*. "Five Stones" cites the commonly held hypothesis that astragalus gaming spread along the Silk Road, reaching China from Central Asian nomadic tribes and coming to the ancient Mediterranean from the east. See: http://riowang.blogspot.in/2011/05/five-stones.html. This website page has been stable for more than five years. The origins of knucklebone gaming in ancient Greece were often attributed to the Lydians of Asia Minor (Davis 1962: 6).

49 See Tahberer 2012.

players attempt to flip over astragali from the upright position by striking it with another.[50] *Bojul* is played with ovicaprid astragali in Khorasan, northeastern Iran, and links two sides of the bone with the donkey and horse, a game that appears to be of ancient origins based on archaeological discoveries of astragali in the region.[51] *Qāb-bāzī* ("knucklebones") is a game of chance with complicated rules played with sheep astragali by Iranian nomads that also probably dates to antiquity.[52] Schädler and Dunn-Vaturi[53] caution however that apart from chess and backgammon, little is known about games in ancient Persia and the archaeological evidence is often inconclusive.[54] Similarly, the impression of researchers and players in other parts of Eurasia is that many of these games have very old lineages. Nevertheless, the absence of continuous streams of documentary evidence from deep in the past to the present means that conjecture and conviction regarding the perdurability of astragalus gaming is not likely to yield to scientific certainty anytime soon (but this does not render it any less plausible).

Looking eastward from Iran, the next big northern territory that comes in line is Mongolia. Given their geographic proximity, it is not surprising that astragali traditions in Mongolia closely resemble those on the Tibetan plateau. Knucklebones are used in Mongolia in gaming, life-cycle rituals, amulets, sacrificial objects, tools of divination, and in in trials of martial strength.[55] Mongolian knucklebones have been elevated to a national pastime and are recognized by UNESCO as a cultural heritage of international importance.[56] While often a form of recreation in Mongolia there is a game played at New Year with a sacral character, the winner of the competition destined to be the most fortunate in the coming year.[57] Holmgren discusses[58] a study by Kabzinska-Stawarz (1991), linking the fertility of livestock to the astragalus (each of its four sides representing a different domestic animal), a bone believed to have magical properties that strengthens the life-force of animals and increases the size of flocks. In the *Secret History of the Mongols* (13th century CE), astragali are not only playthings

50 Holmgren 2004: 214.

51 See Sabori *et al*. 2016.

52 See Vahman 1989.

53 See Schädler and Dunn-Vaturi 2009.

54 Muscarella (1974: 80 [n. 21]) notes that workers often asked for astragali recovered from archaeological sites excavated in Iran so that they could give them to their children as toys.

55 Birtalan 2003.

56 Inscribed by the Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage of Humanity on November 27, 2014. The enduring strength of shamanistic practices and ideologies in Mongolian cultural world probably helps explain the high profile of knucklebones in the steppes. Generally speaking, the sheer dominance of Buddhism on the Tibetan plateau eliminated or dampened many archaic traditions and probably had an effect on astragalus gaming and lore as well.

57 Birtalan 2003: 48.

58 Holmgren 2004: 213.

of children and adults but a solemn object for divination and sacrifice.[59] According to historical sources, while still children, the future Mongol chieftains Temujin and Jamukha entered into a sworn alliance sealed with the exchange of astragali.[60]

A wide range of knucklebones games were played on the Tibetan plateau and in Mongolia where pieces were either tossed or flicked.[61] Some of these games are similar, others are unique to each territory. One of the most common in Tibet and Mongolia is the horserace, which is played in a similar manner. In Tibet and Mongolia, the four main sides of an ovicaprid astragalus represents a group of animals with three members in common. In Mongolia these are the horse, camel, goat, and sheep; in Tibet the horse, donkey, goat, and sheep. As in Tibet, the luckiest sides are the horse and sheep in Mongolia. Mongolians also color astragali for gaming and divination. Their avid use of horse astragali however is not matched in Tibet. In addition to astragalomancy, scapulimancy (shoulder blade divination) was practiced in both Tibet and Mongolia. The belief that ovicaprid astragali have talismanic and prosperity-and life-enhancing qualities appears to be deeply anchored in both the Mongolian and Tibetan pastoralist context.

