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Reconstruction of the West Tibetan Temples of Khorchag: The Lhakhang Chenmo

The monastery of Khorchag (T. Khor 'chags),[1] located in the Purang (T. sPu rang, also sPu hrengs, etc.) district in the west of the Tibet Autonomous Region, can be described as the easternmost of the three first monastic structures of the historic West Tibetan kingdom established under Yeshe Ö (T. Ye shes 'od), alongside the monastery of Nyarma (T. Nyar ma, etc.) (in today's Ladakh) and the monastery of Tholing (Tho ling, etc.) in Guge (present-day Tsamda district) (Fig. 1).[2]

The trade and pilgrimage route (see Jahoda 2012a: 8) linking Nepal and India in the south with the Kailas region in the north still goes directly past the Khorchag monastery, partially following the Peacock River (T. rMa bya kha 'bab; known as Karnāli in Nepal),[3] locally still known as an important trail for the transport of wood from Nepal to Purang. The monastery's location is on the south-eastern edge of the Purang territory just a few kilometres from today's Nepalese border. The closeness to a river correlates with the location of the Tholing monastery on the left bank of the Sutlej River (T. Glang chen kha 'bab), this river defining the east-west trade and pilgrimage route linking Guge and Spiti. The Nyarma monastery is about 1.4 km from the right bank of the Indus,[4] but directly on the western shore of a lake. The monasteries' proximity to trade routes along the Indus, the Peacock River and the Sutlej River, means a good strategic and agricultural location for these three sites. Certainly, the pilgrimage route to Mount Tise in Tibet is very important, also the one from the south, that goes by Khorchag. Kathmandu was connected with Purang (Taklakot, T. sTag la mkhar) via Humla, while the pilgrim path (S. *yātri*) from India led over the Lipu Pass into Tibet close to the Nepalese border.

Their accessibility must have been part of the spatial concept of the early West Tibetan empire, allowing these three monasteries to be reached easily by pilgrims and traders, a fact which was reflected

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1 Tibetan terms are added in transliteration—marked with "(T.)"—according to the Wylie system, similar to the marking with "(S.)" in front of transliterated Sanskrit terms.

2 For the history of the West Tibetan kingdom see Vitali 1996: 262.

3 The earliest ensemble of monastic foundations is a trinity of Nyarma, Tholing and Khorchag (probably founded in the same year 996 AD) as centres of the three imperial territories of historical Western Tibet (T. mNga' ris skor gsum)—Maryul (T. Mar yul), Guge (T. Gu ge) and Purang. These monastic foundations were important and central pilgrimage spots within these territories, their installation probably strengthening the political role of the related parts of the empire with a supraregional importance. Comparatively, we may note a Central Tibetan pilgrimage concept also manifested by the installation of a trinity of spiritual centres, i.e. the Jokhang *vihāra* in Lhasa, the *vihāra* in Samye (T. bSam yas) and the *vihāra* in Thandrug (T. Khra 'brug), also known as the group of three key *dharmacakra*s (S.) of Central Tibet (T. *chos 'khor gnas gsum)*. They represented the three leading holy sites or pilgrim sites in imperial Tibet (Hazod and Sørensen 2005: 4). Since these *vihāra*s, unlike the West Tibetan trinity, were not founded in the same year, the earliest idea for this trinity was the period of the foundation of Samye *vihāra*. According to Hazod and Sørensen (2005: 4): at the latest at the beginning of the 9th century when there were large-scale calendrical and oratorical festivals to mark the Tripiṭaka.

4 In the case of Nyarma the relatively great distance from the river, compared to Tholing and Khorchag, is outweighed by a certain sheltered position in close vicinity to the lake or a spring, mentioned by Joseph Gergan (cf. Feiglstorfer, forthcoming a). With this off-track-position there is no evidence for any commercial advantage. In this segment of the Indus, which is near Nyarma, the route along the river is described as a summer route, linking Tashigang in the south and Skardu in the north (see also Devers 2014, volume 2: fig. 294).

in the choice of their site on the plain, in contrast to later foundations (Feiglstorfer 2011 I: 132f.) in the Western Himalayas which began to move up to sites that were harder to reach (Khosla 1979: 30). The establishment of religious temple sites of early Central Tibetan foundations, starting under Songtsen Gampo, differ from the West Tibetan approach to choosing a site for a religious monument, as the Central Tibetan setting was, in most cases, at the centre of an alluvial fan, thus related to a river outfall. Khorchag itself is the one of these three West Tibetan examples whose position is related to an alluvial fan. The close proximity to river banks and alluvial fans ensured easy access to the deposit of relatively fine earthen building material suitable for making adobe bricks—something that becomes relevant in the observation discussed later about the use of such bricks for the earliest West Tibetan monasteries.

The choice of the sites on the plain, in both West Tibet and Central Tibet, was strategically linked to the existence of fortresses. Several later foundations, moving up to higher sites, become defensive fortresses, like structures integrating all the monastic functions into one solid structural compound. In the case of Nyarma, the fortress is located on top of a rock about 360 metres north-west of the main temple (T. *gtsug lag khang*). The monastery of Tholing is also well protected by the fortress on a hill to the south. Both monasteries, Nyarma and Tholing, are situated on the plain, open on all sides, which permits a good view from the monastery in all directions. The strategically elevated positions of the fortresses afford a wide overview for kilometres.

In Khorchag, no remains of a fortress have been found in the immediate vicinity of the monastery. The big fortress of Purang is too far away to permit a view over the monastery to secure its immediate defence (Fig. 2). The existence of a fortress does not seem to have been relevant to the foundation site of a monastery. The Khorchag monastery is protectively flanked to the north and east by steep mountain slopes and to the west by the meandering Peacock River, with the north-south trail passing by. Only to the south towards Nepal does the environment open towards the valley plain along the river.

In Khorchag, we are still dependent on mythological tales to learn about the choice of the building site and the position of the rock, today located in the Jokhang. One story says that the disciple of a lama who stayed at the site of the later monastery was asked by the lama to pile up a heap of stones where he saw light on the sand every night. The next morning the heap of stones had become a large boulder, which today is located in the Jokhang (Swami Pranavānanda 1949: 64). In these early days this site may have been on a trading route and pre- or non-Buddhist rituals might have been practised. Tsering Gyalpo suggests an interpretative understanding of the above legend, possibly as a way of purifying or occupying this site in a ritual and mythological context with the ritual marking of a particular spot—in the following related with the sacred Amolika stone.[5]

From the view of the early West Tibetan monasteries, a decentralised defensive system allowed the focus to be on a material definition of the main temple at each site as a solitary religious structure, geometrically and proportionally independent of its peripheral functions such as the monks' residences, the kitchen, storage rooms etc., which were structurally independent of the sacred core. These facts combined with the location of the early structures on the plain enabled the architectural expression of a metaphysical concept by concentrically shaping the whole religious compound from the inside towards the outside, thus also defining the religious space for the pilgrim (Feiglstorfer, forthcoming a). This clear organisation of the whole centralised monastic compound—with its individual geometrically and proportionally adjusted elements—finds its architectural masterpiece in early monastic compounds of the West Tibetan empire, with Samye as one of their Central Tibetan structurally centralised predecessors.

At Khorchag within the recently built concrete enclosure wall beside the two temples (Lhakhang Chenmo [T. lHa khang chen mo] and Jokhang [T. Jo khang]), several out-buildings such as monks' residences, kitchens and a butterlamp house are part of a continuously developed structure (Fig. 3). The circumambulation paths used during the Namthong festival during field research in 2010 led along the outside of both temples. The paths along the wall both inside and outside the compound were not used and not properly prepared either. This kind of circumambulation was conducted along the walls of both temples as one integrative path and also along both temples separately. The Mani Lhakhang (T. Ma ṇi lha khang), situated between the two temples, was also integrated in this walking ritual (see Fig. 3). The path around the Jokhang is accompanied by prayer wheels. Close to the south-western corner of the Lhakhang Chenmo the pilgrim's path passes a 'sun and moon' stone[6] and along the west façade, which has the inscription *oṃ ma ṇi pad me hūṃ*. Approaching the monastery on the road, a recently erected eight-chorten (*mchod*

5 Personal communication by Tsering Gyalpo, Vienna, April, 2015.

6 Christiane Kalantari describes the sun and moon as an augmentation of the group of the Four Great Kings (T. *rgyal chen sde bzhi*), referring to earlier representations of 'Indic' deities "dwelling as protectors in the outer spheres of the mandala" (Kalantari 2012b: 176).

rten) group (T. *de bzhin gshegs pa'i mchod rten brgyad*) is visible in front of its façade. During the Namthong festival the guests use the area along the circumambulation path for picnics. The kitchen is located along the northern section of the enclosure wall, and the Tschömekhang (T. *mchod me khang*) located at the north-east corner of the Lhakhang Chenmo was recently built in reinforced concrete with a staircase leading downwards.

The two temples show a conglomeration of several phases of additions and reconstructions, which makes it a challenge to figure out the original structural core, in this contribution with a focus on the Lhakhang Chenmo. In their present state, the outer shape of both temples is symmetrically cruciform (see Fig. 3). Regarding structural evidence—as we will see later—this kind of formalism seems to have been a later stage of renovation and not obviously the original architectural pattern. On the other hand we cannot exclude the possibility that this cruciform shape is based on a similar earlier formal pattern,[7] possibly similar to the course of a former enclosure wall. In this case the appearance of the ground plan follows a layout pattern as we know it from the main temple in Nyarma, i.e. a surrounding corridor on the east, north and west including lateral niches (chambers) in the north and south (Fig. 4).[8]

The mandalic shape of the Lhakhang Chenmo is determined by a rectangular ground plan and shows one projection on each of the two opposite lateral sides but—in contrast to the Jokhang—without a projection towards the entrance or the side of the sanctum (T. *dri gtsang khang,* S. *gandhakuṭī*) in its latest phase. In both cases a central assembly hall (T. *'du khang*) was extended in all four directions by several functions, thus forming the present mandalic shape. There is no evidence of an early Tibetan tradition of hermetically closing the internal and the earliest core of the temples apart from the entrance, while several of the later construction additions have window openings.

The rooms, which are organised laterally to the anterior, i.e. the eastern sections of the assembly hall, are linked to the surrounding chambers and are accessible from the first floor. Inside the assembly hall the anterior (eastern) and the posterior (western) sections are separated by one step running all the way across the hall from north to south (Figs. 3 and 4).

THE IMPACT OF WATER ON THE FOUNDATION SITE AND RELATED STRUCTURAL CHANGES

Many of the Central Tibetan *vihāra*s constructed during the early imperial period were sited close to waterways, primarily on alluvial fans. Closeness to water is also the case for the earliest West Tibetan foundations, which were located not far from water but not primarily on alluvial fans, for example in Nyarma, Tabo, Alchi or Nako. The proximity to water certainly has a functional background in its use in daily life, but in several cases, e.g. in Khorchag, Nyarma or even Lhasa, the existence of the holy shrines was continuously endangered by this proximity, which necessitated great efforts to avert the danger. The history and fate of these sites is inevitably linked to water and its forces, in several cases like in Lhasa already starting with the *vihāra*'s foundation myth. Furthermore, the history of controlling water is closely connected with political power needed to control a site (Sørensen 2003).

In Khorchag, the Peacock River meanders past the village, continuously encroaching on land. In Lhasa, the marshy land along the Kyichu River never guaranteed a solid foundation as would have been the case on higher rocky ground a certain distance from the river. At both sites the main temples as the predominant structures were severely endangered by flooding several times. At the time of the foundation of the Rasa and the Ramoche *vihāra*s up until at least the 14th century there were just a few hamlets (Sørensen and Hazod 2007: 472), and it was not possible to foresee Lhasa's expansion as a settlement when these religious monuments were erected, about 700 years before these settlements began to expand. In this regard the aspect of 'taming' negative influences within this wide and barren nature becomes even more noticeable. On the other hand, this barren picture is attenuated by the fact that wide areas of the highlands were forested, thus protecting the sandy and muddy subsoil from being easily washed away. According to recent research the hypothesis that "the present high mountain deserts of southern Tibet are the result of deforestation due to centuries of woodcutting, use of incense, and grazing"[9] would explain a certain protection by forestation, which obviously was not efficient against the power of water.

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7 Tsering Gyalpo suggests the need to include the idea of a mandalic shape following a similar earlier pattern but necessarily materialised in the present form. This approach would also allow the hypothesis of the outer shape of the Lhakhang Chenmo having (partially) been the shape of a former enclosure wall. He also mentions four chorten marking particular spots of this early mandalic shape (personal communication, Vienna, April, 2015). They are hidden within the structure and were not accessible during field research.

8 Compare ground plan in Feiglstorfer, forthcoming a.

9 Miehe *et al*. 2003: 325. Sir Charles Bell (1924: 16) reports a traditional saying that in earlier times there were many more Cypress trees in Tibet.

The danger of flooding could not have been a sudden surprise after these costly religious establishments were founded, but must have been taken into account at the time the site was chosen. Even if the river bed was then further away, the risks must have been evident. The main aspect beside the functional one may have been the need to tame the *nāga*s directly where land and water meet.[10] Thus the future struggle with water must have been part of the foundation programme. And this struggle intensified as a result of the many floods and resulting devastation with further consequences in great expenses and burdens on the community. Flood control became one of the main measures enabling the survival in these endangered areas and one of the main communal duties to protect the holy shrines, in particular the *dri gtsang khang*.

The earliest measures may be attributed to Songtsen Gampo, who may have erected the first protective earth ditches (T. *sa khung*). The first proven protection measures were undertaken in the 12th century AD, with Myang ral as most significant architect (Sørensen 2003: 100). In Khorchag, three large dams were constructed as long-term protection against flooding, i.e. the Dujom Dorje (literally: 'Adamantine Conqueror of Evil') Dam, the Chulung Kemche ('River-Diminishing') Dyke and the Dutsho Kemche ('Diminishing the Evil Lake') Dam (Jahoda 2012a: 18). The names of these two dams and the one dyke point towards practices of taming magic forces related to religious practices and offerings. In the case of flooding, all expenditures were directly assumed by the Tibetan government. The (faithful) local people had to volunteer the necessary means to build the dams (*ibid*.: 19).

