

# KAGBENI : Structural Analysis of Dendrochronological Data

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## Introduction

In October 1991 a survey of Kagbeni village was done with the assistance of Robert Kostka, resulting in a map scale 1:200, covering the ground floor level of the castle with the historic core and the surrounding courtyard houses. On the basis of this survey the remaining three levels were covered with measured drawings in April 1992 by Bijay Basukala, Gyanendra Joshi and Asharam Twayna. At the same time measured drawings were prepared of the castle, Waya Tsherings's house and Pema Drolkar's house.

Only after repeated field trips an approach towards the understanding of data provided for by dendrochronology developed. Observations made on current demolition and construction sites at Kagbeni prepared the ground for a careful selection of pillars, joists and beams as samples for a dendrochronological study. Burghard Schmidt had worked out a tree ring curve in 1993, based on about 400 samples collected in March 1989 and October 1992, spanning now the time between 1455 until today (ANCIENT NEPAL 130 - 133, 28).

Based on this tree ring curve and taking advantage of the measured drawings of the village in order to identify the location of every sample we undertook

a dendrochronological survey, the result of which is presented below. The samples collected in March 1993 were analyzed by the tree ring laboratory of the University of Cologne.

## HOUSE 1 : Pema Drolkar

The house of Pema Drolkar ranks without any doubt as the finest residential building of Kagbeni. Even the casual visitor might identify four stages of development without taking into account any historical data.

A structural analysis alone reveals the following :

Initially a building developed around a large courtyard, the ground floor fully arcaded on four sides and probably from the beginning used as stables. Two store rooms on the northern side flank the entrance from the covered lane. At second floor three large pillared rooms are placed on the western and northern sides of the building, while narrow rooms on the remaining sides probably served as store rooms. The western room with its raised ceiling is fashioned in an extraordinary way. The walls display paintings depicting the four Guardians of the World, two Bodhisattvas and three Tathāgatas on the southern wall. The two pillars with their capitals and the lintel across the entire room are carved and fully

however, would lead to the assumption that both halls were built at the same time. Even more confusing is the fact that the beam of the roof above the Lhakhang and the pillar of the arcade (1883/1887) are of the same period. We must therefore believe that the building underwent a restructuring in 1888, probably causing the courtyard to be enlarged and that some time later the Lhakhang was added, reducing the courtyard to half its size.

To conclude, I suggest, that the house of Pema Drolkar was built around 1860, using timber that had been stored for some 12 years or was or had been acquired from other sites. About 28 years later, the building was restructured. The structural analysis provides no hint to what extent and for what purpose this was undertaken. In a third phase of construction the Lhakhang was added to house a colossal statue. This phase cannot be dated on the base of dendrochronological data at hand. We have to guess that it happened at the beginning of this century.

#### HOUSE 2 to 9

Besides the noble house of Pema Drolkar, 28 samples from 16 houses were collected, 11 originating from ceiling joists, 7 from lintels, 6 from beams and 4 from pillars of which 3 were cut to size while one (sample 21) preserved its full diameter. Of two houses (house 5: Mingmar A and house 14 : Norbu Drandul) samples were collected from three levels, while at the four-storeyed house of Samdruk (house 6) seven samples (12 - ; 41 - 44) originate only from the two lowest levels.

To start with the horizontal levels the dates of those cores collected at first (ground) floor level, there is a wide variety covering roughly three hundred years, from 1572 - 1886. The 23 dates at hand may be arranged into three groups : With three consistent dates referring to the year 1572, it seems sure that Samdruk's house (No. 6), prominently located opposite the castle, is the

oldest house of the village, having probably been constructed at the same time as the castle itself. Three houses located in the most clustered part of the village (house 2 : Waya Tshering, 1680; house 7 : Phuntshok A, 1630; house 8 : Pema Ongdi, 1605) provide dates from the 17th century, while four houses in the same area (house 3 : Norbu Sangpo A, 1770; house 5 : Mingmar A, 1770; house 10 : Norbu Sangpo B 1730; house 13 : Kemesha, 1770) extend the range of dates for another century up to 1770. The date of a pillar of the northern gate refers again to 1770, being almost a part of the collapsed house of Kemesha that provides the same date.

A third group of dates are found at houses on the eastern side of the castle, starting with the house of Norbu Drandul (house 14, 1827; in fact Norbu Drandul owns only the ground floor from where the sample originates). A few years older is the sample taken from the lintel of the entrance door of To Tshang's house (No. 4, 1814), but this one is considered a repair of the largest four storeyed building of the village which fell into ruins a generation ago. The house of Karma Tshogle (No. 15) and a beam of Ringzing's house (No. 16) are dated to 1853 and 1848. Of the 'old style' houses north of the castle, the house of Phuntshok B No. 12) provides the date 1847. These dates that centre around 1850, are supplemented by dates from the monastery (chöde) from 1860 and of the southern gate from 1885.

The dates from the upper levels present again a remarkable consistency for the house located in the village square, facing the castle. Four samples from the house of Samdruk (No. 6) identically date back to 1771, whereas a sample from the neighbouring house of Mingmar A (No. 5) dates back to 1770. The sample from Norbu Drandul's second floor (No.14) is much younger, dating to 1858.

While in Mingmar A's house (No. 5) the date of the second level is the same as that of the first

painted. Obviously this room served as the ritual room of the noble family in the initial stage of development. Known by the name of 'Kanjur Simkhang' (gzims-khang-honorific term for 'room') the room recalls the Kanjur corpus of sacred books that were once stored here.

In a second stage of construction activities the Kanjur Simkhang seemed not to be appropriate any more to demonstrate the status of the family. A new hall of 330 cm width, the Lhakhang was therefore added to the Simkhang side, thus crossing the former courtyard. The new hall had to be made 120 cm higher than the old hall in order to house a colossal Vairocana statue on a raised pedestal and enshrined by a fully carved tympanum. The new hall is supported by a simple pillar and capital structure, while the capitals of the initial arcade display detailed carvings based on lotus patterns. Below the colossal statue, however, a massive block of stones serves as a kind of extended socle. In a third stage of development the building was transformed into a lodge in 1986. The two long narrow rooms on the eastern and southern sides of the courtyard were rebuilt and subdivided into four guest rooms. In 1991 three more rooms and a glazed conservatory were added on top of the roof, and an additional guest room and stables built to the South.

If we correlate the six dates from the dendrochronological campaign in March 1993 and three more dated from the previous campaign in 1992 with the analysis presented above, we understand, that data provided by dendrochronology need careful consideration.

There are three groups of dates, one covering the time 1848 - 56, one around 1887 and one of the second half of the 18th century, thus dating considerable further back. The beams above the lane (sample 28 = 1856) and the stable (sample 29 = 1848) preserve their original size and enable us to identify the felling year exactly, thus these samples provide the more reliable evidence. Even

after having learnt in Kagbeni that bearing members are considered as rare construction materials that is eventually reused, I feel inclined to say that the basic structure of Pema Drolkar's house including the Kanjur Simkhang, was built around 1860. Especially the date of the pillar of the large hall (sample 46 : 1858) and the date of the ceiling board from the Kanjur Simkhang (sample 48 = 1859) support this assumption. However, what remains irritating are the dates of the pillar in the courtyard (sample 30 = 1887) and the beam above the eastern arcade (sample 31 = 1886). Incidentally, these dates are almost identical. Both timbers are cut to size (14/14 and 10, 5/8 cm), and so they do not necessarily provide the date of the felling year. Moreover, the beam seems to have been recovered from somewhere else fairly recently, being reused in 1986 at the time the house was transformed into a lodge. The dates referring to the obvious later addition, the Lhakhang, are again confusing : The beam (sample 32 = 1856) that supports this structure belongs to the same group that was used for the first phase of construction around 1856, whereas the beam (sample 47 = 1883, cut to size 11, 5/13, 5 cm) above the high room is 27 years younger. Even more confusing seems to be the date of a board (sample 33 = 1775) that bridges the gap between the ceiling joists above the extended arcade below the Lhakhang. Dates of additional boards as presented in Ancient Nepal (1992/93, Nos.130 - 133, p.30) refer even to 1765 and 1769.

The only possible answer to the remarkable range of dates (1765 - 1883) is that the Lhakhang was built some time after 1883, possibly around 1900. Certainly, the boards above the arcade have been reused, having been salvaged from an older site. But the same is true for the beam (sample 32) that supports the structure. The dilemma is that the structural analysis tells us that the Lhakhang represents an addition to an older structure, making the closure of a window of the Simkhang necessary and obscuring the arcade of the courtyard. The dates provided by dendrochronology,

level, the dates from Samdruk's house (No. 6) differ by 99 years, that of Norbu Drandul's house (No. 14) by 31 years. The dates of the few explored third levels differ again considerably. At Mingmar A's house (No. 5) they are 86 or 117 years younger than those of the lower levels, at Norbu Drandul's (No. 14) the difference is 105 years; the felling date of 1963 suggests a recent repair of the roof, as the third level represents the uppermost one. Replacement of timbers at roof level must have been the rule over centuries.

The samples from Samdruk's house (1572) represent the earliest evidence, suggesting, the village developed at the same time as the castle itself, forming a small nucleus in a short distance and thus possibly framing the trade route. The limited number of samples do not allow to assert that Samdurk's house is the oldest one nor that it is the only one of the early phase of the village.