Certain similarities between Tibetan and Mongolian knucklebone gaming, divination, and symbolism are probably attributable to processes of cross-fertilization. Agents of transmission from ca. 11th-18th century CE could possibly have included the Tanguts, Jurchens, Kitans, and/or various groups of Mongols. The cultural and political impact of the Mongols in Tibet was especially powerful and far reaching, and the linguistic, gaming and religious evidence presented in this work suggests that their influence extended into the realm of astragali as well.[62] Interactions between Mongolia and the Tibetan plateau in the Late Prehistoric era must also be considered. The rise of nomadic pastoralism in Mongolia and other regions of north Inner Asia in the Late Bronze Age may have acted as a springboard for the broadcast of astragalus-related traditions south onto the Tibetan plateau, as part of a suite of herding customs and their ritual and symbolic props. My research demonstrates that Mongolia and southern Siberia and Tibet exhibit cognate chariot, mascoid, big game hunting with the recurve bow, combat, and Eurasian Animal Style rock art,[63] the raising of standing stones and slab wall constructions at funerary

59 Birtalan 2007-2008: 49.

60 Birtalan 2007-2008: 47. Yamakoshi 2016: 89.

61 There are many online sources for Mongolian knucklebone gaming, which may involve multiple teams and hundreds of players. For a summary of a study endorsing the value of knucklebones in the cognitive development of young children in Mongolia, see Sarantuya and Erdenetsetseg 2014.

62 An examination of the vectors of transmission potentially responsible for the adoption and enrichment of knucklebones games played by the Chinese (*zhuā guǎi*) is beyond the scope of this article. Mainland China is an eastern terminus in the tradition, where games of tossing and catching ovicaprid and pig astragali played by children have analogues across Eurasia.

63 Parallels in the themes, subjects and motifs of rock art are particularly strong in Mongolia and Ladakh. See Bellezza forthcoming-a.

sites,[64] similar kinds of copper alloy objects,[65] common archaic funerary rites,[66] and interrelated pastoral practices, etc. It would be in keeping with the prevailing patterns of transmission if these vibrant and extensive cultural and technological links between Mongolia and Tibet beginning in the Late Bronze Age extended to astragalus traditions as well.

Any such bilateral relationship between Tibet and Mongolia is liable to be but one facet in a complex sphere of interactions in Eurasia beginning much earlier with the diffusion of ovicaprid stockbreeding eastward. However, unravelling the complex web of transference accounting for the dissemination of ovicaprid astragalus traditions in Eurasia and the trade, diplomatic, military, cultural, and religious processes involved is a formidable task. To properly assess the spread of astragalus games, lore and ritual over the breadth of the continent would require substantial collective effort and comprehensive study of the archaeological, ethnographic and linguistic records of many peoples, past and present.

To illustrate interactions across the breadth of Eurasia that may have a bearing on Tibetan astragalus traditions, I take just one example regarding the assigned values of the four sides of the bone. The Mongolian game of *dörwön berx* (four difficulties) is "very similar" to the Greco-Roman divination tradition known as the venus-throw.[67] The numerical values accorded the faces of an astragalus by the Greeks and Romans finds correspondence in the Iron Age site of Geoy Tepe, western Azerbaijan.[68] Analogous numerical associations are found in Mongolia and the Tibetan plateau. These appear to have been engendered along a corridor extending from the Mediterranean to Inner Asia via western Asia. Be that as it may, the archaeological data required to translate the circumstantial evidence for spatio-temporal ties into verifiable findings is not yet available to us.

The diffusion of astragalus traditions in Eurasia over the last three millennia is almost certainly not merely the result of a down-the-line transfer from one people to another. It is much more likely that multilateral transmissions in which activities and ideas were combined and recombined over the long haul are implicated. To explain the deep-seated and pervasive nature of astragalus traditions in Eurasia and their possible effects on the Tibetan plateau, I tender a model predicated on different chrono-cultural stages of development. Despite the historical linkages propounded being hypothetical, this model helps situate astragalus cultural complexity in a framework amenable to further scrutiny and amendment. I propose that the following four chrono-cultural stages are represented in the dissemination of astragalus traditions on the Tibetan plateau:

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64 See Bellezza 2008: 92-99, 106-108; 2017; forthcoming-a; forthcoming-b.