Measures undertaken by the dyke builders (T. *chu rags pa*) were to organise the transport of foundation stones (T. *rgyab rdo*) (in case of Rasa by 300 skin coracles) on which the walls were erected and filled with various building materials. Another wall made of peat (T. *la ma*) was erected and behind and in between the peat wall a mound of small pebbles (T. *gram gseg*) was built (Sørensen 2003: 102). The dimensions were immense. In the case of Khorchag measures described under Namgyal De included the making of a sand embankment and the fearful population throwing logs into the river.[11]

Several measures undertaken in Khorchag against flooding are recorded, as are several renovations by strengthening walls but interestingly these measures are not always unambiguously ascribed to measures related to flooding. The strengthening of walls of the Lhasa Jokhang is not mentioned as a direct answer to floods. On the other hand, one may argue that the strengthening of walls (most probably) implies flood protection. Of course, most of the strengthening measures may be related to flooding, but they may not a priori have been taken as such as there may have been several other reasons necessitating such action. The protection of the sanctum (T. *dri gtsang khang*) must have been a primary task in the case of flooding. Not much time would have been left to react to the rapidly rising water if preliminary measures had not been taken. Concerning the erecting of walls or the moving of huge and heavy sculptures including their basis, the question arises of whether these were measures taken in advance or after disastrous flooding. In the case of moving heavy sculptures it is questionable if this was the reason for changing of their position instead of protecting them by external measures. Kalantari (2012a: 108) reports that in the Jokhang the apse was closed off at some point in the past to protect the old cultic centre from flooding. In this particular case the new wall closing the sanctum niche is about 70 cm in front of its original rear wall, which cannot entail any protection, as no new wall was built laterally to the niche where the *maṇḍala* was found. This would not indicate a measure against water, in particular not at the most sacred space within the temple. But the moving of the Three Jobo Silver Brother statues is recorded as a possible measure due to the extreme flooding in 1503, while its implementation is left open in this text. In the Water Pig year (1503) due to a major swelling of the gShel River—"the embankment and all the precipitous cliffs of the area [around Khorchag] were torn down to the plain"—even the shifting of the main temple was considered but then obviously not carried out (Vitali 1996: 538).

The erecting of two walls within the sanctum (Allinger, Tsering Gyalpo and Kalantari 2012: 202), thus separating the central Maitreya sculpture from the eight clay sculptures, four on each side, is also mentioned as a possible measure to protect the Lhakhang Chenmo's sanctum's core. In this case a discussion is warranted as to whether the erection of these separating walls was really a response to flooding. Results of the architectural survey show that these new walls were probably built as sub-construction to raise the height of the central temple by one more storey (Fig. 5). Of course, one cannot exclude the fact that there may have been multiple reasons behind the decision to erect these walls.

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10 Sørensen (2003: 93) mentions this place of transfer as "the most vulnerable locale, considered the gateway or entrance to the subterranean world."

11 Vitali 1996: 475: Between the lines of translation one may read the despair of the population towards the immense power of the floods. Interestingly this text passage gives a hint of more wood resources in these early days. Otherwise it could not be mentioned as co-measure to divide the floods.

Several other measures are reported to have been taken in Khorchag. In the 13th century king Tashi De (T. bKra shis lde) took effective flood-control measures.[12] In the early 15th century, Namgyal De, the king of Guge commissioned renovations of the interior of the main temple and completed a stone dam to protect the monastery from flooding. Throughout the second half of the 15th century until the early 16th century, flooding from the river flowing past Khorchag seems to have endangered the monastery and necessitated urgent construction work. A new river embankment was erected, probably under the king of Lo (Mustang), Amgön Sangpo in the second half of the 15th century when river flooding endangered the monastery until the early 16th century (cf. Jahoda 2012b: 59–60). Most of the reported measures relate to dam building, only a few are mentioned as structural measures within the monastery complex. Although it appears difficult to derive specific modifications from the original substance of the Lhakhang Chenmo, one can state with certainty that the water must have influenced the architecture of the whole monastery. Most recorded modifications are not related to a specific part of the monastery, something that makes the structural reconstruction of a single building more difficult.

GEOMETRIC AND PROPORTIONAL FEATURES

A study on the geometry and proportions of early religious structures from the imperial period in Central Tibet[13] showed strong similarities with methods used for the early West Tibetan structures.[14] About twenty Central Tibetan religious structures from the early imperial period in Central Tibet were examined. Most of them showed a clear relation to the methods used later on in West Tibet to define the complex geometry and proportion of the main temples. These methods enabled the merging of religious (in the sense of metaphysical) and practical (related to the needs of the user) aspects by concentrating the whole complex on one pivot in the centre of the assembly hall, imagined as centrally overlapping with the sanctum (in general its centre)—thus structuring the whole building concentrically around it.

From the practical point of view this method is obvious, having been carried out with a rope by marking the results on the ground, which must have previously been levelled (and probably strewn with sand or earth to mark out the ground plan). This could be done by at least two people, one holding and one marking. From the metaphysical point of view, such methods could define several parts of the building as belonging together in a religious and ideological context, thus relating all the individual parts to one common whole. Even if for the common user these temples do not necessarily appear as centralised structures, by following this geometric idea they focused on a common centre, and by using these tools to proportion the whole structure they followed one unifying idea. Very few Tibetan religious structures were constructed as real centralised structures in a geometrical sense, such as the main temple (*gtsug lag khang*) in Tholing, the Sumtseg (T. gSum brtsegs) in Alchi or the Sani *vihāra* in Zangskar as Western Tibetan examples or the Jokhang *vihāra* in Lhasa and the Samye *vihāra*, probably also the Jamshing Lhakhang (T. Byams sprin lha khang) and the Phakpa Lhakhang (T. 'Phags pa lha khang), Central Tibetan examples both located in Kyirong.

From a functional point of view in Samye or Tholing the assembly hall appears to be spatially minor, while in the same year of foundation in Tabo and Nyarma the development of the temple structures goes proportionally towards the enlargement of the assembly hall in relation to the size of the sanctum, possibly a functional decision for giving more space to a growing number of monks—a development which continued in the following periods. This conclusion does not apply to early structures that followed an Indian *vihāra* typology, with a few examples as in Lhasa, probably in Thandrug[15] or in Sani

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12 Vitali (1996: 404): "khri bKra.shis.lde [13th century], who belonged to the lineage of the Guge *chos.rgyal*-s […] issued orders to arrange an effective method to protect the *gtsug.lag.khang* from the fear of the river. The range of the sandy dunes had been washed away. The population was frightened. Having blocked the flood of the river, he diverted the course of the waters. Thanks to his instructions, an efficient system of controlling the river [by means of] an embankment was introduced".

13 This study on early imperial religious structures in Central Tibet was conducted within the FWF project P25066 "The Burial Mounds of Central Tibet" in spring 2014 at the Austrian Academy of Sciences in Vienna. The results have not yet been published.

14 At the 12th IATS conference in Vancouver in 2010 (15 to 21 August) the author presented the various geometric tools which were used for defining the proportion of layouts of early Western Himalayan religious structures. As a result four basic proportioning schemes could be established. It is interesting to note that all the four schemes had to do with the geometrical and proportional relationship between the sanctum and the assembly hall. One of the main tools used for creating this relation was the use of the perimeter or the inner circle (in most of the examined cases the perimeter was used, not the inner circle) around corners of the sanctum and by that defining the width of the assembly hall with the diameter of the obtained circle (or vice versa), finally with the centre of the assembly hall as common pivot.

15 Today the layout of the Thandrug *vihāra* with the tripartite central area and the two temples added laterally on each side (rTa mgrin, sPyan stong, sMan lha'i lha khang and Thugs dam gong ma) leaves open the hypothesis that the

in Zangskar. At these sites, the Indian *vihāra* concept was from the beginning intended to provide space for a bigger group of teachers and students.[16]

As a result we can conclude that basically the early Central and West Tibetan religious structures used similar ways to define their internal geometrical and proportional order. What may be surprising is that most of their designs are individual and different from one another, and simply looking at them provides no real evidence of the internal geometrical and proportional relationship that must have been predefined in the plan. This fact is also important for the further investigation of the architectural typology of the Lhakhang Chenmo, as there is no longer any evidence from the geometrical and proportional point of view to see it as a particularly 'West' or 'Central Tibetan' temple or with a particular relation to the main temples in Tholing, Nyarma or Tabo.

THE QUESTION OF THE TYPOLOGICAL RELATIONSHIP OF THE LHAKHANG CHENMO TO AN 'INDIAN VIHĀRA' STRUCTURE

In view of the fact that the layout of the Lhakhang Chenmo has similarities with the one found in Thandrug, which may probably have followed an 'Indian *vihāra'* layout, the following section looks at the historic and social setting of the 'Indian *vihāra*' typology and its possible influences on the genesis of this typology in Tibet. The oftenmentioned Indian *vihāra* type refers to the courtyard as the centre of a surrounding building structure,[17] as we also know it in a later development of the *madrasa*,[18] both used as a centre of discourse and debate. From the point of view of the typological genesis of the *'du khang* as a closed assembly hall within a monastic complex, it can be explained in spatial terms as a closed form of a *vihāra* courtyard which, in its former Indian context, was built as an open space enclosed by a functionally linked building; i.e. the central court or assembly hall was used as the common place for assemblies surrounded by chambers used for residential purpose, as in the early *vihāra* idea, which was followed by the practice of discourse and debate or later on used for religious purposes, as we find in the further development of the formerly free-standing type of assembly hall (see Tabo, Nyarma or Alchi). Samye and Tholing show the geometrical integration of the assembly hall into the whole monastic structure but from the spatial point of view they do not define the assembly hall as the centrally located place of the whole complex, as is the case in the examples of Khorchag, Tabo, Nyarma or Alchi and the Indian *vihāra* type.

Since their early existence, Indian *vihāra*s have given shelter to pilgrims and monks (in a further development architecturally expressed in monks' residential cells) and have been a place of discourse and debate. The role of the assembly hall in the *vihāra* goes from being a place where these scientific methods were practised to a space for religious practice, thus becoming a closed, roofed space. This change may well be seen in the Jokhang in Lhasa, where the cells around the central court have successively been transformed into temples (T. *lha khang*)[19] with the central open *vihāra* courtyard being

whole structure was conceived as a *vihāra* following an Indian typology. Several descriptions of the compound by visitors keep this hypothesis alive, in particular by its comparison with the Lhasa Jokhang (Hazod and Sørensen 2005: 15f.). Compared with the layout of the Lhakhang Chenmo, similarities may be recognised in the spatial definition of the tripartite central core, surrounded on three sides by the inner circumambulation path (T. *nang skor*) and preceded by an Indian *vihāra*-like structure. But what cannot be determined with the existing research data in Khorchag is whether the original plan followed an Indian *vihāra* structure, as the existing evidence suggests the successive and not synchronous erection of its individual sections. In the case of Thandrug by comparison the sGo drug Ka drug as the earliest core was described as an expansion of the sanctum during subsequent building phases (Hazod and Sørensen 2005: 16). In Khorchag, with regard to a subsequent enlargement of the central core towards a (hypothetically Indian) *vihāra* structure leaves the single-chamber structure and not the Indian *vihāra* structure as the primary idea of the layout. If this is the case, the planning approach would not have been 'all-inclusive' in the primary design stage as was certainly the case at the *vihāra*s of Samye or Tholing; not to be excluded is the possibility that the continuous development of the early core structures of Thandrug or Khorchag was—to a certain degree—part of the spatial programme.

16 For plans of the Thandrug *vihāra* see Hazod and Sørensen 2005: 325–328; plans of the Lhasa Jokhang and the Ramoche: Feiglstorfer 2010.

17 The *vihāra* as a Buddhist monastic institution follows its early origins as dwellings (Dutt 1962: 95) and shelter for the Bhikkhu sponsored by rich lay devotees and often contains shrines. The architectural typology of *vihāra* structures started in the 2nd century BC and was widely used for monastic structures during the Gupta and Pāla periods. The foundation of Nālandā is mentioned in the 5th century (Dutt 1962: 329). It was continuously extended. Xuanzang describes the monastery of Nālandā in the 7th century AD (Tang Dynasty) (see Grousset 1971: 158f.). This is roughly the time when the first *vihāra*s were founded in Tibet. Dutt (1962: 342) also says that Tibetans started visiting Nālandā when Xuanzang was in residence there.

18 The broad impact in the use of the 'Indian *vihāra*' made the structure attractive for several purposes in the field of a (scientific) discourse and debate: Beckwith concludes the development of the four-*īwān*-style *madrasa* from the discovery and excavation of Adzhina-Tepe in Tajikistan, a *vihāra* resembling the later four-*īwān*-style (Beckwith 2012: 40).

19 Alexander (2010: 211) mentions the Jokhang in its original form (639 AD) as a two-storey square *vihāra* with seven niches on each side (except the central niches) that were used as pilgrims' resting places (*ibid*.: 211) surrounding the Kyil-khor-ting (T. *dkyil 'khor sdings*) and which were also spatially defined by

closed with a skylight in the late 13th/early 14th century (Alexander 2005: 32). The early residential cells of the *vihāra* structure in the Jokhang must have been transformed successively by adapting the cells to the needs of Vajrayāna Buddhism needs and integrating them into a three-dimensional pantheon. The centre of the Kyil-khorting as a concentric manifestation of a *maṇḍala* structure (possibly following the model of the Nepal *maṇḍala*) (Sørensen and Hazod 2007: 453) shifts the meaning of the simple functional *vihāra* court as a place of education towards a different level of meaning within a cosmological sphere.[20]

The Vajrayāna Buddhist *vihāra* of Samye, by contrast, was already designed as a monastery with its original plan, its cells from the very beginning being used for the monastic community. Samye is described as the first great *vihāra* where teaching, research and translation activities were connected (Beckwith 2012: 127). From the spatial point of view the big court surrounded by the monks' residences was used for the erection of the Utse (T. dBu rtse), and a small part of the ground floor of the Utse next to the entrance being the assembly hall.