Timbers from houses that more or less form an arc west of the castle date from 1605 to 1680, suggesting that some 15 houses (not households/meptra) existed towards the end of the 17th century, constituting an extremely dense cluster and keeping a distance from the still free-standing castle. The house of Waya Tshering (No. 2) was finally closest to the castle. It is told that at the time of construction, probably around 1680, the owner challenged the height of the castle itself and subsequently was ordered by the king to pull down an entire storey to come down to a more decent height respecting the dominant structure of the royal building.

The fact, that the timber of the second levels of two prominent houses in the village square are of a remarkable consistency, being dated to 1770 and 1771, suggests a major event that led to the rebuilding of these houses. Although the samples collected for this study present a very limited scope, it is striking, that three more samples date to 1770 (samples 23 and 24) and 1730 (sample 20).

Houses east of the castle provide ample data to prove that between 1850 and 1860 the entire area was built up. As the house of Pema Drolkar (No. 1) as well as the chöde date to the same decade, we must believe that the village experienced an affluence that probably reflected a change in status, leading to a considerable expansion.

The dating of a pillar in Laksom's house (No. 11) to 1920 proves, that on the northern edge the castle's wall remained fully exposed until very recently. In the same way, Pema Ongdi's house was built beside Laksom's house, and on the western side Hrewo Pema built a house against the castle wall some 30 years ago.

#### THE CASTLE (KHAR)

Altogether 21 dated samples from the castle have been taken : Seven from ground floor level, five from the second level, five from the third level and finally four from the fourth level. No timbers survived on fifth floor level. There, the joists and beams have been salvaged, only a row of holes indicate the level of the ceiling joists.

Six samples were collected from pillars, four of which are those characteristic ones that extend over two storeys in order to support the wall of the third storey. The two remaining pillars are from the hall of the third floor. Seven samples originate from lintels, those second most important structural elements that bridge the narrow passages that are up to 120 cm lower than the height of the rooms (first floor 243 cm, second floor 326 cm, third floor 240, fourth floor 242, fifth floor 210 cm). Sample 57 is taken from the lintel of a window. Five samples are from ceiling joists of different dimensions as the rooms they span are of varying width (ground floor 118 cm - Ø 11 cm; third floor 225 cm - Ø 13 cm). Two of the samples were stumps left in the wall as they have been broken off earlier to be reused at new construction sites. One sample (No. 38) was cut from a fragment of a ceiling joists that remained in

situ Besides these types of timber that have also been collected from the residential structures of the village, three samples are of a different type. Two of these (No.39, 60) are thin boards which form the top of the holes for the removable timber shuttering supports used during construction. As the shuttering moved the support beams were taken out, the holes and these boards remained in place. These holes could later be used for scaffolding in case repair work needed to be under-taken.

Seven samples could be dated to the year 1568, providing the earliest evidence so far found in Kagbeni. Five of these have been found at second floor, one at third floor and one at fourth level. Surprisingly, none is found at ground floor level.

The most crucial structural elements, the pair of pillars extending over two storeys, are dated to 1586 (sample 1) and 1596 (sample 2) at the northern entrance and 1572 (sample 5) at the western entrance to the castle. The remaining dates cluster around 1600, ranging from 1581 (sample 3) to 1622 (sample 4). The exceptional date of 1683 for a lintel at the western entrance can be explained more easily, as the western extension represents a more recent reshaping of the access in order to comply with changing concepts of security and defence. While the straight northern entrance remained unchanged, the main entrance at the western side, from where a staircase led to the upper levels, was changed into an L-shaped one.

The crucial date of 1622 (sample 4), taken from a lintel appears again on the second level, being related to a lintel above the area of the northern entrance. And it appears again on the third level, where one pillar of the extant hall is dated (sample 52). A surprise disturbs our notion about the consistency of building material in a single building again: The second pillar of that hall is 53 years older, being dated to 1572 (sample 51). Obviously, the castle remained in a process of

restructuring throughout the end of the 16th and early 17th century. It is naturally the top floor that was open for interventions to respond to changing needs. Apart from the pillared hall on the third floor it was probably only the fourth floor that offered space to be considered a 'room', while the fifth floor might have consisted of a large, but only partly covered room. The two rooms of the fourth floor facing north and east must have been impressive halls to serve for various kinds of gatherings. We must therefore assume that the south eastern corner of the castle was reshaped in 1665 (sample 57) in the course of which a new window was added. Another window was added in 1779 (sample 58, 59) to provide more light to the eastern hall that had a broad projecting balcony.

There is one sample from the fourth floor, the date of which does not at all fit into the pattern explained above. It originates from a board of a putlock on the northern facade that remained there from shuttering. The date 1568 suggests a reuse after a period of more than two hundred years.

The following analysis of the data described above certainly must be conjectural as our knowledge of mud structures of the Tibetan/Nepalese plateau is fairly limited. Without doubt, construction of the castle began in 1568, but we cannot say anything about the shape of the building as the outcome of a first phase of construction. We believe that the central part of the castle with the northern and western entrance was constructed within a short period, probably three storeys high. Some time later, probably around 1600, the castle must have undergone a considerable change. Disturbances in the area of the northern entrance suggest that new walls were introduced on the ground floor level as well as on the third floor level, although it cannot be said why these walls were introduced.

Again some time later, probably around 1622, the castle was reshaped. A lintel from the ground floor, a lintel from the second floor and pillars from the third floor testify intervention on the

crucial levels - at a time when more storeys were added or reshaped completely.

The lintel from the western entrance, dated to 1683 suggests the redesigning of that portion of the castle towards the end of the 17th century. The end of the 18th century saw massive interventions and changes of the fourth floor, probably including the addition of the fifth floor.

#### Concluding remarks about construction and reconstruction of houses in Kagbeni

Dendrochronological evidence under the conditions of mud and timber construction has not been discussed to date, neither for the Central Asian plateau, nor for similar regions of the world. We know in fact very little about the historical perspective of mud structures in semi-arid zones. Several questions arise which cannot satisfactorily be answered with the experience at hand. The present study presents only a first step from an architectural survey of existing mud structures into the historical dimension.

Tapering mud walls 15 metres high with a thickness of 172 cm at the base must be considered extremely durable. However, once the crown of the wall remains unprotected by a projecting layer of cypress and juniper shrub the structure will suffer from the rains, although the average precipitation is rather low. The constant wind which usually starts at ten in the morning and which prevails until seven in the evening, also has an adverse effect on the mud walls. Those walls that are exposed towards the Southwest, the valley of the Kaligandaki, have eroded by nine centimetres over the past four hundred years. While the flat stones and boards that form the top of the putlock holes remain in place, the surface of the mud with its enclosures of gravel erodes. Finally, earthquake must be mentioned as a possible if not major threat to these structures. As there are no historical

records of such events, we may only assume that earthquakes at certain times must have led to a considerable reshaping if not reconstruction of collapsed structures. As joints between sections of mud walls are virtually nonexistent, earthquake must result in gaps once the walls are inclined. Several such gaps can be observed at the castle of Kagbeni, but it cannot be said with certainty that these originated from earthquakes. The large house of the noble Hrewo family in Jharkot suffered the collapse of an end wall a few times. Only a trained eye will be able to identify repair work following such events.

To sum up, climatological factors might have contributed a little to reshape existing buildings, and about seismic effects little can be said for the time being. Economic and social changes must be considered as the driving forces behind reshaping. To start with, the most recent change that can be remembered by the villagers, is the move from the clustered core towards the periphery. It is the move from a well-protected but dark environment to the courtyard building type, and at the same time a vertical movement from the top of a four-storeyed building down to the second floor of a building which is now limited to only two levels. When Samdruk moved from his home from the house (No. 6) in the village square towards east in February 1993, he even confined his new residence to the ground floor, hoping for further extensions. Altogether 18 new houses which follow this trend have been built over the past two generations. The latest moves were made by Samdruk (house 6) and Kunga (house 3, upper storey and adjoining building) in spring 1993. Kunga has not yet moved to the new house. Samdruk already started to demolish his old house in May to salvage building materials for the new one. Yet the Tsangang, that triangular-shaped repository of juniper twigs on top of the roof, remains, fairly well supported. Only after the new house has acquired full performance as a home he will move this protective element that wards off evil spirits. At the same time, his neighbour Mingmar (house

5) demolished his house : The joists and beams were removed for reuse, only the bleak mud walls remained. The ground floor was rearranged to serve as a store for hay and straw. Mingmar's neighbour (house 4) in turn joined in demolishing parts of her house that had already been in ruins for many years. The way the timber is recovered from existing houses might throw a light on the availability and costliness of timber in general. As a commodity it is used over and over again : A joist will be reused as a joist and a beam as a beam. There is no reason to believe, that the general practice differed a century of two ago.

With these considerations in mind the dendrochronological evidence at hand for Kagbeni has to be treated with due reservations. Perhaps the best examples for reuse of timber are the board on the fourth floor levels of the castle (sample 60, dated 1568) used in a context of late 18th century construction and the board below the Lhakhang of Pema Drolkar's house (sample 33) dated 1775, but reused in the context of an early 20th century addition to the existing house. There is another case of reuse that remained misleading until recently. The core from a beam in Ringzin's house (sample 27) is dated 1848 although Ringzin insisted (interviews in April 1992 and June 1993) that he built his house some forty years ago at the time he moved from his father's house to build his own residence. A closer look at his house revealed that the lifts of the mud wall measure 22 cm like

the walls of all the other houses that were constructed east of Pema Drolkar's house after 1930. The small lifts contrast with those of Pema Drolkar's house and Karma Tsogle's houses which were constructed around the middle of the 19th century and measure 56 and 46 cm respectively.