65 See Bellezza 2008: 99-106; 2016; forthcoming-b.

66 See Bellezza 2008: 544-59.

67 Birtalan 2007-2008: 48; a different number appearing on each upright side of four tali thrown simultaneously.

68 Schädler and Dunn-Vaturi 2009.

1) Late Bronze Age and Early Iron Age (ca. 1500-600 BCE) transfer from Inner Asian pastoralist groups in the wake of the expansion of Andronovo cultural traits in Xinjiang and eastern Kazakhstan.
2) Iron Age and Protohistoric (ca. 600 BCE to 300 CE) transfer potentially encompassing the classical world and involving the Saka and possibly Achaemenid and Parthian intermediaries.
3) Imperial period (ca. 600-850 CE) transfer effected through cultural borrowing and consolidation spurred on by Tibetan imperial expansion.
4) Later historical period (1000-1700 CE) transfer through north Inner Asian cultures that had extensive contacts with Tibetans.

While cultures of north Inner Asia were well suited to serve as a cultural purveyor of ovicaprid astragalus traditions to the plateau, independent innovation appears to have played a role in molding unique aspects of the Tibetan declension, reflecting the distinctive cultural, religious and social environment of the plateau. Functional similarities in ovicaprid pastoralism and responses to similar conditions arising from it may also account for affinities in astragalus traditions among different peoples. Yet, independent innovation and functional convergence do not appear to have deterred successive waves of interactions in Eurasia, the force of seminal ideas, things and activities often transcending geographic, cultural and linguistic barriers. Finally, as so little is known about the historical dispersal of astragali as cultural objects and symbols, Tibet as a generator of tradition to other parts of the continent must also be considered in the mix of factors contributing to large-scale assimilation on the continent.

Conclusion

This article furnishes a bird's eye view of the cultural significance of ovicaprid astragali on the Tibetan plateau. It presents both archaeological and ethnohistoric data in a comprehensive review of the subject. Nonetheless, this study is but an initial step in the examination of astragalus phenomena in Tibet. The role of knucklebones in gaming, divination, tallying, and religious beliefs and customs demands far more attention from archaeologists, historians and anthropologists working on the Tibetan plateau than it has received to date. An exhaustive look at Tibetan historical references to knucklebones in gaming and divination is bound to provide valuable insights into their functions and symbolism, supplementing what may have been already written on the subject by contemporary native authors. The typological and regional classification of astragalus gaming and the analysis of its linguistic and ideological components has a very large purview, ensuring that much work remains to be done.

I trust this study has demonstrated that knucklebones are not just a matter of curiosity but a vital tool in understanding the course of Tibetan civilization and its interactions with a host

of other peoples over the last 3000 years. Perhaps no other single object offers such a large window onto transcultural relationships that helped shape the sportive, religious and intellectual complexion of Tibet and the entire Eurasian continent.

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Abstracts

尼泊尔上穆斯塘地区桑宗墓地所见苯教施垛仪轨的考古学证据

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在考古发掘中，发现确凿清晰的有关古代仪式方面的证据一向是很困难的。但也有例外，比如我们在尼泊尔穆斯塘北部地区发掘的古代墓葬，其中所出一系列遗物很可能属于所谓的苯教施垛（Mdos rgyab）仪式。公元 5 世纪晚期的桑宗 5 号墓中，我们发现了铁三脚架、铜容器及木杯和竹杯子，这一套器物与民族志描述的有关苯教施垛仪式中所用的道具惊人地相似。本文解释了何为苯教的施垛仪式，并且依据桑宗 5 号墓的墓葬背景和出土的人工制品，可认为至少在公元 5 世纪苯教已见于穆斯塘北部。

羊距骨：西藏最古老的博具和占卜工具的考古学和民族史初探

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本文旨在通过考古学和民族史的证据，对藏族文化中流行的一种物件——“羊距骨”做综合性考察。首先提出了鉴别墓葬中那些具有文化意义羊距骨的标准，并比较了欧亚大陆其他地区同类实例。本文特别关注到一件西藏的红铜合金的羊距骨，这为讨论该类物品在高原古代文化中的意义提供了佐证。文本还讨论了羊距骨在藏族博具、占卜、计数及其他仪式、观念中的作用。最后，本文聚焦羊距骨的跨文化意义，尝试说明羊距骨能够帮助我们进一步理解史前晚期（约公元前 1200 年至公元 600 年）及历史时期欧亚大陆跨文化交流的一些面貌。

Re-examination of Materials about the Communications between Nepal and China in the Early Tang Dynasty

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The Bod-Balpo Ancient Road has a long history, which can be traced back to the Paleolithic Age on the basis of archaeological discoveries. As for the history of the Bod-Balpo Ancient Road, we can distinguish three periods, namely, pre-, during, and post-Tang dynasty to the Qing dynasty. In the specific case of the Bod-Balpo Ancient Road, we need to consider the situation of East Asia, South Asia and even Central Asia at that time, the chronological order of the literary records and the recent archaeological discoveries. In the meantime, although many researchers have noticed and quoted the literary records on the Bod-Balpo Ancient Road, there are still some problems that require further studies. In addition, we also should pay attention to the relationship between the Buddhist monks and diplomatic envoys and merchants, they always traveled together at that time. In fact, the routes taken by Buddhist monks coincide with those taken by commerce.