The use of the expression 'bi hara'[21] as a kind of loan word in Tibetan for the earliest structures, with the Thandrug *vihāra*[22] as the first Tibetan *vihāra*,[23] suggests its Indian[24] or Nepalese[25] predecessors. Fourteen *mahāvihāra*s located between Cha Bahil and Gokarna are mentioned during the reign of the Licchavi kings (Tiwari 2001: 64). *Vihāra*s of the Licchavi period were primarily located in more rural areas (*ibid*.: 67). Their original layout is no longer known.

The Thandrug *vihāra* is a kind of starting point for a continuing development of Tibetan *vihāra* structures such as the Lhasa *vihāra*. Actually, this development is relatively late as the 'Indian *vihāra*' was transmitted to China in Gansu much earlier, between the mid-first century BC and the mid-first century AD. The idea of the *vihāra* 'college' had already developed in Central Asia during the Kuṣāṇa empire (ca. 50 BC to 225 AD) (Beckwith 2012: 125, 133). The structural idea which goes hand-in-hand with the performance of the development of the culture of a particular form of 'scientific' discourse must have been revolutionary—it spread all over the empire and also replaced the early *saṅghārāma* (*ibid*.: 125).

The first Tibetan *vihāra*s can be dated between the empires of the Gupta and the Pāla, while the first West Tibetan monasteries follow the golden age of the Pāla (Feiglstorfer 2013a: 30). An important shift towards representation within a *vihāra* structure may have been given with the rise of Mahāyāna Buddhism during the

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the 8 x 8 pillars following the path along the cells. The mention of the use of monastic cells in the early phase on page 211 has to be qualified, as no ordained monks would have been practising in Tibet at this early time—a crucial difference to the religious complex of Samye, the first monastery of Tibet, thus housing the first ordained monks' community already following the rules of the Vinaya at the time of its foundation.

20 The study on early imperial religious structures in Central Tibet conducted within the FWF project P25066 "The Burial Mounds of Central Tibet" in the spring of 2014 at the Austrian Academy of Sciences in Vienna showed that the geometrical and proportional derivation of the early *vihāra* geometry of the Lhasa Jokhang is possible from the geometry of the courtyard as well as from the geometry of the Jobo Lhakhang. On the one hand, this proportional matching and mutual relation refers to the intention to define the single parts as parts of one whole. On the other hand, this fact in relation to defining the "centre of the dkyil ´khor sdings as a concentric manifestation of a mandala structure" may define the starting point of the construction process, i.e. the courtyard in succession, also the assembly hall and not the sanctum, as the starting point for the geometrical proportioning. This aspect also seems to be relevant for the early West Tibetan monastic structures. It is interesting that this proportional relation is given with the square outer shape of the Jobo Lhakhang, which is mentioned by Alexander (2005: 32) as the result of a later extension. But according to the proportional result this shape must have been part of the early structure, which has to be discussed elsewhere.

21 Personal communication by Guntram Hazod (2014-09-11). Also 'pe har' is used in an early source on the foundation of the Jokhang as Ra sa Pe har gling in the *dBa 'bzhed* (Pasang Wangdu and Diemberger 2000: 26), mentioned in Hazod and Sørensen 2005: 176.

22 The *vihāra* may be mentioned as a further development of preceding typologies of Buddhist residences. The *pāsāda* was used as a version of monastery with more than one storey (Dutt 1962: 96). The *vihāra* and *guhā* (structural caves) remained as common versions, the first related to monastic establishments in the Indian north, the latter to the south. With the *upaṭṭhāna-sālā* (meeting hall) as a 'symbol of the collective' (*ibid*.: 93) the later development of the courtyard and further on of the assembly hall (in a figurative sense) as places of assembly have already been described. Buddhaghosa (5th century AD) already explains the *vihāra* "as a dwelling-house with a chamber in it" (*ibid*.: 95).

23 The Thandrug *vihāra* is mentioned as "being the foundation of all [subsequent] *vihāra*-s" (Hazod and Sørensen 2005: 145).

24 The question of a correlation arises between the proportional system used for these *vihāra* structures in India and at the Lhasa Jokhang. In the Jokhang, the proportional system is manifested by concentrically interweaving circles and squares and not by a modular grid system. What we learn from the *Kriyāsaṃgrahapañjikā* (a commentary on the collection of Buddhist tantric rituals) by Kuladatta (ca. 11th/12th century AD) is the use of a 'gain and loss (*āyavyaya*) method', which makes it possible to judge whether the proportions of a compartment of a monastery are auspicious or inauspicious by specific calculations based on the size of a monk's cell (Ryugen 2004: 25). This could also mean that outside the Tibetan cultural zone the Indian *vihāra* concept may have followed different or additional methods of proportioning *vihāra* structures. Many early Indian *vihāra*s tend to have a square layout.

25 Gyurme Dorje (2010: 51) points out that either a Newār model or a Vikramaśīla monastery model may be hypothetical predecessors. The fact that the development of possible examples may be much older leads us back to the *vihāra* type, the earliest examples of which are related to the Kuṣāṇa empire (Beckwith 2012: 41).

Gupta dynasties, coupled with a change in the utilitarian appearance of monasteries of the Kuṣāṇa age towards a new splendour (Dutt 1962: 198). Concerning the early monastic foundations by Yeshe Ö, the foundation of five great *mahāvihāra*s preceded his foundations during the early Pāla dynasty. Dutt mentions the Somapura *vihāra* as a centre for translating religious texts into Tibetan and as a functioning *vihāra* for about 400 years from the early 9th century onwards.[26] In several texts Nepalese (or Newar) models of *vihāra*s are mentioned. Remaining structures such as the Gha Bahil in Deupatan founded by Charumati (Korn 1998: 26; Bonapace and Sestini 2003: 5) are likely to have been changed over the course of time. It can only be speculated that present-day structures, such as the *vihāra*-like structures of the Pintu Bahil or Chhusya Bahil among many others, follow earlier *vihāra* models.

In the case of the Lhakhang Chenmo it is interesting that the methods used for the geometrical proportioning in the Lhasa Jokhang *vihāra* cannot be considered relevant. The reasons may be that the original structure of the central core of the Lhakhang Chenmo was changed during restoration so that a reconstruction would only be possible by opening several walls to discover the original structure. Another reason—and this seems to be quite plausible, as several of the proportioning methods have been applied during studies without even an approximate result—may be that the original core of the Lhakhang Chenmo simply was not planned as an Indian *vihāra* structure.

According to Hazod and Sørensen (2005: 21), we can consider all the architectural components of the Thandrug *vihāra* apart from the basic structure (i.e. the three central temples, the inner circumambulation path and the four lateral temples, two on each side) to be products of the 17th century or later. Although there are proportional relations between the central core and the *vihāra*-shaped appendix, they are of no relevance for a further proportional research on this *vihāra*. The proportional relations within this central core of Thandrug appear reasonable, in particular between the gTsang khang dBus ma, the position of the wall of the ambulation path and of the two laterally adjoining temples (T. dKor mdzod gong ma). In comparison, in Khorchag there is evidence of the proportional relation between the circumcircle around the outer corners of the Maitreya Lhakhang and the position of the circumambulation wall. Due to the geometrical inaccuracies resulting from the renovations mentioned, this finding must be seen as hypothetical. But if this were so, this relationship between the Maitreya Lhakhang and the adjoining circumambulation path behind it may have been part of the earliest layout (Fig. 4). Today's wall bordering the ambulation path may be in the position of a former barrier of this path.

Generally speaking, there is little evidence for the hypothesis of the Lhakhang Chenmo as a *vihāra* structure apart from its relationship to the Thandrug *vihāra*. Aside from the early core structure, it is the assembly hall that is flanked by chambers on all sides and is not free standing, as we know, for example, from Tabo or Alchi, and also not integrated into such a geometrically well-proportioned centralised structure as we know from the main temples (T. *gtsug lag khang*) in Nyarma or Tholing. As the walls of the assembly hall are made from rammed earth (as far as can be proven) this method of construction is certainly not of the early adobe brick era but—similar to the rammed earth walls in the Jokhang—a later addition. The unplastered part of the assembly hall walls which could be structurally examined was on the outer surface and not along the plastered interior. Perhaps the rammed earth walls that were examined are a later addition along the outer temple walls as a buttress or protection against flooding.

The widths of the three assembly hall walls (north, south and east) in the Lhakhang Chenmo vary between about 118 cm and 189 cm. In comparison, the lateral adobe brick walls of the Maitreya Lhakhang vary between about 90 cm and 128 cm. In the case of the 189-cm-thick assembly hall walls, a double shell (adobe brick and later rammed earth) would technically be possible. In the relatively unrealistic scenario that *vihāra* cells could have been erected as a continuation of the outer lateral walls of the circumambulation path flanking a *vihāra* court to its north and south, the existing structure would have been erected on the foundations of a former *vihāra* structure and the two lateral temples, the Temple of the Buddhas of the Ten Directions and the Temple of the Seven Excellent Buddhas of the Past, would also be later additions. Current research reveals that the hypothesis of a former Indian *vihāra* structure turns out to be largely unfounded, and the arguments for its development as a free-standing single-chamber temple (probably without an assembly hall in the earliest phase) are far more definite and in line with the present findings.

On the other hand, according to Tsering Gyalpo's hypothesis that the outer shape of the Lhakhang Chenmo is based on an earlier structure, the sanctum, assembly hall and circumambulation corridor[27]

[26] Dutt 1962: 375. At this time, translation activities from Sanskrit into Tibetan are also mentioned at Vikramaśīla (Feiglstorfer 2013a: 39).

[27] Figs. 6 and 7 show the circumambulation corridor on a similar level as the Maitreya Lhakhang. The two lateral temples, the Temple of the Seven Excellent Buddhas of the Past and the Temple of the Buddhas of the Ten Directions (not

could have been erected as part of one structure and turned into today's shape during later renovations. Overlooking this all-in-one structure-hypothesis may lead to a single-chamber temple hypothesis where a single chamber temple defines the earliest core and may have been extended successively in an order such as: single-chamber temple—its two flanking temples—the closing of the ambulatory—the erection of the lateral walls of the assembly hall—the addition of the Temple of the Buddhas of the Ten Directions and the Temple of the Seven Excellent Buddhas of the Past, and additional constructions along the north-east-south bordering the assembly hall.

Wagindra Karma mentions a second important building phase after the foundation in the 13th century, when Tobtsen De (T. sTobs btsan lde) built the bKra shis brtsegs pa'i gtsug lag khang (Vitali [1996: 265, n. 395] mentions him as sponsor, not as builder) and as the third important phase the adding of temples in the late 13th/early 14th century, but not giving any further details (Wagindra Karma 1996: ix). This may be a reference for later structural additions to an early core. The Yishi Lhungyi Drupa Tsuglagkhang as the foundation under King Khorre is said to have had many (literally, 'one hundred') pillars in its main hall at one time (Kalantari 2012b: 146). This source suggests a huge structure as the earliest core, which still questions the single-chamber temple hypothesis, and does not suggest an open *vihāra* courtyard but far more a closed assembly hall structure as far as we may deduce from the large number of pillars. Regarding layouts of other West Tibetan temples erected at the very end of the 10th century—in particular Tabo and Nyarma—their central core is spatially far closer to a one-chamber temple as a forerunner than we find in all the later West Tibetan temples, which have a much more distinct spatial concentration on the assembly hall. These early temples rather appear as a spatial combination of a single-chamber temple with an attached assembly hall. In the case of Nyarma, this feature is very striking and, from the few written sources and spatial evidence, the Lhakhang Chenmo may have been a combination of two such structures (temple and assembly hall) in one with a surrounding enclosure structure (probably a wall) as well.

THE HYPOTHESIS OF THE DEVELOPMENT OF THE LHAKHANG CHENMO FROM A SINGLE-CHAMBER TEMPLE

In the first examples with the main temples (T. *gtsug lag khang*) of Nyarma, Tabo and Tholing we still find the sanctum as a more separate structure than in all the later West Tibetan examples, which may show a relation to earlier single-chamber structures, e.g., the Lotsāba Lhakhang in Ribba in Kinnaur (ca. 9th/10th century AD) as a Buddhist example, the Lakṣanā Devī Temple in Bharmour (7th century AD) or the Śakti Devī Temple in Chatrarhi (7th century AD), both of the latter being Hindu examples. Associations with single-chamber structures during the Gupta period also suggest themselves in a geometrical and proportional context (Feiglstorfer 2011 I: 186). The sanctum was spatially and constructively defined as more independent than in the following development, when it was combined with the assembly hall in the form of a cella niche. This early feature was already significant for the early West Tibetan and also early Central Tibetan temple structures and is one of the main features defining most of the ground plans of early imperial Central Tibetan structures.

In the wooden temples in Bharmour and in Ribba, the central core, the *garbhagṛha* or sanctum (T. *gtsang khang*), is closed by a door and can be described as a shrine. The idea of physically locking what was most precious within a shrine may still have been the case in the sanctum of Nyarma, where there is evidence of a former door or at least a kind of a door frame. In Tabo this spatial approach changes from a (seemingly) lockable shrine to an open door-less chamber, thus becoming an integral part of the surrounding space, and its integration within the three-dimensional Vajradhātumaṇḍala becomes spatially more evident. But the sanctum still exists as a central chamber. It is remarkable that such spatial changes between these temples so far apart were carried out within one year of the foundation. In the following steps of development of the temple layout the spatial accentuation of the sanctum as a separate chamber dissolves by using a cella niche as sanctum, as we can see in the Jokhang in Khorchag or in the Alchi Dukhang. With the latter example the architectural tradition of the internal circumambulation path at early West Tibetan religious structures finishes. From this perspective the existence of an internal circumambulation path (S. *pradakṣiṇāpatha* or T. *nang skor*) correlates with a particular spatial concept for the circumambulated cella. Here, the Maitreya Lhakhang in Khorchag may have followed the concept of a lockable shrine.

In Central Tibet we can see a similar development, but interestingly at least 350 years earlier. Early 7th century structures like the Thandrug *vihāra*, the Lhasa Jokhang, the Ramoche monastery, the Jampey Lhakhang or the Kyichu Lhakhang (the latter two being in Bhutan) are lockable shrines, and with the exception of the Jokhang follow an Indian *vihāra* concept with an internal ambulatory (T. *skor lam*). Several temples in the 8th/9th centuries, such as the Uru Shey Lhakhang, the Tsentang Yüyi Lhakhang, the Meru Nyingpa Dzambhala

part of these drawings) are all on a similar level. The level of the corridor was aligned with the level of these three chambers.