The lifts of the old houses which form an arc around the castle towards the west again differ considerably from those of the 19th century. At Samdruk's house (No. 6) the lifts measure 90 cm, at Mingmar's house (No. 5) 56 and at Waya Tshering's house (No. 2), the one that is said to have once challenged the height of the castle, measurements come up to 98 and 108 cm. Generally it can be said, that the house of the 17th century tended to have five storeys, demanding more solid walls, while by the middle of the 19th century only three-storeyed houses were being built, demanding less solid walls. By the middle of the 20th century houses used to have only two storeys, walls did not have to bear a substantial load, subsequently the lifts of the mud walls were reduced.

From this discussion it becomes evident that data provided by dendrochronological findings have to be correlated with evidence from structural analysis in order to come to a reliable conclusion about the history of a house or the development of a village.

**CASTLE****Range****First Floor :**

Northern Entrance :

Sample 1 : Core of a long pillar : 1586

Sample 2 : Core of a long pillar : 1596

Sample 3 : Core of a ceiling joist : 1581

Sample 4 : Core of a lintel : 1622

1586 - 1622

Western Entrance:

Sample 5 : Core of a pillar : 1572

Sample 6 : Core of a lintel : 1600

Sample 7 : Core of a lintel : 1683

1572 - 1683

**Second Floor :**

Sample 35 : Stump of a ceiling joist : 1568

Sample 36 : Core of a lintel : 1622

Sample 37 : Stump of a ceiling joist : 1568

Sample 38 : Cut end of a ceiling joist : 1568

Sample 39 : Fragment of a board from shuttering : 1568

1568 - 1622

**Third Floor :**

Sample 49 : Core of a lintel : 1568

Sample 50 : Core of a ceiling joist : 1596

Sample 51 : Core of a pillar : 1572

Sample 52 : Core of a pillar : 1621

Sample 53 : Core of a pillar : 1621

1568 - 1621

**Fourth Floor :**

Sample 57 : Core of a window lintel : 1665

Sample 58 : Cut end of a wall crown support : 1779

Sample 59 : Cut end of a window lintel : 1779

Sample 60 : Board from shuttering : 1568

1665 - 1779

(1568 = secondary use)

**NORTHERN GATE**

Sample 24 : Core of a pillar 1770

**SOUTHERN GATE**

Sample 34 : Core of a beam 1885

**CHÔDE (MONASTERY)**

Sample 61 : Core of a sill 1860

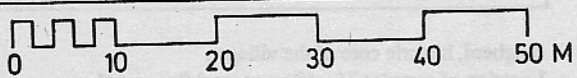
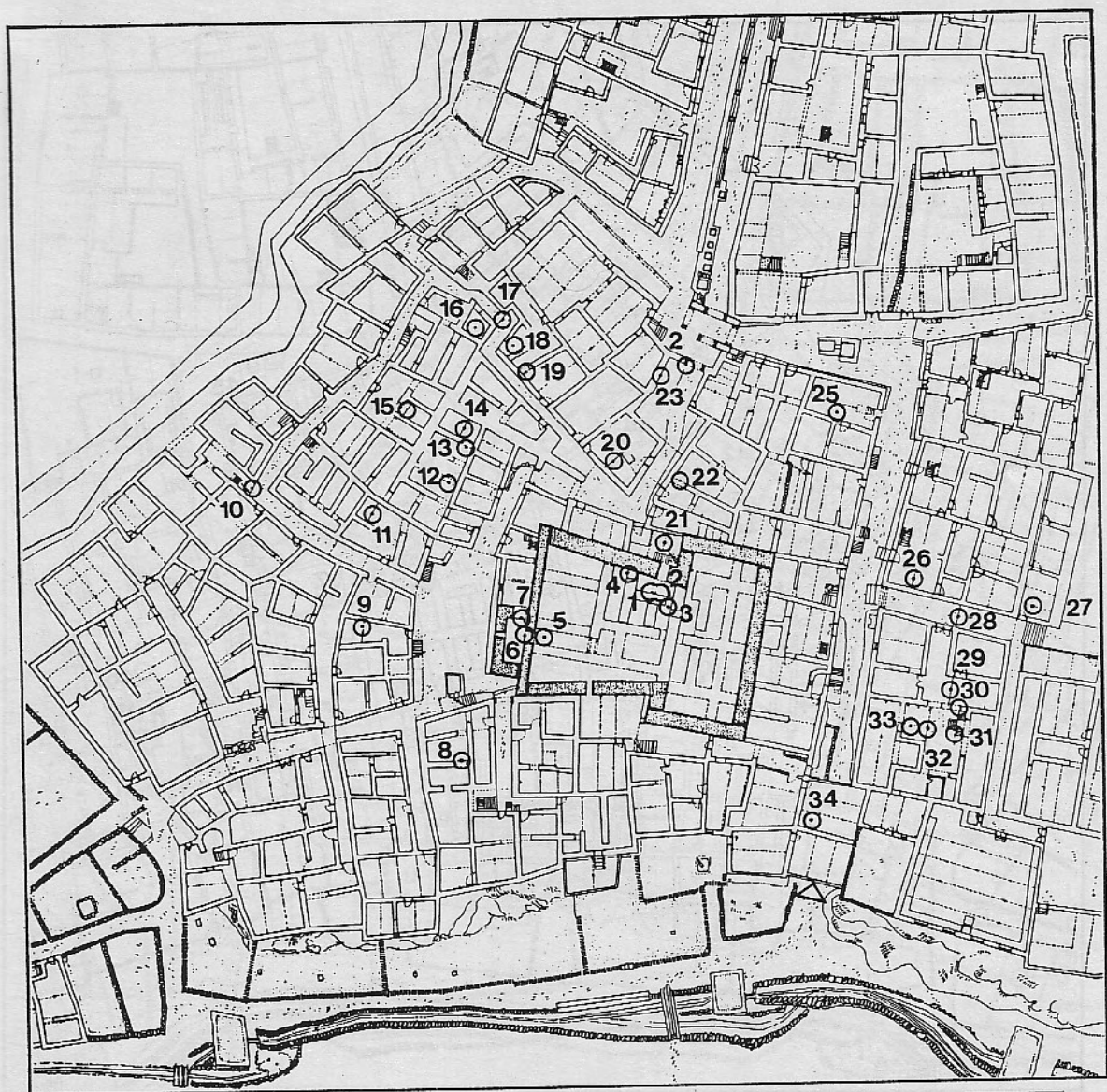
Sample 62 : Core of a sill 1860

Kagbeni Castle : Dendrochronological analysis of 21 samples with dates ranging from 1568 to 1779 AD (based on samples secured in 1992 and 1993 )