在河西走廊和西藏发现的不空之影响

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本文分析了莫高窟和榆林窟被认为是受到吐蕃影响的早期藏传佛教艺术遗存。与此观点相反，本文认为这些图像实际上是受到了南印度艺术的影响，尤其是泰米尔纳德帕拉瓦王国艺术的影响，这与 8 世纪上半叶来自帕拉瓦王国的著名佛教大师金刚智在中国的传法密切相关，更与不空 8 世纪中叶在河西的活动有关。这些图像属于金刚智所创造的一种独特艺术传统，他也是一位伟大的画家。吐蕃统治时期的艺术只是吐蕃占领河西以前已经存在的艺术和宗教传统的继续延续而已。不仅如此，吐蕃控制河西走廊使得吐蕃能够移植当时当地流行的宗教和艺术潮流。因此，吐蕃将佛教作为国教正是基于不空在唐代所提出的以佛法护国的模式，本文支持这一理论。

A Preliminary Survey on *Mthing shog* Manuscripts

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Mthing shog, translated as blue-black paper 蓝黑纸 in Tibetan-Chinese dictionaries, is a kind of colored paper that we find in Tibetan culture. Its production covers three steps: 1) several layers of papers are laminated with a wheat paste; 2) a specially made coloring material is applied to the surface of the paper; and 3) the paper is burnished with a *gzi* bead or a smooth piece of conch shell or other smooth and hard precious stones. The recipes and substances of making coloring materials for *mthing shog* vary. For instance, one formula uses black ink, which is made from soot (*sre nag*) or burnt resinous pine wood (*sgron shing*), which is mixed with yak and/or sheep brains; one formula uses a mixture consisting of black vitriol (*nag mtshur*), euphorbia (*thar nu*), borax (*tsa la*), wheat beer (*gro chang*), and myrobalan (*a ru ra*); one formula uses a solution made with ground white cowry shell (*'gron bu*), ground cardamom (*dzā ti*) and myrobalan juice; one formula uses indigo (*rams*).

Judging from literary sources and extant objects, the expression *mthing shog* derives from *shug bu mthing ga* of the Tibetan dynastic period. It is *mthing shog* that was used for writing royal edicts. Beginning from the 10th century, *mthing shog* is most often used to write Buddhist sutras. The most prized manuscripts frequently use gold ink or a combination of gold and silver ink. The main purpose of preparing *mthing shog* manuscripts is for devotional purposes. These are deposited in shrines and monasteries and prepared for the accumulation of merit; they are not intended for circulation.

Chinese scholars often term the black-blue paper of Tibetan cultural tradition as 瓷/磁青纸, "porcelain green paper," an indigo-dyed paper in Chinese culture. However, as mentioned above, there are many different materials that are used to make *mthing shog*. *Mthing shog* includes indigo-dyed paper, but they are not identical. The gold or/and silver manuscripts produced in China proper, especially those in the Ming and Qing courts, may be written on indigo-dyed paper or *mthing shog*. As for gold or/and silver manuscripts from the Tibetan cultural area, the situation is more complicated, and it seems that not all gold or/and silver texts are written on *mthing shog*.

An Interpretation of the Mural of Lce btsun Shes rab 'byung gnas in Zhwa lu Monastery

Jia Yuping

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This paper discusses the mural depicting Lce bstun Shes rab 'byung gnas (the 11th century founder of Zhwa lu) in the Sgo gsum ma lha khang of Zhwa lu monastery. The history of the monastery and the Lce clan from the 11th to the 14th century are fully presented through the images and inscriptions in a series of murals. Combining the literature on the genealogies of Zhwa lu and related Tibetan sources, this paper discusses some stories about Zhwa lu that were hitherto not well known. These include aspects of its religious background and its connections with the Indian subcontinent, as well as its contact with western Tibet during the period of the second diffusion of Buddhism. Its governance through a combination of politics and religion makes Zhwa lu one of the earliest monasteries that was under the control of a family-owned theocratic system.