Lhakhang,[28] the Samye Tsuglagkhang or the Samye Queen's Temple, open without a wall and a door towards the assembly hall. Of course, this is not always the case, but the examples given suggest certain tendencies in the spatial evolution.

There may be a relationship between the tower-like appearance of the central core chambers and *sku mkhar* (castle)-like residential building (Hazod and Sørensen 2005: 17) with a striking tower-like design. This can be seen in early structures such as the Uru Katsel (T. sBu ru Ka tshal), but also in Thandrug, the Lhasa Jokhang or the Ramoche. In a West Tibetan context, this design, related to the *sku mkhar* and in a further association hypothetically to the shape of a tent, can be seen in the sanctum of Nyarma and also in the shape of the Maitreya Lhakhang in Khorchag (see Figs. 6 and 7). This *sku mkhar*-like shape may correlate with the design of these early West Tibetan shrine structures.[29] The tower-like shape of the Maitreya Lhakhang appears strengthened by the use of tapering walls, which could be detected at this temple but not at the adjoining Tārā Lhakhang and Gonkhang—possibly further evidence of a different construction typology and thus of a diverging building phase.

We can already find the development in favour of a cella niche in the Jokhang of Khorchag, which still has a *nang skor* as an internal ambulation path for circumambulating the core chamber, the *dri gtsang khang*. A reconstruction study (Feiglstorfer 2013b) has shown that this internally closed ambulation path may have been a later addition to a cella-niche type with an open ambulation path circumambulating the (Amolika) rock and the silver sculptures. Together with the Alchi Dukhang these two examples are among the earliest West Tibetan cella-niche examples.

The early West Tibetan single-chamber structures (and not the cella-niche structures) as mentioned before supported the structural implementation of an internal ambulatory. In the case of the Lhakhang Chenmo there is a circumambulation path leading around the most inner core (see Fig. 4). The construction of the outer circumambulation wall as it appears today must have been a later addition when closing the circumambulation path with an outer wall[30] and by doing so integrating it into the building structure.[31] In its present state the circumambulation path is no longer used, since its exit via the Temple of the Seven Excellent Buddhas of the Past in the north has been walled up, as one can see in the chamber's south-western corner, and its access via the Temple of the Buddhas of the Ten Directions was partially closed and a relatively small and hard to access entrance hole remained (see Fig. 4). Approximately in the middle of the assembly hall one step has to be taken onto a platform to reach all the temples linked to the assembly hall. In this way the Lhakhang Chenmo follows a typology of other West Tibetan structures whose floor levels ascend from the entrance towards the sanctum.

There were similarities with potential typological Indian predecessors such as wooden temples, but so far not within the close vicinity of Nepalese territory. The question of potential Nepalese structural influences arises. The earliest examples of Nepalese Degas such as the Paśupatināth Dega, which is mentioned as early as the 4th century AD, no longer exist (Korn 1998: 66). In most cases the ground plan of the *garbhagṛha* of the Nepalese Degas (a style which may have been formally followed in the Byams sprin Lhakhang and the Phakpa Lhakhang, both in Kyirong Town) follows the typology of a single-chamber temple. Its ground plan is usually based on a square, in some cases on a rectangle or an octagon. In several cases the central chamber is surrounded by a circumambulation path, bordered by walls or columns. At first sight there is nothing particular to compare with the Maitreya Lhakhang of Khorchag in detail, but the fact that these single-temple structures must have been a predominant type may have influenced the architecture in West Tibetan areas and would correlate with the Nepalese influence in several other architecture-related crafts such as metalworking or wood carving.

Three building phases are mentioned for the Thandrug *vihāra* with the building of the sanctum (T. *gtsang khang*): the Khra 'brug dBu rtse dBus ma as its first structure, "presumably no more than

[28] For plans of the Ramoche temple and the Meru Nyingpa Lhakhang see Feiglstorfer 2010.

[29] The association of the central tower-like structure in particular of the Ramoche Temple with a *śikara* as given by Alexander (2005: 86) may be seen as a formal correlation but may differ substantially in a Tibetan context.

[30] With regard to Tsering Gyalpo's above-mentioned hypothesis on the outer shape of the Lhakhang Chenmo and that it already follows a mandalic structure at an early building phase, the position of today's circumambulation wall may date back to an early enclosing structure.

[31] According to Christiane Kalantari (personal communication spring 2013), remains of wall paintings in the Temple of the Buddhas of the Ten Directions may be dated back to the 15th/16th century, which would correlate with the period of major renovations in the second quarter of the 15th century (Jahoda 2012b: 59) and also with the period of major renovations between 1506 and 1512 which followed a flood in 1506, according to Wagindra Karma's 16th century *Jo bo dngul sku mched gsum dkar chag* (1996: xii). These restorations included work on the architectural structure, such as the strengthening of the walls of the side temples and the completion of the circumambulation hall (T. *skor khang*). This may refer to a big renovation and extension of the Lhakhang Chenmo concerning the possible addition of the Temple of the Buddhas of the Ten Directions and the Temple of the Seven Excellent Buddhas of the Past as well as changes to the circumambulation corridor, probably the erection of the outer wall.

a simple rectangular brick building in the traditional style of a *pho brang*, 'palace'," later on the sMu lugs lha khang and, finally, the sGo drug Ka drug complex (Hazod and Sørensen 2005: 255), but no mention is made of the erection of a *vihāra* in a classical Indian shape. Regarding the existing central core with the Maitreya Lhakhang in the Lhakhang Chenmo being its central chamber, several facts suggest such a phased development of a former single-chamber structure. Even the mention of the style of a *pho brang* can be put forward as a hypothesis for the construction of the central Maitreya Lhakhang with its tapering walls. One point in favour of the hypothesis of the erection of the Maitreya Lhakhang as an independent structure—as mentioned above—is the fact of this tapering, as this differs from the adjoining two temples where such a tapering is not found. The dating of the wall paintings within the Tārā Lhakhang (Kalantari 2012b: 166) beginning in the 14th century may be another indication of a later date for this temple adjoining the central Maitreya Lhakhang. The walls of the Gonkhang which are relatively uneven have been whitewashed—recently, judging from their gleaming white surface—which lends credence to conclusions regarding earlier phases.

The Maitreya Lhakhang is higher than the adjoining Protectors' Temple (T. *mgon khang*) to its right and the Tārā Lhakhang to its left (see Fig. 5). This fact may be ascribed to the later addition of the upper storey above the Maitreya Lhakhang. From the present structural evidence on the outer surface of its rear wall—where the structure appears partially unplastered and coloured red—we can assume that the Maitreya Lhakhang was taller than the two lateral temples when they were added in the earliest phase. There is no evidence of a later reduction in the height of these two lateral temples. From this point of view, the Maitreya Lhakhang may have been the central and earliest temple, probably accentuated as such by the lower height of the two adjoining temples. This hypothesis is supported by the fact that the Maitreya Lhakang is also deeper than the lateral temples, thus appearing as a *triratha* shape in an Indian context. Unlike the Maitreya Lhakhang, the rear wall of the Tārā Lhakhang shows no tapering and does not contain any wooden lacing—thus supporting the hypothesis that the Tārā Lhakhang may have been built at a later period than the Maitreya Lhakhang.

In addition to the different heights of the Maitreya Lhakhang (ca. 514 cm at the west wall and 435 cm at its centre with a lower ceiling apparently added later), the adjoining Tārā Lhakhang (ca. 438 cm) and Gonkhang (ca. 396 cm), the different levels in the approach to these temples emphasises their different hierarchical position. The Maitreya Lhakhang is accessible from the assembly hall via several stairs with a floor level difference of about 64 cm while the floor level difference between the assembly hall and the Tārā Lhakhang and the Gonkhang is only about 14 cm (Fig. 6). This height difference of about half a metre between the Maitreya Lhakhang and the adjoining side temples and the assembly hall gives it a dominant position.

The Maitreya Lhakhang is flanked by a walled lateral niche on each side, which can be accessed via the uppermost storey. Inside each of these two niches there are clay sculptures in a sitting position placed on the earthen floor. The rear walls of these two niches, one bordering the Protectors' Temple and the other bordering the Tārā Lhakhang, as well as their side walls (as far this could be examined) are made of brick, which may indicate that they are part of an early structural core, unlike the walls of the niches bordering the Maitreya Lhakhang (Fig. 8). Built of rammed earth, these walls are clearly a later addition—for structural purposes, probably at a time when the upper storey was erected, since these rammed walls are below the later construction of the uppermost storey just above the Maitreya Lhakhang (see Figs. 6 and 7), which today contains wooden printing blocks. At least this structural relation between the first floor (Maitreya Lhakhang) and the second floor (upper chamber) suggests a later addition of the upper chamber on top of the Maitreya Lhakhang, with it following the one-storey building tradition of the earliest West Tibetan temple structures. Parts of the brick walls in these niches[32] are plastered and painted, which impedes the closer examination of the underlying construction.

Today the shape of the ground plan of the Maitreya Lhakhang is in a rectangular and elongated form. Assuming that the rammed earth walls were part of a later building phase, the ground plan of the Maitreya Lhakhang would have a wider rectangular shape (ca. 5.6 m long by 5.22 to 5.76 m wide) close to a square.[33] As the structure of the lateral walls of the niches facing the assembly hall seems to have been very roughly reconstructed, the former shape of this temple may have been approximately square—bathe absolute form used in the sanctum of Tholing, Nyarma and Tabo. In the latter example the square shape is geometrically dissolved by the use of rectangles in

[32] The floor level of the two lateral niches is higher than the adjoining level of the Maitreya Lhakhang (see Fig. 6). This may be an indication that the statues were erected after building these two side chambers. In this position the statues could only have been part of the Maitreya Lhakhang when erected on a pedestal. The different height of the two pedestals contradicts this hypothesis.

[33] Calculated using an average wall width of 85 cm as given at the entrance to the Maitreya Lhakhang. The rear wall is 692 cm wide including the thickness of the walls of ca. 85 cm (hence 522 cm wide). In contrast, the front wall is ca. 746 cm wide, including the walls, and ca. 566 cm wide including the 85 cm width of walls (hence 576 cm wide).

proportional reference to each other. The early West Tibetan main temples (*gtsug lag khang*) follow a clear geometric order, with the square in its geometrically absolute form.[34]

As the Maitreya Lhakhang has two lateral niches inside its rear wall we cannot exclude that this temple was once in the shape of a cella-niche temple. A carved wooden beam was detected during field research in a small gap between the structure of the Maitreya Lhakhang and the Protectors' Temple, but it was too far inside the wall for a further investigation (see Fig. 4). It would appear that the early construction of the Maitreya Lhakhang may have contained more wooden parts than it appears today.

Several records provide evidence of the Maitreya Lhakhang as the earliest core: *The Register of the Three Silver Brothers* (Wagindra Karma 1996) mentions the Great Translator Rinchen Sangpo as the 'builder' of the Great Temple Kama at Khorchag, probably an extension or renovation of the earlier Yishi Lhungyi Drupa Temple (Jahoda 2012b: 49). He also refers to Vitali's *Royal Lineages of Western Tibet*, a chronicle of the royal lineages of Purang and Guge, which says that the original main image installed in the Khorchag main temple (*gtsug lag khang*) was a Maitreya statue,[35] which correlates with the current situation in the use of this temple. According to the *Royal Lineages of Western Tibet* (T. *mNga' ris rgyal rabs*, Vitali 1996: 149), Khorre was the founder of the Yishi Lhungyi Drupa Tsuglagkhang (T. Yid bzhin lhun gyi grub pa'i gtsug lag khang),[36] and Vitali also refers to the existence of two temples at the time of King Lhade (*ibid*.: 259), when the Jokhang possibly already existed.

THE ENCLOSURE WALL

Another important architectural feature of the early West Tibetan main temples in Nyarma, Tabo, Tholing and Alchi is the enclosure wall (T. *lcags ri*), which was built as an integral part of the whole geometrical system of the compound, with Samye as a potential Central Tibetan predecessor. After these early West Tibetan examples, the material definition of a *lcags ri* was also used in different ways, but the way it was used in this geometrically integrated manner to gain a materialised image of the universe is specific to these structures. Samye, the first Tibetan monastery, integrates the surrounding enclosure wall within the whole geometric concept of the compound (Feiglstorfer 2011 II: 216). The building of an enclosure wall is also common at several temples in Central Tibet, apart from Samye, at Ramoche in the form of the outer limit of a circumambulation path, at Thandrug, at bTsan thang gyu'i lha khang, at 'On Brag dmar Ke ru, at Byams pa lha khang in Bhutan and at bKra gdun rtse.

Returning to the monastery of Khorchag today, we note that the enclosure wall is a recent construction. The previous construction, as a kind of surrounding wall, was defined by surrounding housing structures and not by a specific wall, as was locally reported. From an account given by Wagindra Karma, who describes the restoration of a boundary wall lasting from 1509 to 1510, we know of its existence before that time (Wagindra Karma 1996: xiii). At Nyarma and Alchi, for example, not only is the whole compound surrounded by an enclosure wall, but the main temples themselves also formally align with the outer shape of the enclosure wall following a former enclosure wall, in line with Tsering Gyalpo's above-mentioned hypothesis of the current outer shape following an earlier layout. This would correlate with the temple layout of the Lhakhang Chenmo.

ON THE ORIENTATION OF THE TEMPLE

The orientation of early West and Central Tibetan temples follows an individual concept which was related to a particular group of monasteries or temples. The definition of the orientation of this kind of early religious site can be seen within a certain relation or dependence between particular sites. In the West Tibetan territory, a study on orientations suggests that the main temple of Tholing was a kind of orientation point, in particular for early temples towards the west of Tholing (Feiglstorfer 2011 II: 241), excluding Nyarma and Tabo. Both main temples, in Nyarma and in Tabo, are close to a cardinal easterly orientation. In the case of Tholing, the orientation does not follow this kind of absolute cardinal orientation. Rather, it seems to follow the direction of the river, similar to other sites like the Alchi Dukhang.