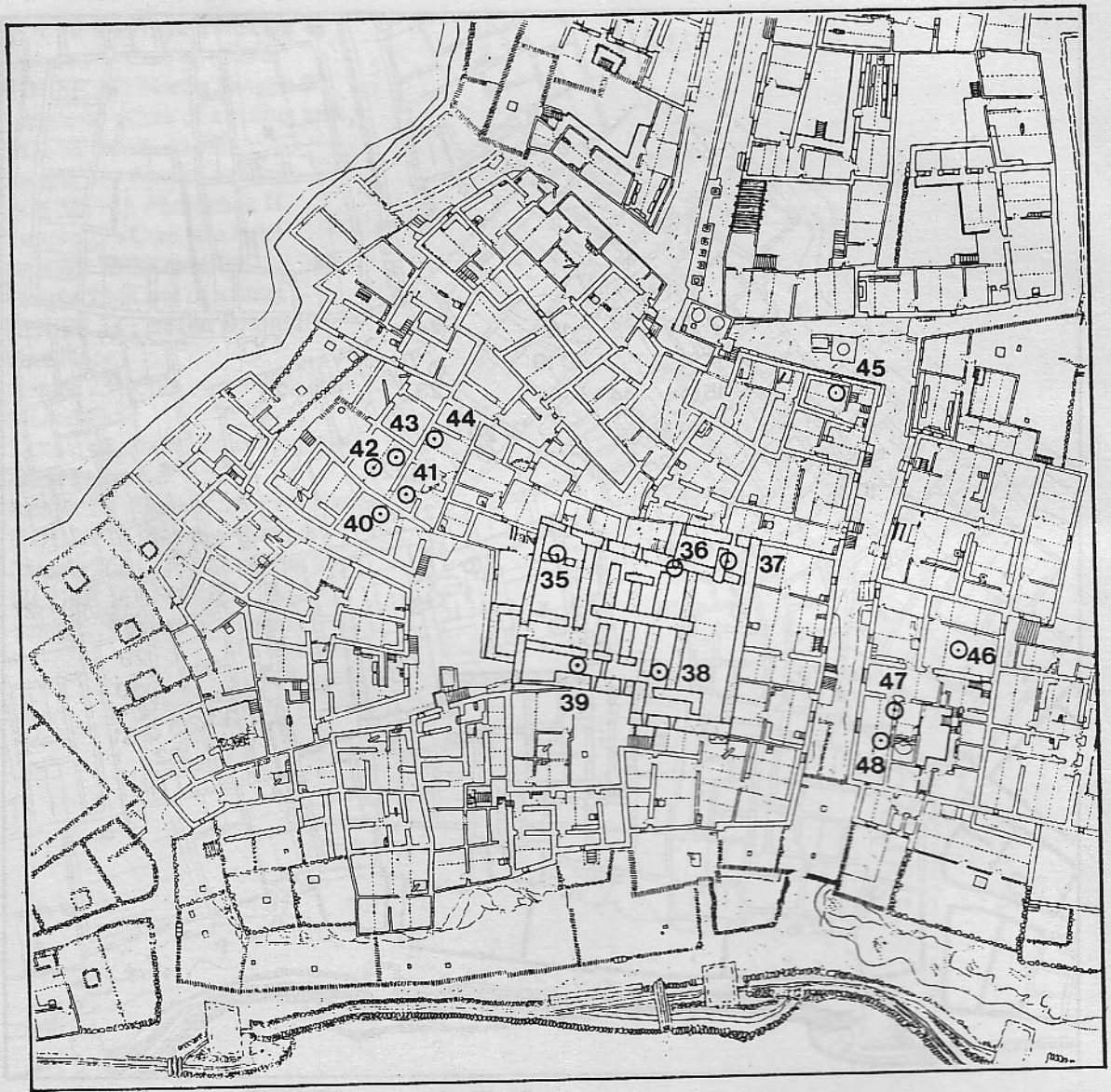


HOUSE No.	OWNER	DATE
<b>HOUSE 1 : Pema Drolkar</b>		
First Floor		
Sample 28 :	Core of a beam above the lane	1856
Sample 29 :	Core of a beam in the stable	1848
Sample 30 :	Core of a pillar in the courtyard	1887
Sample 31 :	Cut end of a beam in the courtyard	1886
Sample 32 :	Cut end of a beam in the courtyard	1856
Sample 33 :	Ceiling board	1775
Second Floor		
Sample 46 :	Core of a pillar	1858
Sample 47 :	Cut end of a beam above the Lhakhang	1886
Sample 48 :	Ceiling board above the Simkhang	1859
<b>HOUSE 2 : Waya Tshering A</b>		
Sample 8 :	Core of a lintel	1680
<b>HOUSE 3 : Norbu Sangpo A</b>		
Sample 9 :	Core of a beam	1770
<b>HOUSE 4 : To Tshang</b>		
Sample 10 :	Core of a lintel above the entrance	1814
<b>HOUSE 5 : Mingmar A</b>		
First Floor		
Sample 11 :	Core of a beam	1770
Second Floor		
Sample 40 :	Core of a ceiling joist	1770
Third Floor		
Sample 54 :	Core of a pillar	1887
Sample 55 :	Core of a pillar	1856
<b>HOUSE 6 : Samdruk</b>		
First Floor		
Sample 12 :	Core of the middle lintel	1572
Sample 13 :	Core of the front lintel	1572
Sample 14 :	Core of a ceiling joist	1572
Second Floor		
Sample 41 :	Core of a ceiling joist	1771
Sample 42 :	Core of a pillar	1771
Sample 43 :	Core of a ceiling joist	1771
Sample 44 :	Core of a ceiling joist	1771
<b>HOUSE 7 : Phuntshok I</b>		
Sample 15 :	Core of a ceiling joist	1630
<b>HOUSE 8 : Pema Ongdi</b>		
Sample 16 :	Core of a beam	1886
Sample 17 :	Core of a beam	1605
Sample 18 :	Core of a beam	1605

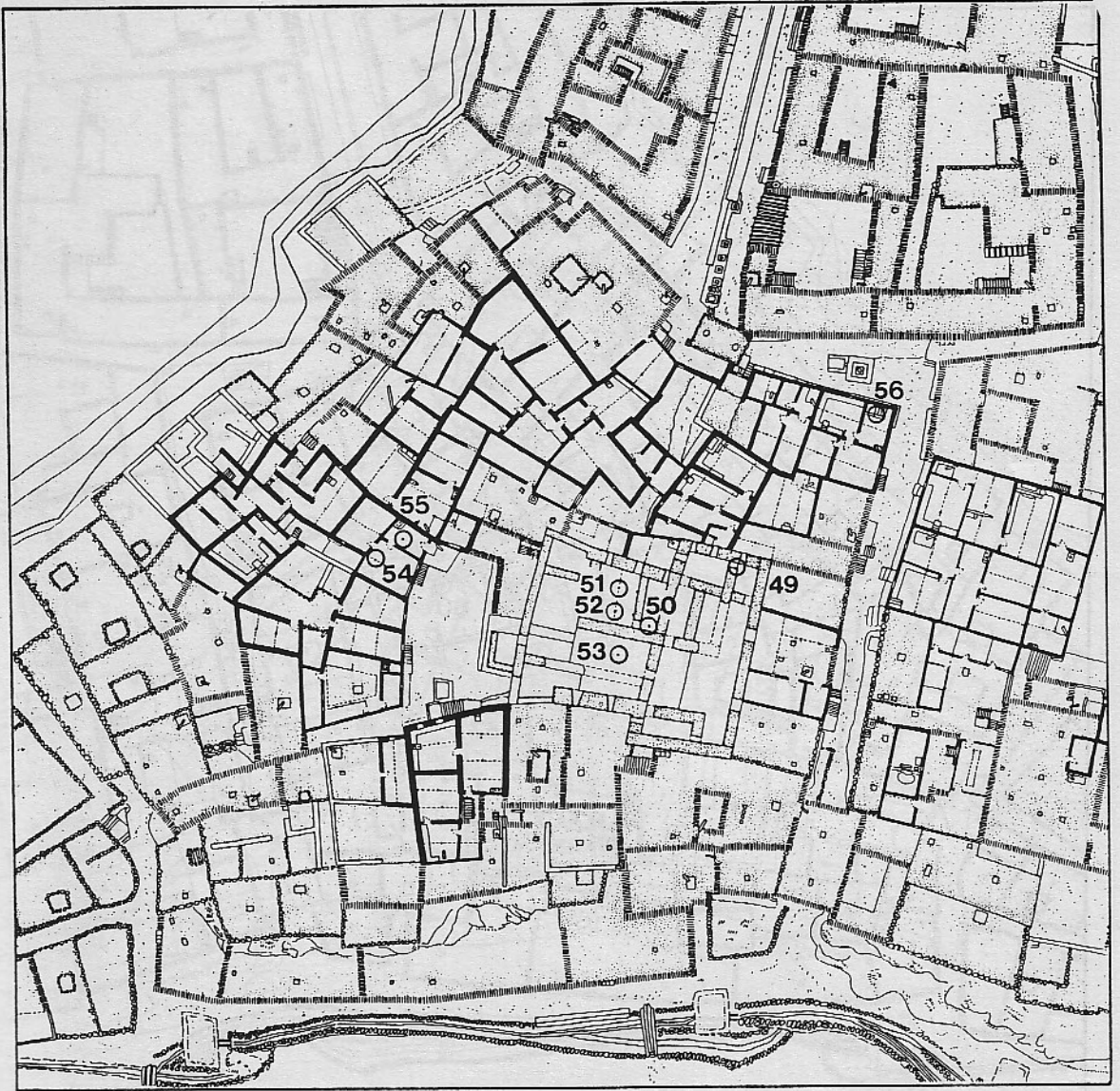
<b>HOUSE 9 : Waya Tshering B</b>	
Sample 19 : Core of a lintel	1855
<b>HOUSE 10 : Norbu Sangpo B</b>	
Sample 20 : Core of a ceiling joist	1730
<b>HOUSE 11 : Laksom</b>	
Sample 21 : Core of a pillar	1920
<b>HOUSE 12 : Phuntshok II</b>	
Sample 22 : Core of a lintel	1847
<b>HOUSE 13 : Kemesha</b>	
Sample 23 : Core of a lintel	1770
<b>HOUSE 14 : Norbu Drandul</b>	
First Floor	
Sample 25 : Core of a ceiling joist	1827
Second Floor	
Sample 45 : Core of a ceiling joist	1858
Third Floor	
Sample 56 : Core of a ceiling joist	1963
<b>HOUSE 15 : Karma Tshogle</b>	
Sample 26 : Core of a ceiling joist	1853
<b>HOUSE 16 : Ringzin</b>	
Sample 27 : Core of a beam	1848