On the Mural Painting of Buddha's life in the Corridor of the Assembly Hall on the First Floor of Zhwa lu Monastery

Meng Yu

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The 101st mural painting in the corridor of the Assembly Hall on the first floor of Zhwa lu Monastery is concerned with the biography of the Buddha, from his birth to nirvana. Twenty significant scenes of the Buddha's life were chosen and depicted in this mural. This essay provides a detailed discussion of each scene and concludes that the 101st mural painting is based on the *Lalitavistara* and other sources. The life

of the Buddha is a popular subject in Buddhist art and literature. It can be found in many texts, besides the one in *Skyes rabs brgya ba*. In addition to texts, the illustrations of the Buddha's life can also be found in other parts of Tibet. This essay also briefly compares the stories of the Buddha's life in the *Skyes rabs brgya ba* and other literary sources in Tibetan, and its representation in Zhwa lu and other places. A conclusion is drawn that, prior to the sixteenth century, the textual and pictorial representations of Buddha's life in Tibet share obvious similarities.

桑噶地区赤洛纳特寺观音崇拜的艺术史证据

林瑞宾

（美国西北大学）

自 19 世纪以来，赤洛纳特寺（Triloknāth Mandir）就一直吸引着宗教史、人类学、艺术史和建筑各领域学者的兴趣。该寺位于喜马偕尔邦钱德拉巴嘎河谷的屯德村（藏语称“热帕”村），属于西喜马拉雅佛教文化圈。竹巴噶举派喇嘛达仓热巴（1574-1651 年）于 17 世纪时到过这里，在其所撰朝圣行纪中称该地为“乌苌那”，引起了图齐的关注。赤洛纳特寺诱人之处部分缘于以下现象，即现在该地居民将寺中的白色大理石造像视为湿婆神并加以供奉，而来自拉胡尔、桑噶及其他地区的佛教信徒则认为这是一尊佛教造像。近年来，一位佛教僧人和一位印度教祭师被委派至该寺以协助不同宗教的朝圣者。寺中另一独特之处是该寺建筑为通常见于北印度婆罗门教建筑的西柯罗高塔，寺内却供奉佛教雕塑，造像材质为白色大理石，在喜马拉雅地区佛教造像中极为罕见。关于该寺的很多问题都观点不一，如寺院的创建时间，这尊造像何时被安置在寺中，寺院建筑最初是否为印度教寺院而在后来容纳了一尊佛像，抑或建寺伊始就是佛教寺院？暂且遑顾上述众多未决之疑问，本文拟集中探讨这尊造像的图像问题，善趣观音（Sugatiśaṃdārśana Lokeśvara）及其与克什米尔的联系，相邻的桑噶地区的图像推测应系模仿今赤洛纳特寺白色大理石造像。大部分桑噶地区的造像所属时期均相对较晚，因此本研究对赤洛纳特寺白色大理石像的断代、以及此像何时取代了另一尊较早的灰色小石像诸问题也将提供一些依据。

Research on the Seals Granted by the Ming Dynasty to Tibet

Li Shuai

(Post-Doctor, Department of Archaeology, Sichuan University)

The types of seals granted by the Ming dynasty to Tibetan individuals include at least four types: religious — title seals, knighthood seals, official seals and stamp seals. The difference of these seals depends on the social status of the grantees. The type of seal and the motivation of granting them reflected the flexibility and diversity of Ming policies towards Tibet. The seals did not only function as political symbols, they also had practical functions in Tibet. They were used to announce local official statements, to handle local affairs, etc. Some of the seals continued to be in use until well into the Qing dynasty and thus form important evidence that their recipients maintained their political status and were able to influence the governance of Tibet.

Research on the Official Seals of the Chieftain (*Tusi*) in the Tibetan Region of Sichuan Province in the Qing Dynasty

Liu Sha

(Sichuan Museum)

Based on the literary sources, this article investigates seventeen seals of the chieftains (*tusi*, 土司) of the Tibetan region of Sichuan Province in the Qing Dynasty in terms of their nature, characteristics, origin, how they were awarded and how they functioned. This paper considers that the official seals used by the chieftains were mainly granted by the central government of the Qing Dynasty. According to the official seal system of the Qing court, the texture, shape, size, impression and inscription of these seals have special provisions. As political tokens, these official seals played a multifaceted role in local society aside from having practical functions. They were highly valued by the chieftains over generations. Through comparison, it was found that the official seals used by the chieftains in the Sichuan Tibetan areas were quite different from those that were in use in Central Tibet. This was no doubt owed to the differences in their administration. The study of the official seals of the chieftains serves to further explore the policies and characteristics of the Qing Dynasty's governance of the border areas.