In the case of early Central Tibetan foundations, the Thandrug *vihāra* (261° W) faces towards Kathmandu, the Lhasa Jokhang following the cardinal system is orientated completely towards west, the Ramoche temple as the sister temple of the Jokhang is orientated towards the east and the Uru Katsel (T. *dBu ru Ka tshal*) towards Thandrug (Herdick 2005: 267). All these examples show either an absolute orientation within the cardinal system or towards a site which was particularly important at the time of foundation, whether it was the seat of the Nepalese king in Kathmandu or another temple

[34] With an approximate height of ca. 514 cm, the proportions of Maitreya Lhakhang are close to that of a cube.

[35] Jahoda 2012b: 48 and 49; compare also Vitali 1996: 233 and 259.

[36] In Wagindra Karma (1996: xvii) the Yid bzhin lhun gyis grub pa Temple is also mentioned as *lha khang ka ma*.

foundation, possibly also natural phenomena like the direction of a nearby river or a sacred place related to a mountain site. None of these facts show a particular network that can be explained by an overall inclusive system.

Regarding the Lhakhang Chenmo of Khorchag, the orientation of the current main temple follows neither the direction of the river, as is the case in Tholing, nor an absolute cardinal system (see Figs. 2 and 3). Noteworthy is that the Lhakhang Chenmo faces away from the threatening Peacock River, with its entrance towards the sheltering mountain range in the east. The Jokhang follows a similar pattern and has its entrance facing the sheltering mountains in the north.[37] According to Google Earth the main temple's orientation is about 78° E, which may diverge a few degrees from its real orientation as Google Earth has a margin or error, but not 12°, which would miss an absolute orientation towards the east. If the Maitreya Lhakhang within the main temple was the earliest core, the divergence from absolute east could be explained by the subsequent addition, which does not preclude the Maitreya Lhakhang having been absolutely orientated and thus according with Nyarma and Tabo. On the other hand, according to Google Earth, the Jokhang is orientated at about 353° N (see Fig. 3). This implies that at least one of these two temples did not follow an absolute system or that the core structure of the Jokhang was also changed by later renovations and both temples were based on an absolute orientation at the time of their foundation.

As the earliest core (according to a reconstruction study; see Feiglstorfer 2013b) of the Jokhang was not a small temple (which the Lhakhang Chenmo might have been), but always a huge assembly-hall structure with thickened walls by strengthening in a later building phase, a major deviation of several degrees from the original orientation cannot be explained by later renovation work—i.e. thickening the walls would have changed the orientation only slightly. Interestingly, the axes of both temples seem to be orientated at right angles to each other, according to Google Earth with a deviation of about 5°. As already mentioned, this deviation is within the margin of error in Google Earth (but probably not of that size) and in later additions to the early structural cores we cannot preclude the rough hypothesis that both temples in their original layout were orientated approximately at right angles to each other.

The orientation of the Jokhang diverges by about 10° from the connecting line to Mount Kailas, it also points towards the Rakṣas Tal (T. *La ngag mtsho*) and is parallel to the Peacock River, all facts without a further comparatively useful quality. The Jokhang faces the Gurla Mandhata III in the north with an approximately 10° clockwise divergence, and the Lhakhang Chenmo is orientated towards the Ganglung Gangri I. The orientation towards mountain peaks may explain the protection of the monastery to the north and the east by these two high peaks. Apart from the protective aspect these peaks have no further known purpose for the orientation of the Khorchag monastery.

In addition to all the fixed points for the orientation mentioned, we may also consider the possibility of astronomical parameters. The Namthong festival is the foundation rite of the Khorchag monastery and starts on the fifteenth day after Losar. With the introduction of the Kālacakratantra in the 11th century, the Tibetan calendar was changed and consequently so was the method of calculating New Year's Day; the previous method for this in Khorchag is unclear. It is not known whether the calendar used in Khorchag in 996 was similar to the one used in the Yarlung (T. *Yar klung*) dynasty, based on a twelve-year cycle giving the months with the four seasons and starting the year with the beginning of summer. Recent studies of local festivals show the meaning of structuring the year by particular natural phenomena and religious ceremonies.[38] The extent to which these festivals were known in 996 in Khorchag and if they were used as parameters within the calendar is also not known.

Since we have few written sources, a study of the parameters (the year 996, the orientation and the surrounding environment) may enable the reconstruction of the movement of celestial bodies in relation to the given parameters. In addition to the year 996, the orientation is given by Google Earth (with the above-mentioned possible deviations) and the profile of the mountain environment as a projection of this orientation line. This profile was also calculated from Google Earth, giving an orientation of 78° E. The 'Stellarium' software enables the reconstruction of each position and the movement of stars and planets related to any time (defined by year, month, day, hour, minute and second),[39] in our case related to the foundation

[37] The orientation of the entrances of the Lhakhang Chenmo and the Jokhang towards protecting mountains and away from the river provided protection against flooding. Tsering Gyalpo also points out the significance of the orientation of the Lhakhang Chenmo towards the residence of the Tulku within the village. In earlier days, this residence might have had another important religious meaning (interview with Tsering Gyalpo, Vienna, April, 2015).

[38] Christian Jahoda (2012c: 212f.) mentions the following festivals beside Losar and Namthong: 'Opening the Earth', 'Shouldering of Religious Books' or 'Inviting Religious Books', 'Removing Weeds and Insects', 'Planting the Arrow of the White Barley', 'Offering Beer', the summer retreat in the sixth month (Yarchö) and 'Descending of the Gods' ritual in the ninth month.

[39] The use of the Stellarium software—version 0.13.0 in 2014—was kindly guided by Georg Zotti (Ludwig Boltzmann Institute for Archaeological Prospection & Virtual Archaeology), a computer scientist (PhD from Vienna University of

year 996 of the Khorchag monastery. Figs. 9, 10 and 11 show the view from the centre of the sanctum at 78° E along the orientation line towards the profile of the mountains opposite. The white arrow points to the intersection of the orientation line with the profile of the mountain. This arrow marks the 'entrance-point' of any stars or planets into the visible sphere. In the picture we see the stars and planets after rising in full. To determine the relevant intersection with the profile in 996, the first moment of visibility of the star was taken, which would fix its entrance into the visible zone slightly more to the left. We do not know what method was used in 996.

If one of the four key positions of the sun—the two solstices and equinoxes—is further regarded, this study makes it clear that only the summer solstice (16 June 996 in the Julian calendar, which is also used in the Stellarium images) can have been relevant when the sun appeared over the mountain ridge at azimuth 73.5° at 9:11 a.m. (Fig. 9). This scenario shows a deviation of about 5° north of the orientation line. Since the Tibetan calendar is based on moon and sun phases, we can find an interesting conjunction on 19 June 996 (i.e. three days after the summer solstice also in the year 996, Fig. 10) with the new moon rising at 9:29 a.m. (at 72.5°), just five minutes after sunrise (at 73°) and two minutes after the rise of Venus (at 72.5°). Of course, the moon and Venus were unobservable on this day.

Apart from these two observations, Mercury at 8:11 a.m. (at 74°) and Mars at 11:41 a.m. (at 77°) pass over on the same day, both, however, not visible in daylight. These transits of four planets are also part of the calendar later introduced following the Buddhist Kālacakratantra. This means that within a time span of 3.5 hours the moon, Mercury, Venus and Mars (besides Jupiter and Saturn the planets used in the calendar following the Kālacakratantra) transit within about 5° of our orientation point ('entrance-point'). Another astronomically relevant aspect may be the transit of the Pleiades at 77° (Fig. 11), the constellation which several cultures used for structuring time. Their role in Tibetan astronomy or cosmology of the period has not yet been explored.

Of course, there are no written sources on these scenarios and they should not be seen as a way to pinpoint the exact historical approach taken to find the temple's orientation. On the other hand, the conjunction of the close positions of these stars and planets related to the orientation of the Lhakhang Chenmo indicates the relevance to include such scenarios in further research and the usefulness of astronomical considerations when examining the positions and orientations of religious structures which has so far largely been neglected in research on Tibet.

ADOBE BRICK WALLS AS EVIDENCE OF THE EARLY STRUCTURAL CORE

The rear wall of the Maitreya Lhakhang (see Fig. 4) in the Lhakhang Chenmo with the two lateral adjoining temples—the Tārā Lhakhang and the Protectors' Temple—is an adobe brick structure with a horizontal wooden lacing. This is also a construction feature of the cella-niche wall in the Jokhang and the storage room below the Temple of the Protective Deities, also located in the Jokhang, suggesting the use of a similar adobe brick construction with wooden inlays for both temples, which appears as one of the main construction features of the earliest construction phase (Fig. 12). In addition, in the Lhakhang Chenmo the western façade facing the ambulation path shows remains of red pigment, which may indicate that these walls once formed the outer façade. This feature also occurs along the above-mentioned early adobe brick walls in the Jokhang. This finding is underlined by the fact that the outer boundary wall of this ambulatory (see Fig. 4) is built of rammed earth, which can obviously be ascribed to a later building phase. Furthermore, in the Lhakhang Chenmo the outer walls of the assembly hall (south, east and north wall) are much thicker than those of the central early core and do not match the location of the walls of the early structure, as seen in front of the Tārā Lhakhang, which clearly suggests that they were added at a later point in time (see Fig. 4).

Regarding the wall-building material of early temples in the Tibetan cultural area, we can confirm that it depended on the local building material and the means of the builder or building institution. In general, for prestigious buildings—religious as well as secular—the best available technology was used and the building material was very carefully selected for its hardness, longevity or workability (e.g. stones or wood), purity, water-repellence or colour (e.g. clay, T. *ar ga*). The ability to work with these materials must have required a relatively high level of expertise in material resources and material qualities and called for the best skilled workers. The economic standard follows the maximum level achievable according to certain social and symbolically contextual standards, limited by the funds that could be raised for such a project.

Technology) and astronomer (Vienna University). Georg Zotti cautions that the horizon profile derived from Google Earth is only a preliminary approximation that should be replaced by a properly processed photographic panorama taken *in situ* if possible. He also mentions that for the 'after-new moon position' image (showing the moon and Venus below the sun) (Fig. 10) it should be noted that the 'old moon' would have been visible about two to three days earlier in the morning at a similar position, which would probably be the more suitable date. It cannot be excluded that the rise of the 'old moon' on the day of solstice or at least their close coincidence was of a certain importance.

If we compare the four structures that may have been founded in 996 (altitude approximately in meters: Nyarma 3,260, Tabo 3,280, Tholing 3,730, and Khorchag 3,720), the altitudes in Ladakh and Spiti and those in Guge and Purang are relatively close to each other. They are all located at altitudes and in regions with adequte water resources which are advantageous for finding proper clay (cf. Feiglstorfer, forthcoming b) for making adobe bricks. Interestingly, the construction traditions of the core of early West Tibetan temple foundations (i.e. in Nyarma, Tabo, Tholing, Alchi or Khorchag) follow more or less pure adobe earth constructions, even when earlier or later local traditions follow other construction traditions, using materials like stone or rammed earth (cf. the construction of the fort or a certain chorten in Nyarma, a rammed earth tradition in Spiti or rammed earth walls as later additions in Khorchag). Regarding this diversity of different construction traditions, it is striking to find these adobe brick structures in all the early monastic cores founded in 996.

Unlike early Central Tibetan temple structures originating in the 7th to 8th century and dating back at least 350 years earlier, the early West Tibetan foundations used stone, although not exclusively (Sørensen and Hazod 2007: 609). In the early imperial period there is no concentration on one specific construction method, as is the case in West Tibet. The existing Central Tibetan constructions may not be sufficiently original to provide clear evidence because most of the early foundations have been reconstructed or renovated. This is in stark contrast to the early West Tibetan structures.

Early foundations such as the Uru Katsel, Uru Shey Lhakhang, Ön Drakmar Keru, Gongdön Lhakhang, Tsunmo Tsel or Dungchu appear as stone constructions today. Both temples located in Kyirong, the three-tiered Jamshing (T. Byams sprin) Lhakhang and the four-tiered Phakpa (T. 'Phags pa) Lhakhang[40] correspond to the solid structure of multi-tiered Nepalese Degas. Some reports diverge from this stone-based picture:[41] Thandrug, for example, was also recorded as a brick building[42] although local reports described it as stone.[43] The Nesar Temple is said to have been built of sun-dried bricks (Bell 1924: 16) and Amy Heller mentions different sizes of brick found in the Lhasa Jokhang, and also bricks found in Samye.[44] Although it remains unclear as to whether both *vihāra*s were completely built of fired bricks or only specific parts and also which building tradition the masons actually followed, at least it provides evidence that shows a heterogeneous approach in the use of building materials.[45] When we restrict this observation to the central five-part temple group as the earliest Central Tibetan temples, i.e. the Jokhang as the 'heart' temple and the four frontier-taming temples (T. *mtha' 'dul lha khang bzhi*) of the Four Horns (T. *ru bzhi*) (i.e. Uru Katsel, Thandrug, Tsangdram Geye Lhakhang and Drompagyang Drime Namdak Lhakhang) the picture remains varied. Before its destruction Uru Katsel was known and locally reported as being a stone building; in Thandrug reports differ, and there are only few remains of the Tsangdram Geye Lhakhang, which may not give a clear picture. The Drompagyang

40 According to sketches in Sørensen and Alexander (2010: 61, 62).

41 Buildings in Lhasa show a typical Tibetan construction pattern in their bond (also known as galleted rubble, banded masonry, diaper masonry or semi-ashlar masonry: see Alexander 2011) which developed during the reign of the Fifth Dalai Lama. Also in Tibetan border areas and even in former Tibetan settlements in Mongolia this pattern reveals its construction history relationship. Previously, according to an interview with Nyima Tashi (June 2014), earlier imperial structures were indeed built as double walls with a rubble core but did not have the regular bond that we find in Lhasa today. Their stones were more roughly hewn and the horizontal joints did not show this kind of linear regularity. The presence of this Lhasa-related bond in stone walls should not obscure the fact that until the reign of the Fifth Dalai Lama the dominant vernacular building material was clay in the form of rammed earth and adobe bricks. The shift to stone structures must have meant a massive change in the economic approach because stone is much more labour-intensive than clay. Even today particular regions are earth-construction-dominated, like the region of the Lhoka prefecture, which is rich in clay. Here, the use of clay, in particular for making rammed earth walls, is common.