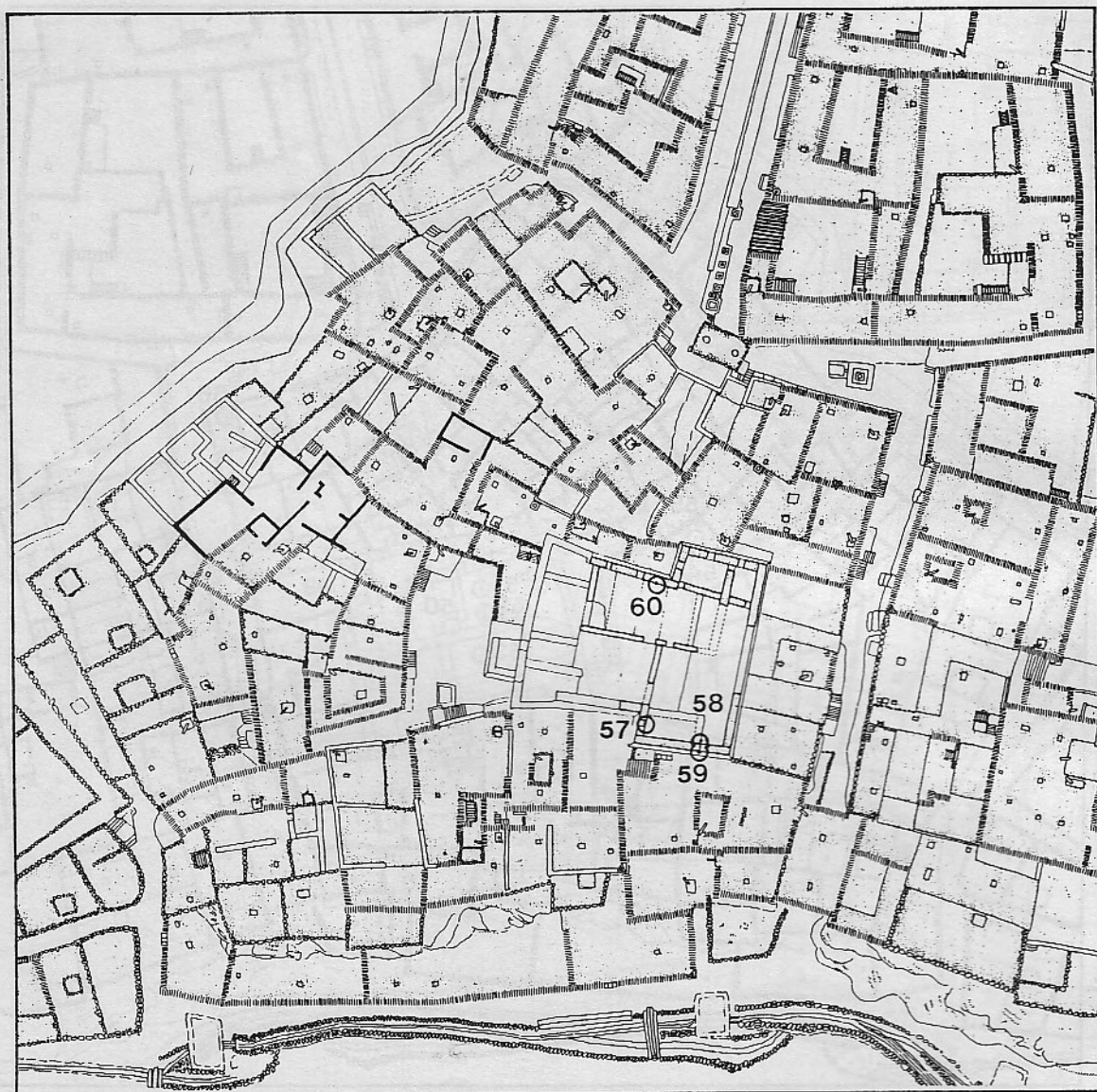
**Kagbeni, historic core of the village :**  
Location of samples 1 - 34 on ground floor level.



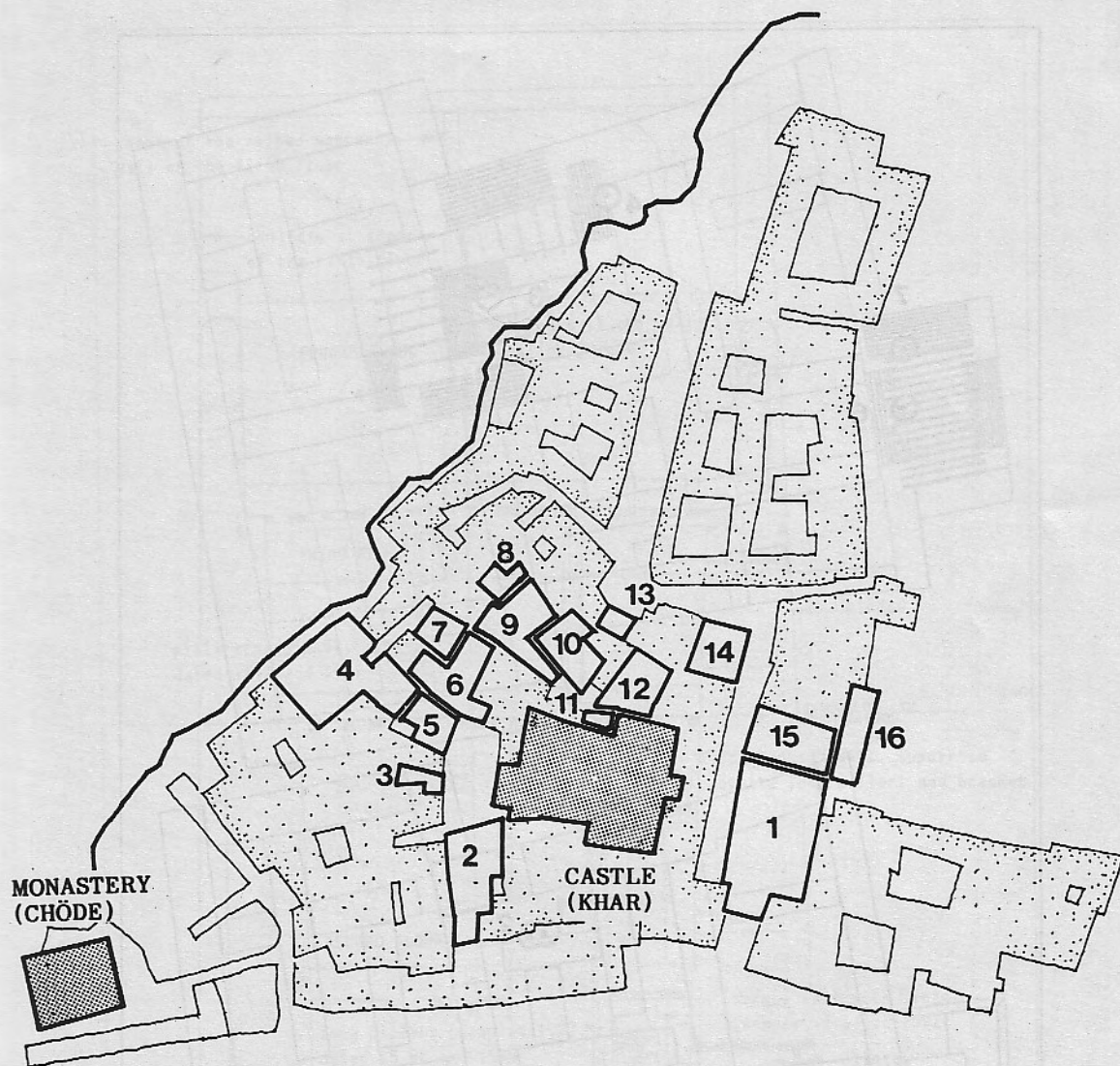
**Kagbeni, historic core of the village :**  
**Location of samples 35 - 48 on second floor level.**