The Imperial Kapala Drums of the Qianlong Emperor

Lin Huan

(The Palace Museum, Beijing)

This paper studies the *kapala* drums (*ḍamaru*) that are found in collection of the Palace Museum. They belong to the Qianlong period of the Qing dynasty. The *ḍamaru* drums were mainly made of human skull caps, ivory, jade or wood and are also called "hand drum" or "tambourine," and they belong to the inventory of musical instruments or ritual instruments. The drums in the Palace collection mostly came from the Tibetan areas in the form as tribute to the Qing court. Based on archival sources and extant objects, we know that the Qianlong Emperor had asked the court workshops partly to change these drums and also ordered the court workshops in Suzhou to imitate these with different materials. The extant drums show different influences from Tibetan, Han Chinese and Mongolian culture. They reflected the Qianlong Emperor's aesthetic taste. These drums were decorated with turquoise, coral, beeswax and tridacna, etc. and thus became luxury objects. However, the shape of the drums and their packaging were not overly modified, and maintained the simple nature of the artifact itself. These drums also demonstrate that under the "great unification" pattern, the mature handicraft skills of the border areas could be transplanted to the court (and even to Suzhou). These skills were quickly mastered and reached a very high standard.

Fa Wang Xin Sheng Zhuan —— Stories of Qianlong Emperor's Incarnations

Li Ruoyu

(The Palace Museum, Beijing)

The Palace Museum collection, no. Zong 23584, contains a book that is titled *Fawang xinsheng zhuan* 法王新胜传 . It was composed by the 6th Panchen Lama Blo bzang dpal ldan ye shes (1738-1780) in 1780 when he visited Rehe for the celebration of the Qianlong Emperor's birthday. It contains eleven stories of the Qianlong Emperor's previous lives thereby creating a system of the emperor's reincarnations. In this system, the Qianlong Emperor's earlier incarnations included kings who protected Buddhism, siddhas and great gurus of the Bka' gdams pa and Dge lugs pa schools. This paper studies the date and background when this book was produced. It also includes translations of parts of the stories for the first time in the hope of achieving a better understanding of the history of this period and this kind of Tibetan text.

西藏的胎藏界曼荼罗传统及其彩砂曼荼罗制作

田中公明

（日本中村元东方研究所）

“两界曼荼罗”于9世纪初自唐传入日本，不仅构建了日本佛教造像的核心体系，并对整个日本文化产生了深远影响。在这两类曼荼罗中，与“金刚界曼荼罗”相关的遗存较为丰富，其原型出自印度，尼泊尔及西藏继承了的印度的曼荼罗传统，并有大量文献记录和绘画保存至今。然而，留存下来的“胎藏界曼荼罗”相关文献却非常少，其原因在于基于《大日经》的密教体系在古印度很早就已衰亡。此外，《大日经》在吐蕃时期自印度传入西藏，迄今仍有一些胎藏界曼荼罗的实例得以留存，尽管这类遗存极为稀少。此前，本人曾于2001年在日本京都日本文化国际研究中心举行的一次国际学术讨论会，及2003年于牛津举行的第10届国际藏学会上，就西藏的胎藏界曼荼罗传统及相关遗存发表过演讲。但当时限于交通条件，我未能亲自考察位于安多的拉加寺、夏琼寺，这两座寺院至今仍几乎每年都要制作胎藏界曼荼罗的彩砂坛城；尽管1994-1996年间当我担任富山市瑜伽禅修博物馆的首席讲师时，藉馆内复原藏传佛教两界曼荼罗之机，就已经获得了一些源自拉卜楞寺、拉加寺的胎藏界曼荼罗资料。近年来，由于安多地区交通大为改善，使我这样的国外学者得以至上述寺院实地考察。本文主要在笔者于2014、2015年田野考察的基础上完成，拟通过对安多寺院中胎藏界曼荼罗彩砂坛城的制作进行初步介绍，并与唐密—东密传统的胎藏界曼荼罗相比较，进而概括总结其特点。

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