42 Hazod and Sørensen 2005: 249–250: "Above this the rectangular brick building of the main temple gTsang-khang (= Khra-'brug dBu-rtse dBus-ma) was built."

43 Hazod and Sørensen (2005: 255) mention three building phases and describe the first phase relating to the gTsang khang as having been a simple rectangular brick building and the second phase relating to the sMu lugs lha khang as having been built of materials from the land of the *nāga*s (T. *klu*), which may hypothetically also refer to mud or clay and thus categorising its location within the dBu rtse.

44 Personal communication by Amy Heller: 2014-02-28; Alexander (2010: 197, n. 35) refers to the *bKa' chems Ka khol ma* that Bhrikuti used bricks etc., to build Songtsen Gampo's fort on the Red Hill implying that the use of fired bricks was probably used for several other prestigious sites.

45 Adjacent countries have a long history of using fired bricks; in China their use has been known at least since the 2nd millennium BC near Xi'an. The Indus culture used fired bricks with the 4:2:1 proportion (the first time this regular proportion is seen). For the construction of *vihāra*s as at Jaulian, Sāñcī or Nālandā, fired bricks were used seemingly following a building tradition. In the case of the Jokhang in Lhasa the question arises of whether the use of fired bricks was part of the Indian *vihāra*-typology. In historical centres in Nepal the use of fired bricks is common, adobe is rare and used in the countryside particularly along the Bagmati River while the use of rammed earth is uncommon. There is also a double leaf wall construction (inner leaf with adobe bricks, outer leaf with fired bricks) (Bonapace and Sestini 2003: 117 and 118). The amount of wood available in Nepal has declined rapidly since the beginning of the last century (Bonapace and Sestini 2003: 3).

Drime Namdak Lhakhang in its current form is a later foundation, possibly from the time of the Fifth Dalai Lama.[46]

Unlike this Central Tibetan imperial approach, the exclusive use of adobe bricks for early West Tibetan religious foundations may have been an aspect of an imperial programme stretching over the whole early West Tibetan empire, including Guge, Purang and Maryul. Depending on the availability of stone in West Tibetan territories there must have been a clear concept of the West Tibetan builders behind the use of pure adobe brick structures.

Based on these facts, the use of brick appears to be a conscious decision and not solely the continuation of a material tradition. Such an approach gives a particular significance to the use of clay in the form of adobe bricks. The question arises of a knowledge transfer of similar brick sizes within the early phase of the West Tibetan empire. In this respect brick measurements found at the main temples in Khorchag and in Nyarma will be compared.

Accessible adobe bricks within the Nyarma main temple suggest the use of relatively consistent brick sizes, i.e. 40–26–10 cm on average measured at different walls. In Khorchag, the bricks in the rear wall of the Maitreya Lhakhang average 42–19–13 cm on the first floor and 42–22–14 cm[47] on the second. Compared with brick sizes of the early core of Nyarma there is only a similarity in the length, not in width or height within an absolute measuring system, and also not for the ratio between the lengths of the individual sides within a relative measuring system.[48] Regarding the absolute sizes, the measurements used for the length and width in Khorchag are possibly related to the use of the length of a span or its doubling. The length-to-width ratio is about 2:1, which is not seen in Nyarma. The difference in size between the bricks from Khorchag and those from Nyarma (within an absolute as well as relative system of measuring) is too big to be explained by alterations during the manufacturing process. Consequently, there is no proportional relationship between the brick samples from Nyarma and those from Khorchag. On the other hand, the reported brick size from Tabo[49] with 40–20–12 cm resembles very much the absolute sizes given for the bricks in Khorchag, following a 4:2:1 proportion.

A MODULAR WOODEN PREFABRICATED SYSTEM AND RELATED EVIDENCE FOR THE MAITREYA LHAKHANG AS PROBABLY THE EARLIEST CORE

Door frames found in Khorchag (such as at the entrance to the assembly hall of the Jokhang) are made of two pieces. The outer one is carved with the lotus profile, the pema chudzö (T. *pad ma chos brtsegs*). The inner frame has a rectangular profile and in several cases, for instance at the door into the Jokhang, it is carved with floral ornaments growing out of a carved vase at the bottom of this frame. The door leaves, often painted red, are mounted in lateral wooden brackets as parts of the wooden lintel above and of the wooden threshold below. The trunnions as parts of the whole door leaf are mounted in these brackets. These leaves are an average of 6 cm thick. Some of the metal fittings include lockets painted with floral motives or abstracted Tibetan letters. Different variations of this Tibetan design can be seen in the Lhakhang Chenmo, the Temple of the Buddhas of the Ten Directions (Yum Chenmo Lhakhang) and the Temple of the Seven Excellent Buddhas of the Past, both located in the Maitreya Lhakhang, also in the Jokhang on the door into the entry hall (T. *sgo khang*) and further along into the assembly hall (*'du khang*).

When it comes to elaborate attention to detail, there is one door frame that exceeds any other carved wooden part (see Fig. 4). In terms of art history it is by far the best-known wood-carved piece in this monastery, namely, the door frame of the assembly hall of the Lhakhang Chenmo. Its design varies in any account from the Tibetan model described before (Kalantari 2012b: 150–165). From an architectural point of view, this early dating[50] raises a discrepancy concerning the age of the door frame and—according to the wall construction (primarily concerning its thickness)—the younger age of the adjoining entrance wall of the assembly hall in which the frame is located. The core and thus the earliest construction of the whole temple-building can be seen in the Maitreya Lhakhang and its immediate surrounding as supported by evidence in this paper. The walls of this core structure are made of adobe bricks.

Apart from these facts, the layout and the proportions of the assembly hall do not coincide with early Central and Western Tibetan

46 Personal communication from Guntram Hazod (2014-10-14).

47 This brick size was measured at the rear wall of the Maitreya Lhakhang, from the circumambulation corridor and also from the walled niche left (south) of the Maitreya Lhakhang.

48 In the Nyarma temples there is not only one brick size but a range of different sizes which relativises a comparison between different sites (paper presented by the author at the TERRA 2016 conference in Lyon in 2016).

49 Postal communication by Dechen Lundup, Tabo, 2015.

50 Christiane Kalantari (2012b: 150) mentions this door frame as most probably the earliest example to have survived not only from Purang but from the area of historical Western Tibet. Christiane Kalantari dates the door frame of the Lhakhang Chenmo as its earliest datable piece that has survived approximately to the beginning of the 11th century, and the *maṇḍala* within the ambulatory of the Jokhang as its earliest datable piece towards the end of the second quarter of the 11th century (personal communication, Vienna, 2014-10-03).

temples. Accordingly we can assume that this wooden door was originally not at its present location, as this probably did not exist at this early time, at least not in its present dimension. Considering the rough opening of this door frame, with a width of about 185 cm, there are two realistic places which come into question for its possible former location (see Fig. 4). One is the entrance opening to the Jokhang, which at around 190 cm is about the same width, and the opening into the Maitreya Lhakhang with a width of about 225 cm. Concerning the height of the wooden panel, which is around 338 cm, the height of the opening into the Jokhang, about 296 cm, would exclude this as the former location of the wooden door frame. On the other hand, a reconstruction study of the Jokhang (which is not part of this paper) does not fully exclude the possibility that the northern assembly hall wall of the Jokhang was partly or completely renovated.

Interestingly, the present height of the opening into the Maitreya Lhakhang, measuring 336 cm from the floor to the lintel, would match the height of the door frame. This consideration would assume that in its early days this portal could have been erected in the outdoor space, hypothetically protected by a veranda. Owing to the good condition of the wood carvings on this door frame we can exclude it having been exposed to the weather for all the time since it was made. This implies either the existence of a former ante-chamber or a roof construction as a shelter against the weather, which would raise the possibility of a former ante- (possibly gable-)roof construction, similar to what we know from temples like the Mirkulā Devī in Udaipur or the Lakśanā Devī in Brahmaur. From the construction point of view these considerations do not exclude other locations that we are unable to reconstruct at present.

The wooden door frame is much wider than the rough opening, as it is not built in between the massive walls but in front of them, which makes it easy to remove the whole construction and to rebuild it elsewhere. A horizontal section shows that the constructions on either side of the door are more or less symmetrical. Each side consists of four vertical wooden elements (Figs. 13, 14, 15). Here is a description of them in the ground plan from the lateral wall towards the door-opening (Fig. 15): element 1 (about 24 cm wide) is attached to the masonry wall, with a vertical notch carved on the opposite side; there is an open space between elements 1 and 2—the position of the panels; element 2 (about 19 cm wide) has a similar vertical notch to element 1, facing that panel (Fig. 16) and a vertically carved tongue on the opposite side. Both, elements 1 and 2 extend from the floor up to the lower edge of the wooden lintel, which is fixed just below the ceiling. The notches of elements 1 and 2 allow the mounting of nine horizontally carved crosspieces the same distance apart, in a way that forms eight 'frames', one above the other. These 'frames' are filled with carved wooden panels. Today, some of these approximately 24 cm by 30 cm infill panels are missing, which makes it possible to study the construction behind them.

There is a gap of about 20 cm between the wooden panel and the masonry wall behind it. This space is partly filled with ashlar to stabilise the infill construction from behind (Figs. 14 centre and 15). As the infill panels can only be removed from the rear without destroying the notches of panels 1 and 2, there are questions as to how it was possible to insert the ashlar. To answer this question we have to walk through the door towards the assembly hall. In the area where the door frame touches the wall we discover that a vertical strip of the wall about 55 cm wide has an unusual uneven surface. At the end of this uneven surface there is a small pillar (Figs. 14 right and 15). This is the 'entrance' to the rear of the wooden door frame which is now closed with rubble and was painted over afterwards (Fig. 17). This explains how the door frame was installed. It was not directly fixed to the wall behind it but was installed with a gap of about 20 cm to 50 cm from this back wall, with the space in between being filled with rubble and ashlar. A wooden pillar (15/15 cm) was set up in this space at the back to stabilise the wooden frame (Figs. 14 centre and 15). Thus the frame could easily be removed and placed somewhere else.

Element 2 to element 3 (about 23 cm wide) are joined together by tongue and grooving, and further on there is element 4 (about 23 cm wide), which is fixed with an overlap to element 3. With these panels we reach the section of the door frame topped by several staggered, carved wooden lintels. This lintel is a compound of five carved panels joined by overlapping or by tongue and groove. Here is a description of them from the ceiling towards the door opening (Fig. 14 left and right): Element A (about 11 cm high) is fixed to an uncarved lintel above, just below the ceiling and laterally to element 2 with a butt joint. Element B (about 10 cm high) is joined laterally to element 2 also with a butt joint and element C (about 15 cm high) is joined laterally to element 3 in a mitre cut. Element D (about 16 cm high) is joined laterally to element 4, also in a mitre cut. The gap between elements A and B (about 21 cm high) and the gap between elements C and D (about 20 cm high) are closed with a carved infill-panel. The threshold is profiled by assembling three wooden beams with an iron hinge. The trunnions of the door leaves are mounted in the two holes on either side of the innermost threshold. The horizontal as well as the vertical order show continuity related to a modular system.

If the carved wooden portal of the Lhakhang Chenmo was part of the early core of this temple the question emerges as to why its position today is in a wall that was added to the central core at a later phase, as this wall was constructed as an oversized thick wall compared to the walls of the late 10th/early 11th century West Tibetan temples. Furthermore, concluding from the adjoining assembly hall walls, this entrance wall was built as a rammed earth wall, which was not the method of construction at this early phase. Given the early dating of the frame we can argue that this portal was part of the early structural core. At this stage the evidences support the hypothesis that this portal could very likely have been the earliest door frame in the Maitreya Lhakhang, possibly forming the earliest core of a one-chamber temple, much more closely related to the early wooden structures we may find in Ribba, thus not excluding no-longer extant forerunners from the Licchavi period.

In addition to the hypothesis of the earlier position of this door frame, the fact of its easy relocation brings us to the field of transport of building material, in particular the carved wooden panels, and its related processing. The door frame was obviously planned as a modular system which allowed the carpenter to prefabricate it and install it in front of the masonry wall. On the one hand, the individual panels could be set into the wooden frame after its erection (a modularity within another modular structure), on the other hand, the whole construction itself can be relocated and installed from behind via access from the assembly hall, facts which make its later relocation feasible.

To erect a new temple with the intention of moving its door together with the frame to another location of a later temple addition and to argue the need for a modular system is somewhat unreasonable. It seems far more likely that there was a need to make it elsewhere or at least to attach it within the doorway easily. The precise fabrication of the door frame also suggests its meaning as something precious at the time it was made, which had to be treated with care.

The question arises of the existence of craft centres at the time of the temple construction. According to Guntram Hazod, there is evidence of "mobile craft centres" for early foundations, also for Khorchag, and also of permanent (regional) centres, particularly for metallurgy (see Hazod 2015). Practically speaking, it also makes a difference if the materials are heavy like stone or bricks, in which case it is even more likely that they were produced *in situ*, or if the materials are transportable like carved wooden door frames, which are produced in pieces for ease of transportation.

Assuming the fabrication was done on site, the modular system would have facilitated the assembly of the individual pieces. In this case, the master-carpenter or his apprentices had to be on the site, which would have guaranteed great precision since a continuous fitting is needed for the correct placing of the individual pieces within the main structure. The materials also may have been sourced from near the site.[51] Owing to the greater number of trees in these early days, as mentioned above, timber was probably readily available and close by.

This also meant that certain well known master carvers must have travelled from site to site by invitation because of their particular skill. For royal foundations we can assume that the best available materials were used by the best available craftsmen. Given the fact that there is strong evidence of the Khorchag door frame's stylistic conformity with Kashmiri and Himachal Pradesh (Kalantari 2012b: 150) carvings, the craftsmen may not have been locals but wandering master craftsmen and apprentices, covering long distances to spread their talent and creativity of certain formal and material expressions from one prestigious benefactor to another. This even transnational interaction is evident in the fields of painting and wood carving as well as in the use of certain building materials such as fired bricks used for the earliest core of the Lhasa Jokhang which Nepalese craftsmen used,[52] or even in certain stylistic aspects including the whole structure, as we can see from the exteriors of the 'Phags pa Temple or Nag po Temple in Kyirong, which formally follow a Nepalese Dega structure. Thus the carpenters most probably took to the road in order to be present when needed. Artistic influences in manufacturing from surrounding territories are evident, in particular from India, Kashmir, Nepal[53] or Khotan.[54]

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51 At Nyarma, there is evidence of the use of the clay for all parts of the walls of the temple structures, bricks, ground plaster and fine plaster (Feiglstorfer, forthcoming a).