**Kagbeni, historic core of the village :**  
Location of samples 49 -50 on **third floor level.**

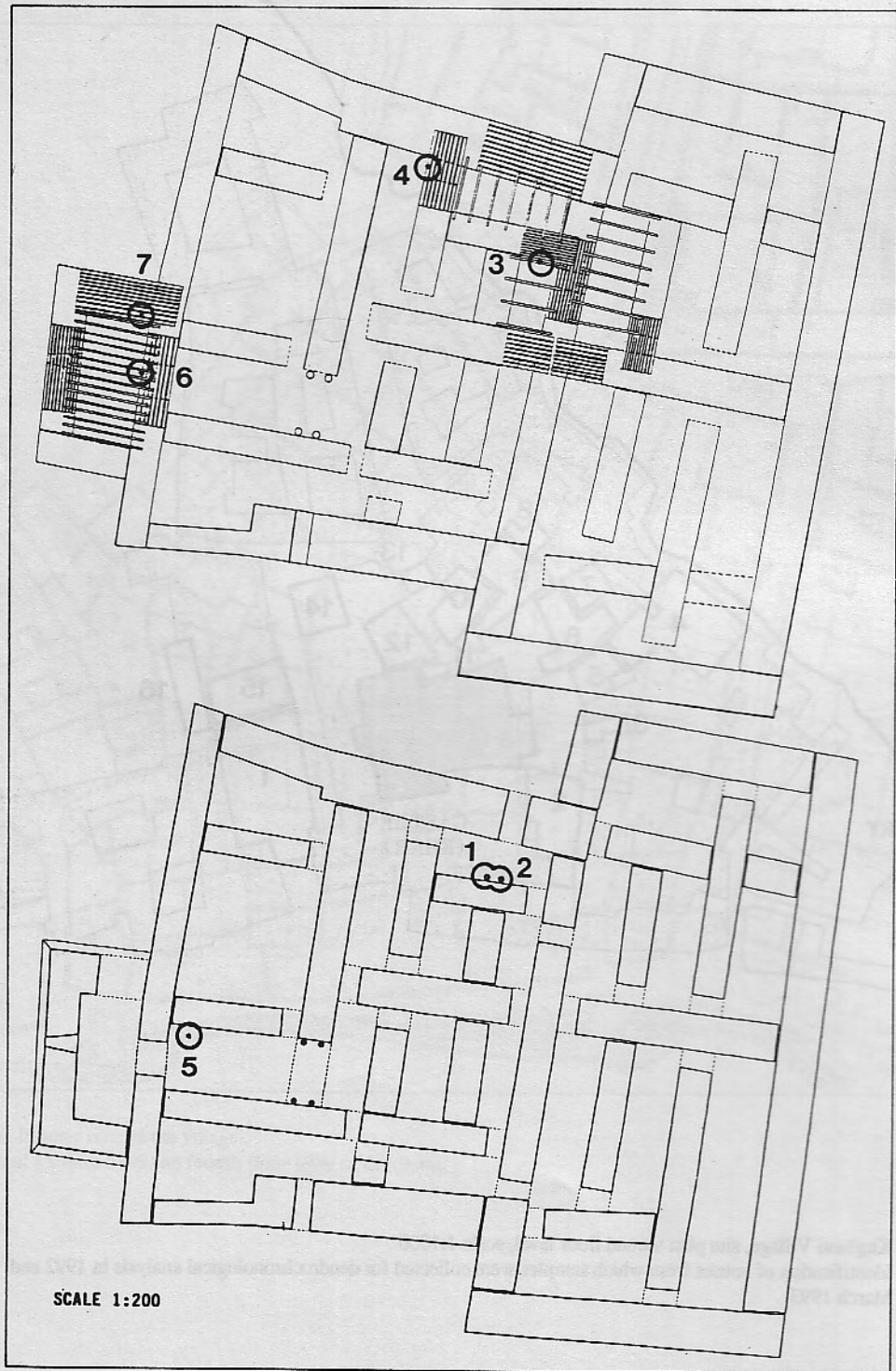


**Kagbeni, historic core of the village :**  
Location of samples 57-60 on **fourth floor** level of the castle.



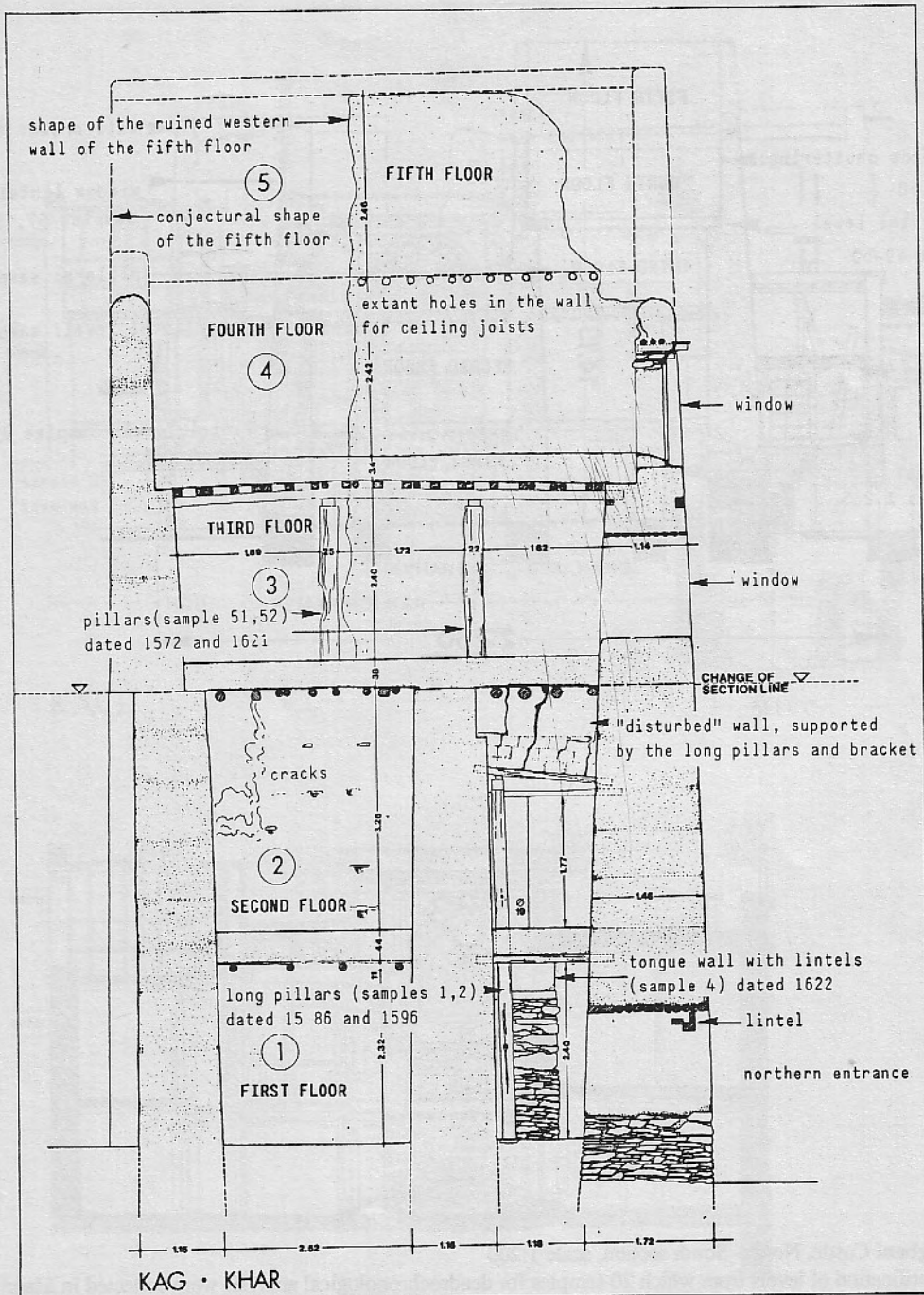
Kagbeni Village, site plan second floor level, scale 1:1000

Identification of houses from which samples were collected for dendrochronological analysis in 1992 and March 1993

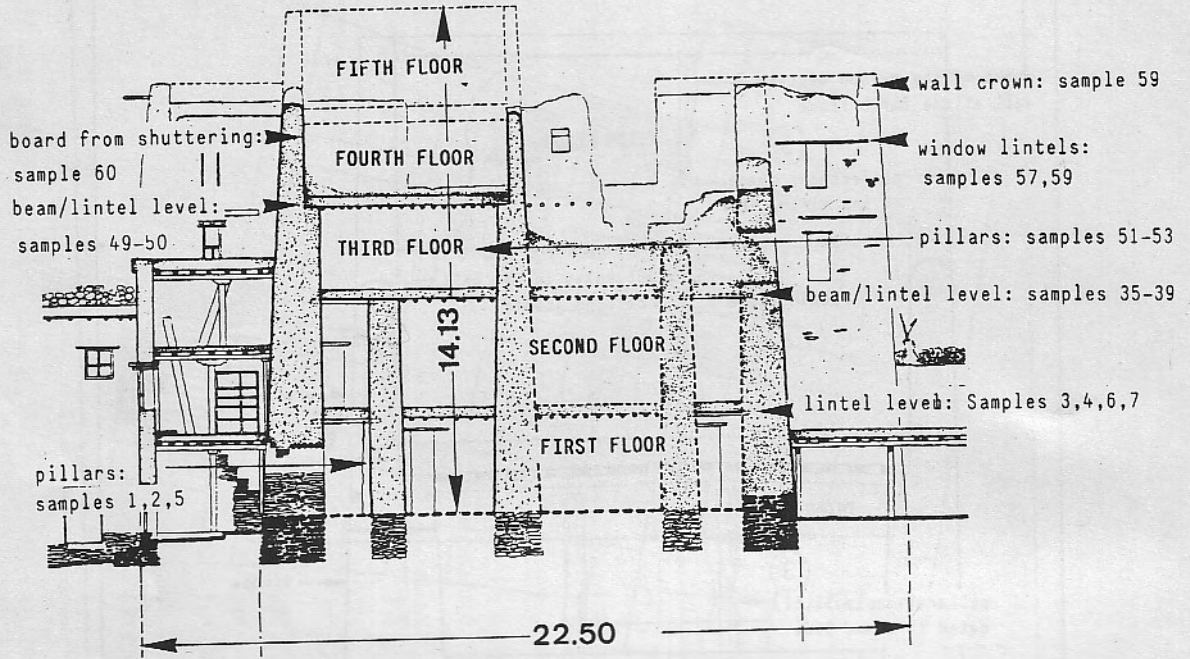


Kagbeni Castle, ground floor level - conjectural plan (below) and ceiling level (above) Identification of samples 1 to 7

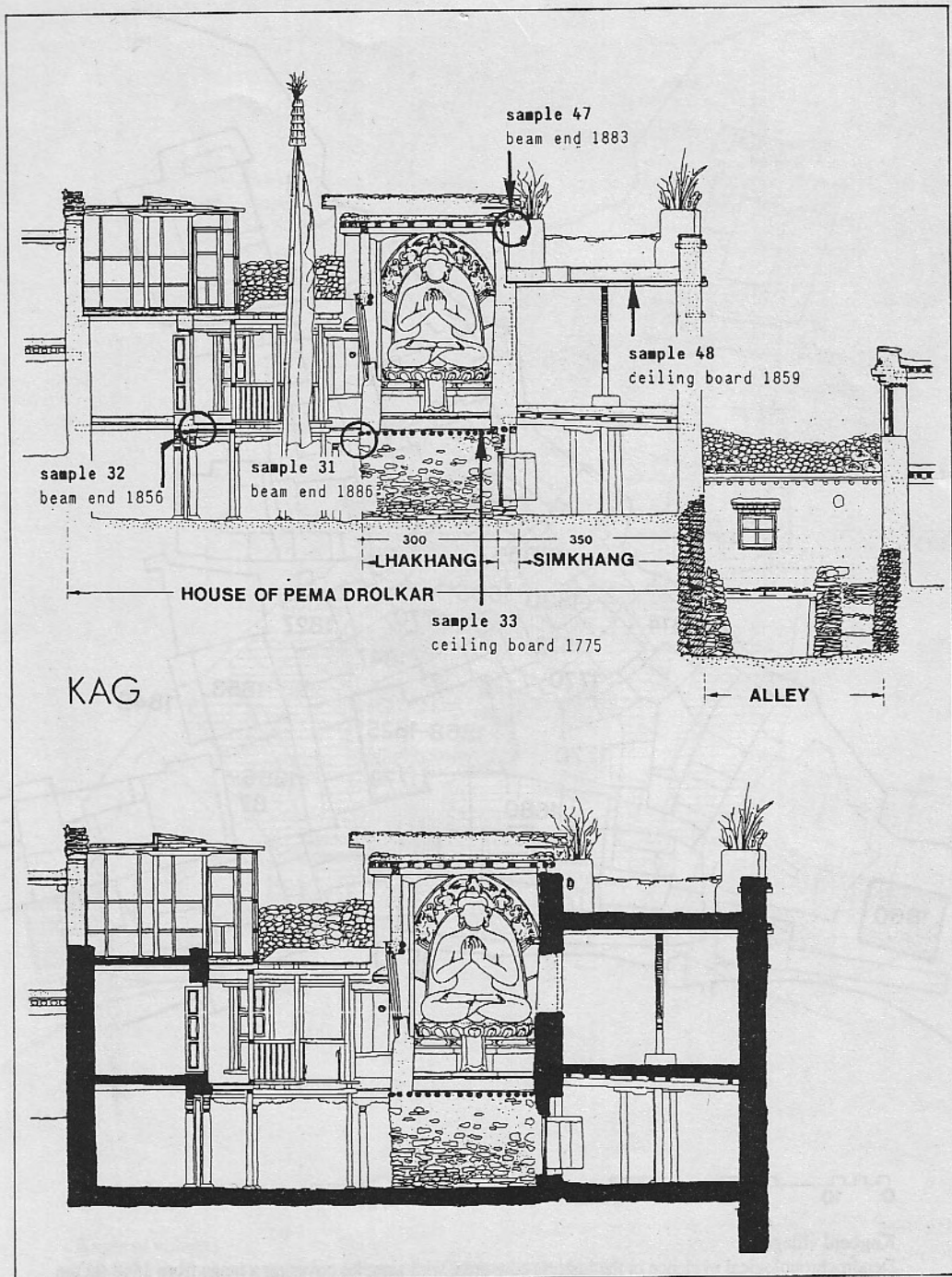




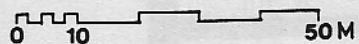
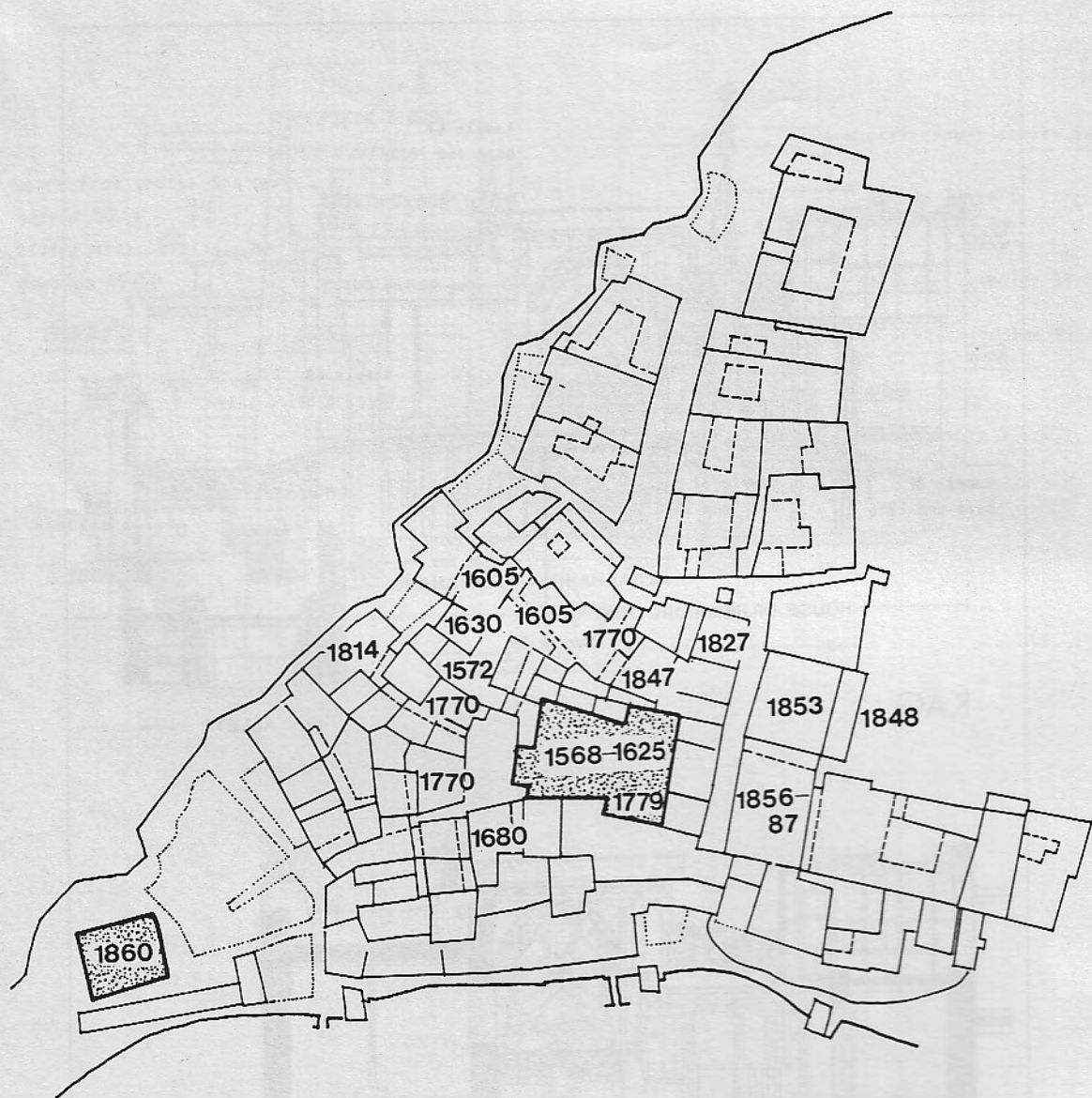
**Kagbeni Castle (Khar), detailed section of the area of the northern entrance.**  
 Identification of samples 1, 2, 5 and 6 of "disturbed" sections of the building that document changes in the building process



**Kagbeni Castle, North - South section, scale 1:200**  
 Identification of levels from which 20 samples for dendrochronological analysis were collected in March 1993 and 1992 (samples 53, 60)

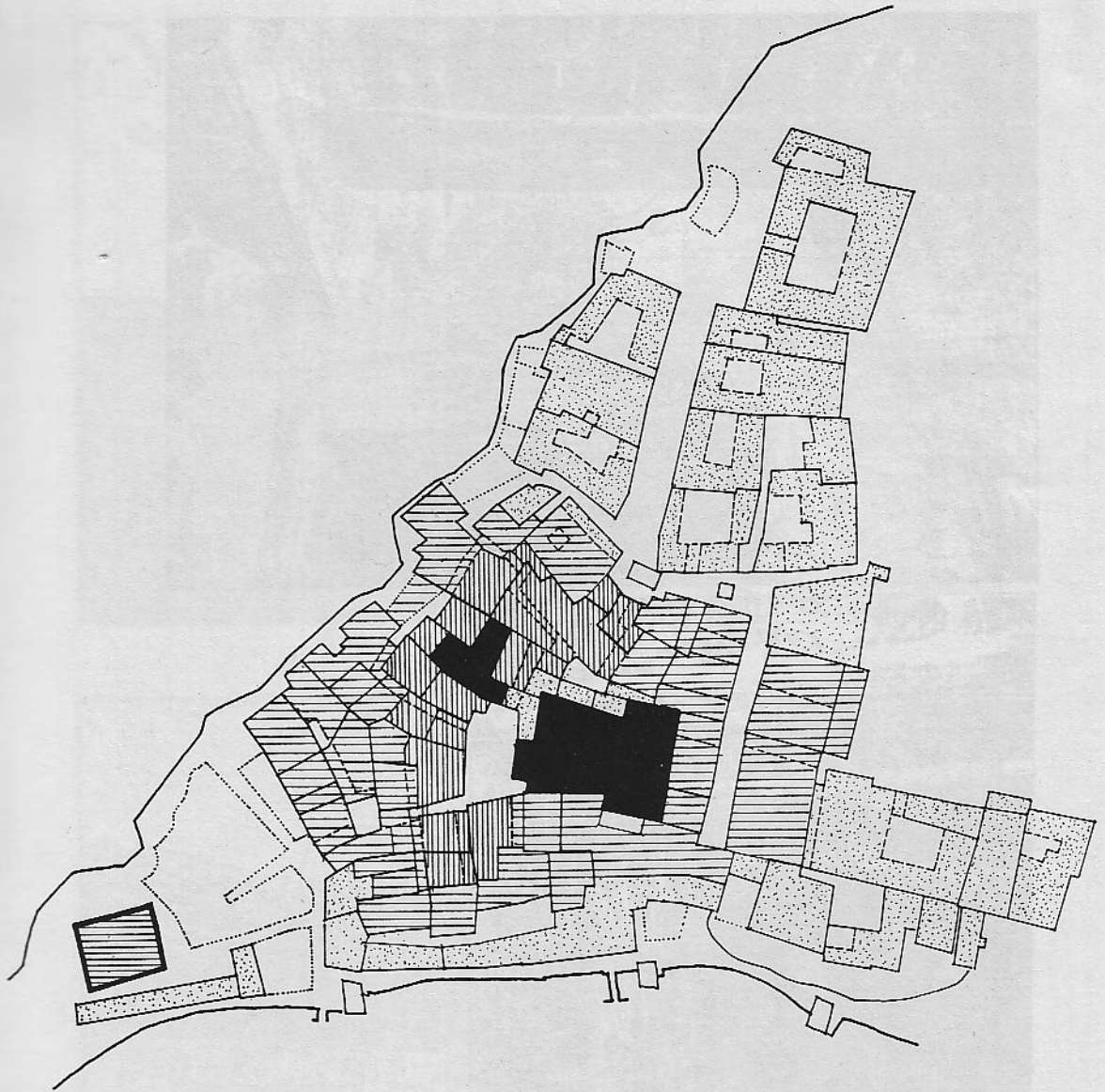


**Kagbeni, House of Pema Drolkar, East - West sections through Simkhang and courtyard.**  
 Identification of samples 31, 32, 33, 47, 48 (above) and conjectural section below after the first phase of construction around 1860 AD with Simkhang (right), large courtyard and stables (left).