52 Alexander 2005: 30; Sørensen and Hazod (2007: 450) explain that the Rasa *vihāra* was built by Nepalese artisans, who employed Indic/Nepalese models and conceptions and that the architects of Thandrug are reported to have been craftsmen from Nepal (*ibid*.: 17). Gyurme Dorje (2010: 51) mentions that several of the early door frames show Indian and others Newar influences.

53 Jahoda 2012b: 48: According to the *Khochar Register*, two craftsmen, one from Nepal and one from Kashmir, made the Jobo Jampe Dorje (Mañjuśrī) silver statue for Khorchag in Sher, which is about 10 km south-east of Khorchag, at the very south end of the historical border of Purang. Thus, the manufacturing was performed (most probably) by external experts at a site close to the monastery.

54 The bodhisattva statues had been cast by emanational sculptors from Khotan in Khotanese style (Hazod and Sørensen 2005: 144). 'Emanational

The religious expression within the manufactured pieces followed an overall programme, while the work in detail shows object-related differences and even differences within objects.[55] This fact may explain that it was not one specific master and his apprentices working on all the West Tibetan sites founded in 996 but ones who were engaged for a specific object or even only for specific parts on one object. An important influence in the design of surfaces, particularly of wall paintings, can also be seen in the performance of sacred activities by lamas. The differences within one surface suggest the division of labour and the allocation of specific work stages to particular apprentices.

For lightweight building material such as wood, we cannot rule out its prefabrication elsewhere, thus enabling the master to be active for different sites and avoid the continuous travelling done by his apprentices. This rough hypothesis would further lead us to an established form of prefabrication already practised in China in the 13th/12th century BC in the fields of writing, casting bronze and preparing architectural modular systems. The individual modules relate to *'sections'* and not to absolute measuring units (Ledderose 2000: 2 and 6). This approach qualifies the idea of an absolute measurement in respect to the use of proportions, which may also have been the case in the prefabrication of the door frame and its filling with wooden panels. This modular idea makes it possible to adjust the figurative patterns within the frame to the overall size of the place of installation. The *Yingzao Fashi* (early 12th century AD) was used in China as a kind of a 'prefabrication' manual. This modular system enabled the prefabrication far away from the final installation point.

Conversely, another conclusion on the use of the modular door frame from the Maitreya Lhakhang would be that the opening in the assembly hall and the size of the ante-chamber were fitted to the door frame and not as usual vice versa. Such modular systems also make it possible to change the installation point of an already installed door frame, as seems to have been the case at the Lhakhang Chenmo in Khorchag. This kind of easy relocation of the door frame would also explain its easy move from the doorway of the Maitreya Lhakhang into the doorway of the assembly hall. And so we cannot exclude the portal's position at the entrance of the Maitreya Lhakhang as a single-chamber temple as the earliest core of the Lhakhang Chenmo and possibly identical with the core of the Yishi Lhungyi Drupa Temple as the earliest structure of the Khorchag monastery.

CONCLUSION

The topics discussed in this paper clearly have complex, interwoven correlations related to an architectural approach to a reconstruction of the Lhakhang Chenmo. Environmental, geological, tectonic, geometrical and proportional, typological, construction and material, or design matters are strikingly interrelated features. Within this context it is important to clarify specific future research questions. The answers to them can be seen as stages in ongoing research.

The interdependencies also establish the importance of their treatment as part of a Himalayan, Tibetan or particularly early West Tibetan cultural sphere, which may become evident in certain programmatic features.

Layout design and the choice of the location of the monastery influence each other. The struggle against water and flooding seems to be part of a predetermined programme and closely linked to the question of 'taming'. Water can be seen as one of the main driving forces for the continuous changes and additions in the Lhakhang Chenmo. Unlike other early West Tibetan main temples, such as at Tholing, Nyarma or the Jokhang in Khorchag, the resulting individual procedures are less homogenous and tend to obscure the early chronology of construction development.

Specific features—e.g., regarding structural matters, the building material used, horizontal and vertical design—suggest an early single-chamber layout, possibly already as part of a concentric, mandalic design. Based on the given structural facts one cannot be certain that this mandalic layout was part of the original design, but it certainly remains as a central architectural research question. The mandalic shape of today's exterior rammed earth wall which might follow an older structural pattern—e.g., of a former enclosure wall—still remains a hypothesis. The astronomical nexus seems to play a crucial role for the orientation and the setting of the temple site. At Khorchag it is an important marker for its geomantic relationship.

In early monastic layouts such as Samye, Tholing, Nyarma or Tabo the centralised structure obviously stems from one homogenous design process and thus relates these structures to a certain geometrical and proportional programme. This cannot be said with certainty of the Lhakhang Chenmo. It seems not to be relevant to

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sculptors' are described as being either non-human or an extraordinary talent, in the sense that the requested extraordinary product can be manufactured only by an equally good artisan.

55 Personal communication by Christiane Kalantari, Vienna, 2014-10-03.

treat the monastery as a West Tibetan design, but far more as one which is interrelated with Tibetan monastic design in general, on the one hand, and local traditions within the vicinity of the southern territories, on the other. On the question of the Indian *vihāra* type as a possible predecessor, there is no striking evidence from field research that would support such a hypothesis.

The material research established the earlier hypothesis that the core of early West Tibetan monastic structures is built of adobe bricks but only partially and not following a particular identical brick size compared with the monasteries of Tabo and Nyarma. In the study on the wood-carved door frame—today located at the entrance to the assembly hall of the Lhakhang Chenmo—several pieces of evidence suggest its former location at the entrance to the Maitreya Lhakhang. It follows a modular door frame system, which may have made its former relocation easier and which may also be important evidence for a kind of a modular prefabrication and assembly.

Generally speaking, it might prove challenging to conduct more research on the architecture of the Khorchag monastery and to gain a deeper understanding of architectural relations within (West) Tibetan concepts and their relation to adjoining territories in an interdisciplinary approach.

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Fig. 1: Map of Western Himalayas (drawing: H. Feiglstorfer, 2012).

Fig. 2: Location of Khorchag and its monastery (see white arrow) on an alluvial fan, to the west flanked by the Peacock River, to the north and east flanked by a mountain ridge; GPS: N 30° 11′ 47.28″, E 81° 16′ 4.66″, altitude: 3,720 m. Source: Google Earth, 2005-11-06, DigitalGlobe ©2015.

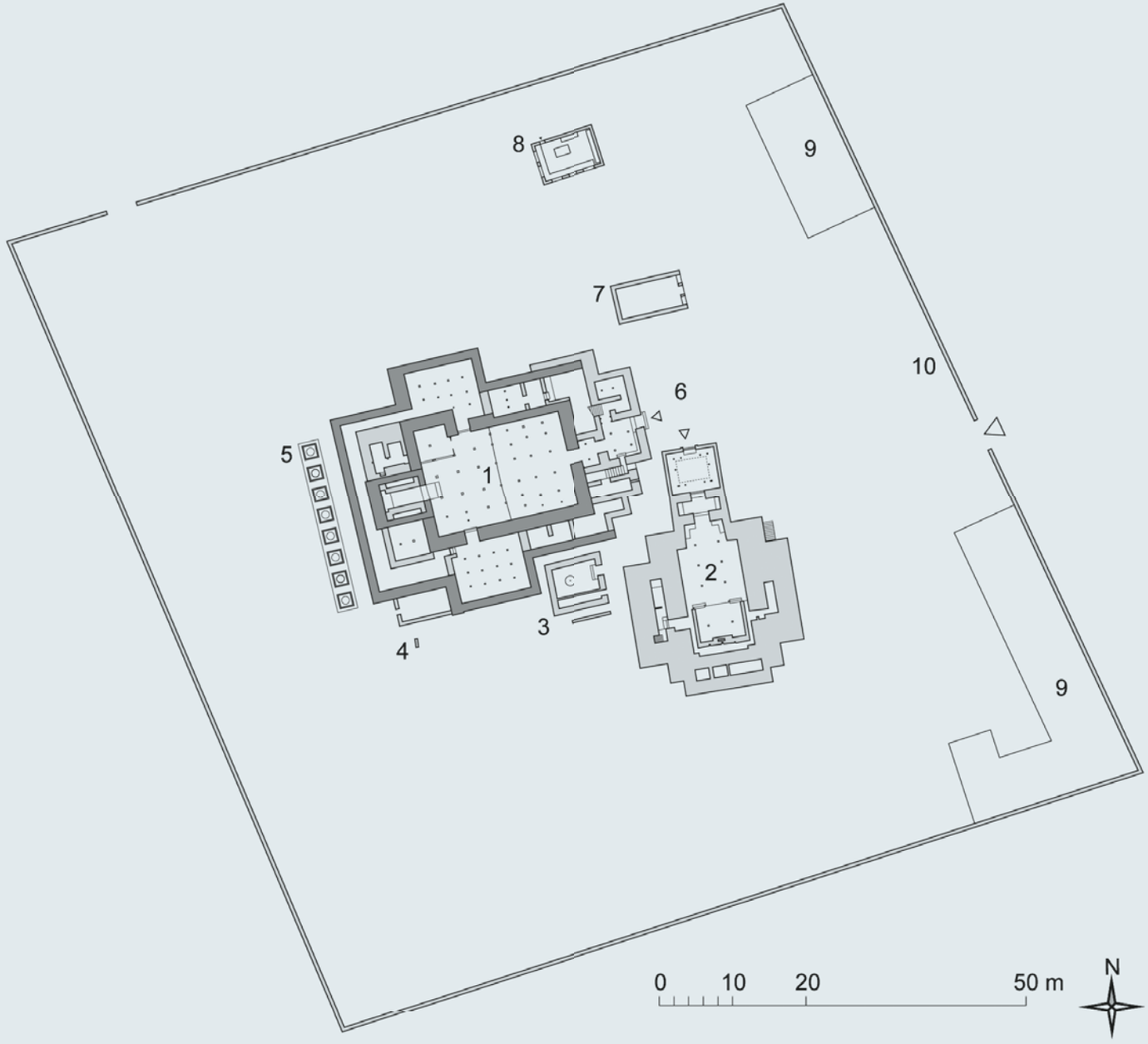

Fig. 3: Structures of the Khorchag monastery as part of pilgrims' circumambulations (2010): 1 Lhakhang Chenmo; 2 Jokhang; 3 Mani Lhakhang; 4 'Sun and moon' stone; 5 Eight-chorten-group; 6 Courtyard used for festival activities including Cham dance; 7 Butterlamp house; 8 Kitchen; 9 Residential and storage buildings; 10 Enclosure wall (drawing: H. Feiglstorfer, 2015; layout based on Google Earth, DigitalGlobe ©2016).

1 Circumambulation corridor; **2** Gonkhang; **3** Maitreya Lhakhang; **4** Tārā Lhakhang;
5 Temple of the Sever Excellent Buddhas of the Past; **6** Assembly hall; **7** Temple of the Buddhas of the Ten Directions;
8 Today empty chambers (accessible from the second floor);
9 Today empty chambers with humid floors due to water pressure from the ground (only accessible through a hole in the ceiling);
10 Storage; **11** Ante-chamber; **12** Ante-chamber with wood-carved door panel; **13** Toilet.

Key:

- Orientation of the circumambulation
- Entrance; the entrance to the circumambulation path on the building's nort-west corner was walled up.
- Wall of the Maitreya Lhakhang
- Walls as later additions and walling up of the circumambulation corridor
- *B* Brick wallon the first floor on top of a stone foundation
- *R* Rammed earth wallon the first floor on top of a stone wall
- *BW* Brick wall with wooden inlays
- *W* Wooden beams between Maitreya Lhakhang and Gonkharg
- *C* Collision (overlapping) of the walls of the Tārā Lhakhang with walls of the Temple of the Buddhas of the Ten Directions
- *D1* Present position of the wood-carved door frame
- *D2* Hypothetical former position of the wood-carved door frame
- *Or* Orientation of the Lhakhang Chenmo following the orientation of the Maitreya statue in the Maitreya Lhakhang

Fig. 4: Ground plan of the Lhakhang Chenmo (drawing: H. Feiglstorfer, 2015).

Fig. 5: South elevation of the Lhakhang Chenmo (photo: H. Feiglstorfer, 2010).

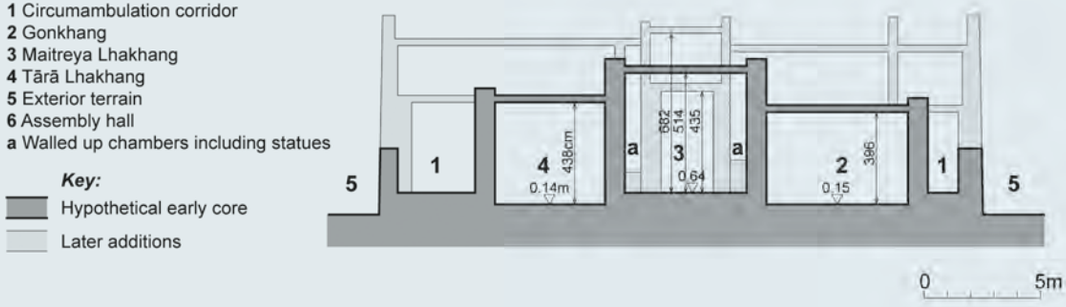

Fig. 6: System cross section: Maitreya Lhakhang (*centre*) flanked by Tārā Lhakhang (*left*) and Gonkhang (*right*) (drawing: H. Feiglstorfer, 2015).

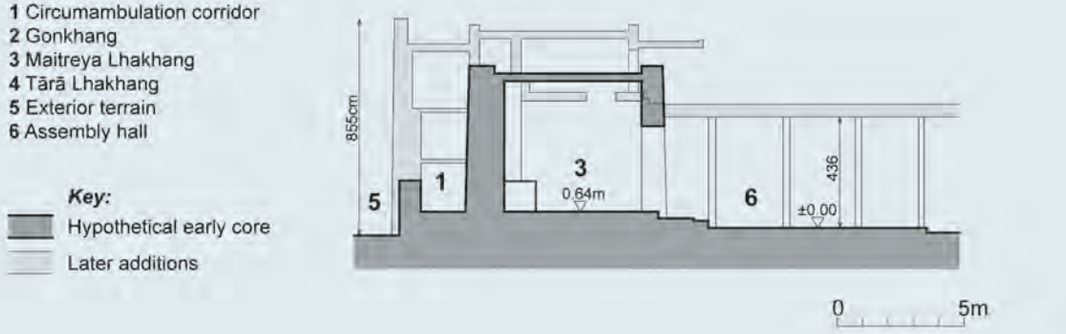

Fig. 7: System longitudinal section (drawing: H. Feiglstorfer, 2015).

Fig. 8: Walled niche to the left (south) of the Maitreya Lhakhang: Brick wall to the left and rammed earth wall to the right (photo: H. Feiglstorfer, 2010).

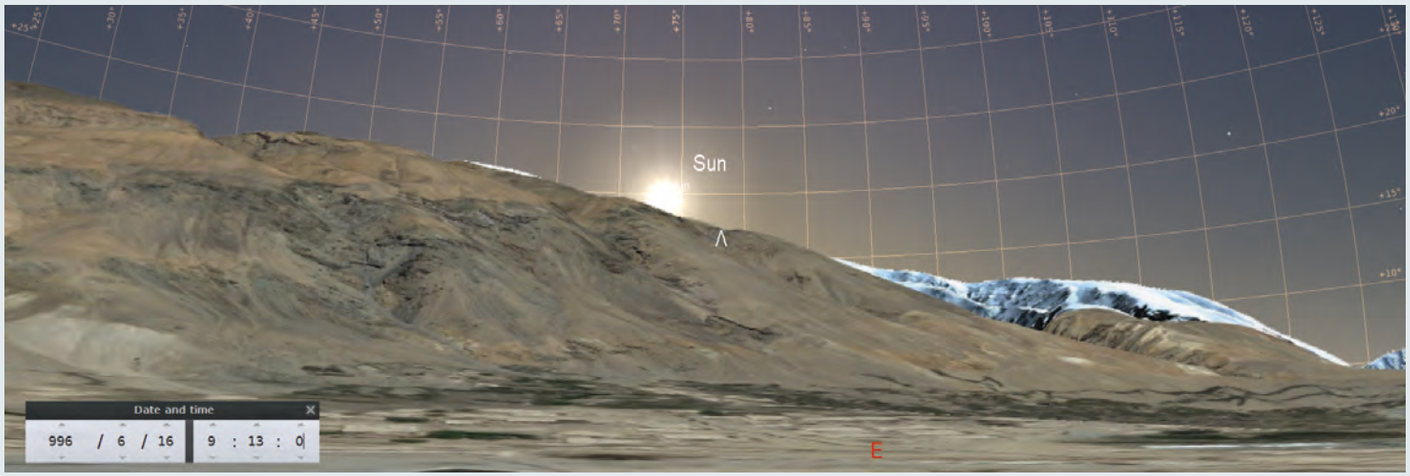

Fig. 9: Sunrise on the 16th of June 996 at 9:13 (day of summer-solstice in Khorchag following the Julian calendar). The white arrow showing the approx. intersection of the axis of the temple (visual axis of the main statue in the temple) with the opposite mountain shape; Stellarium (version 0.13.0, 2014); landscape source: Google Earth (accessed 2014-06-12), DigitalGlobe 2014, satellite recording in 2005.

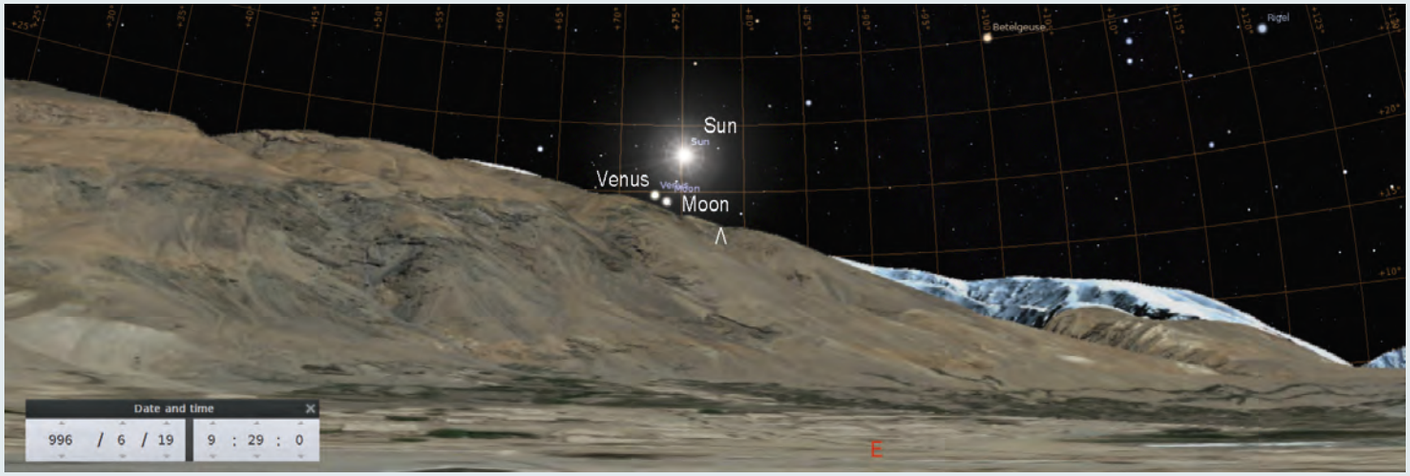

Fig. 10: Rise of moon and Venus on the 19th of June at 9:29 (Julian calendar); Stellarium (version 0.13.0, 2014). Landscape source: Google Earth (accessed 2014-06-12), DigitalGlobe 2014, satellite recording in 2005. For a better visibility of celestial bodies the background of the sky was darkened.

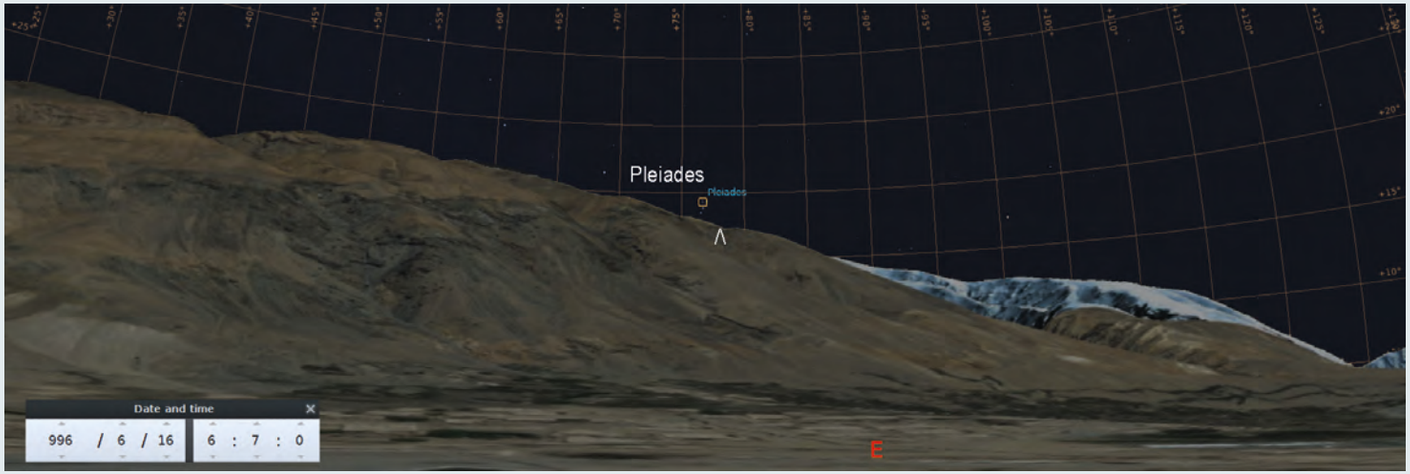

Fig. 11: Position of the Pleiades on the 16th of June 996 at 6:07 (Julian calendar); Stellarium (version 0.13.0, 2014). Landscape source: Google Earth (accessed 2014-06-12), DigitalGlobe 2014, satellite recording in 2005. For a better visibility of the foreground it was slightly lightened.

Fig. 12: Rear wall of the Maitreya Lhakhang inside the circumambulation corridor with view towards north (photo: H. Feiglstorfer, 2010).

Fig. 13: Door frame, left upper corner, view towards assembly hall: horizontal and vertical organisation of the wood-carved elements (photo: H. Feiglstorfer, 2010).

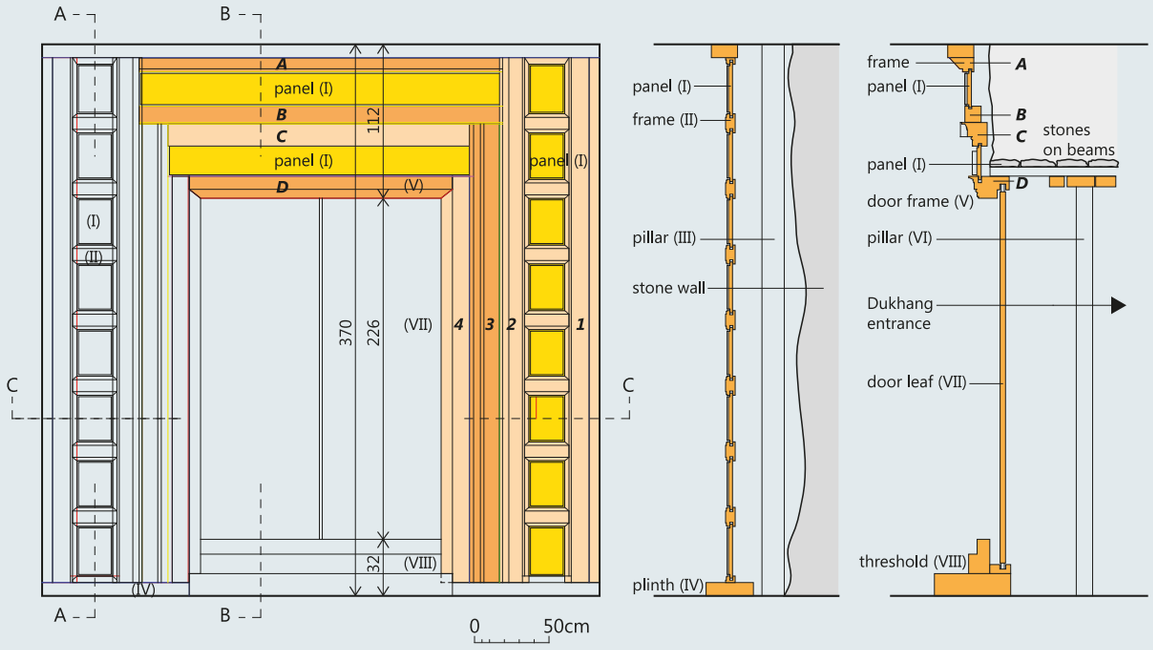

Fig. 14-left:
Elevation (colors symbolizing single wooden parts) [in cm]

Fig. 14-centre:
Vertical section A-A

Fig. 14-right:
Vertical section B-B

Fig. 14: Elevation of door frame divided into constructive elements (colours showing single wooden pieces in plug connection) (*left*); vertical section A-A through side panels (*centre*); vertical section B-B through the door (*right*)
(drawing: H. Feiglstorfer, 2015).

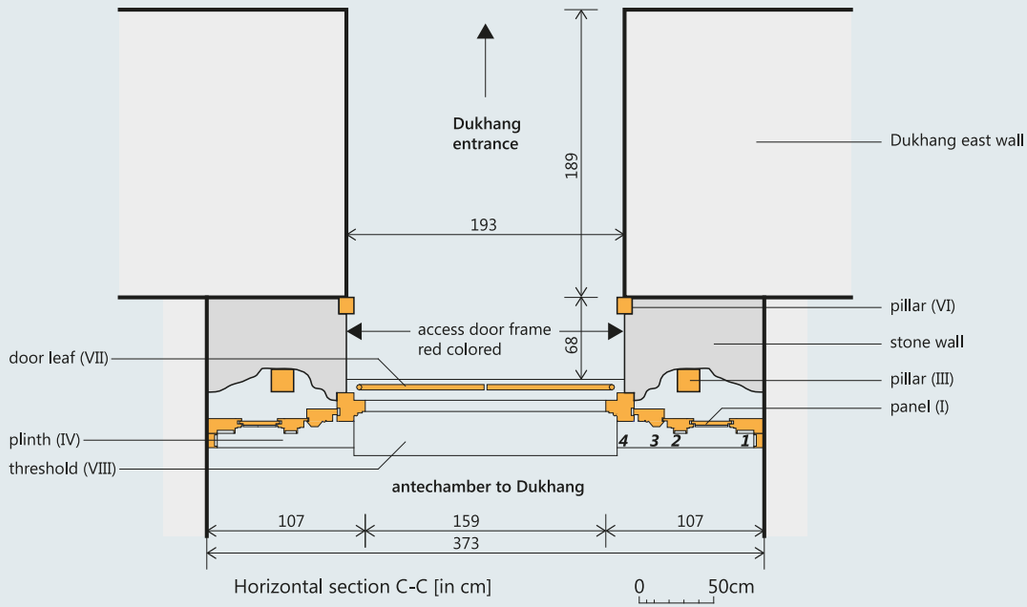

Fig. 15: Horizontal section in about 1 m above floor level (drawing: H. Feiglstorfer, 2015).

Fig. 16: Carved door frame, left portion: mounting hole for a wooden panel (photo: H. Feiglstorfer, 2010).

Fig. 17: View from the assembly hall towards the entrance located towards the east. The red painted wall section is the access to the door frame from its back side (photo: H. Feiglstorfer, 2010).