**Kagbeni village :**

Dendrochronological evidence in the historic core area, with samples covering a range from 1568 (at the castle) to 1860 (the monastery) and 1887 (repairs).



0 10 50 M

**Kagbeni village :**

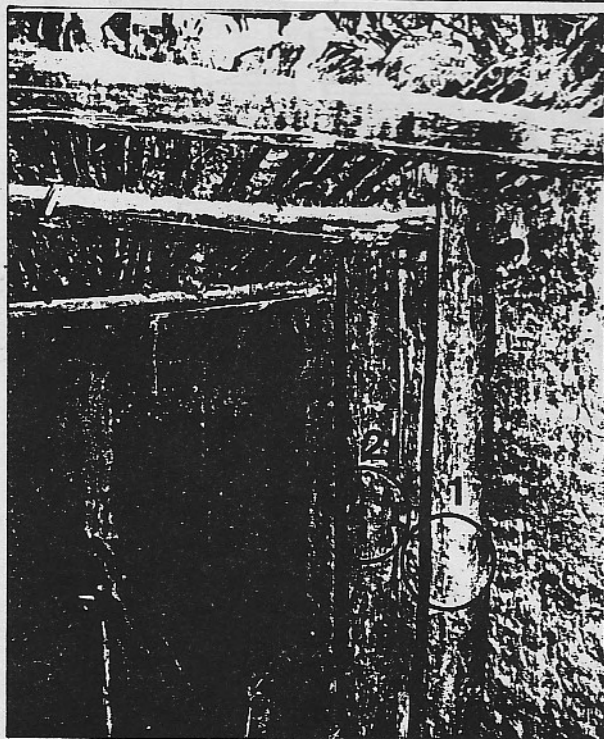
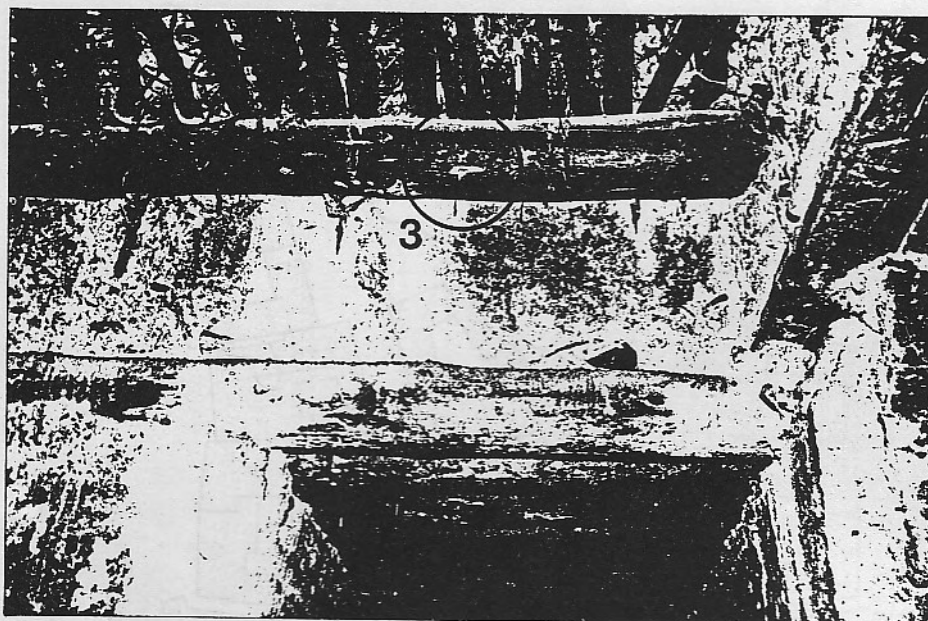
Conjectural development of the settlement with four phases identified :

1 (black) : Beginning of the castle and house Somduk, 1568 - 1600; 2 (vertical lines) :

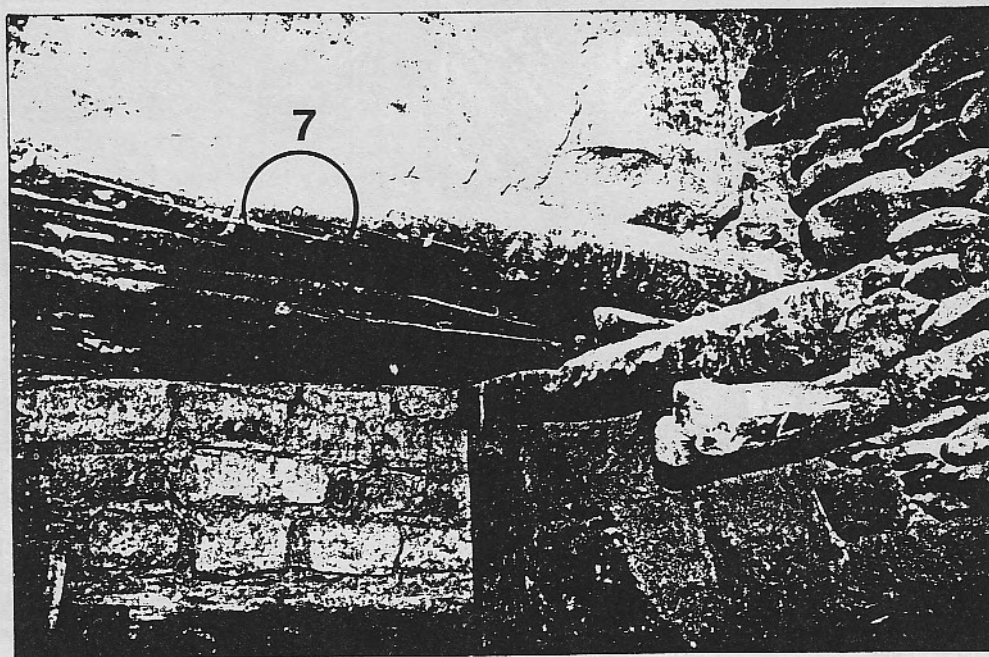
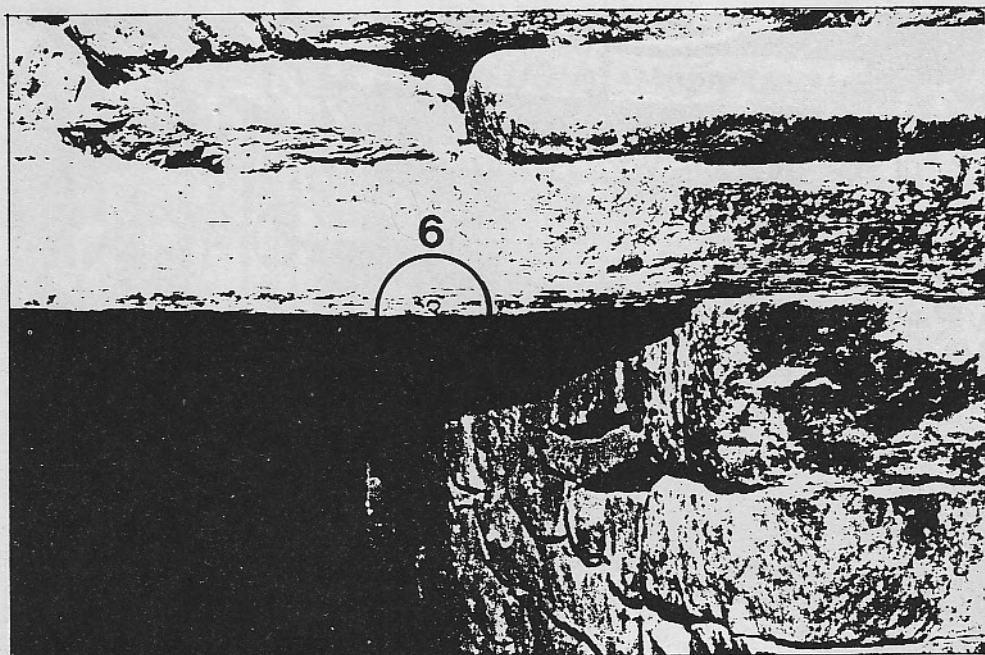
Extension of the castle, construction of about 14 houses west of it, 1600 - 1800;

3 (horizontal lines) : Construction of the monastery and about 40 houses surrounding the castle and the

17th century settlement, 1800 - 1860; 4 (dots) : Construction of about 20 houses in a new fashion around courtyards, 1920 - 1993.



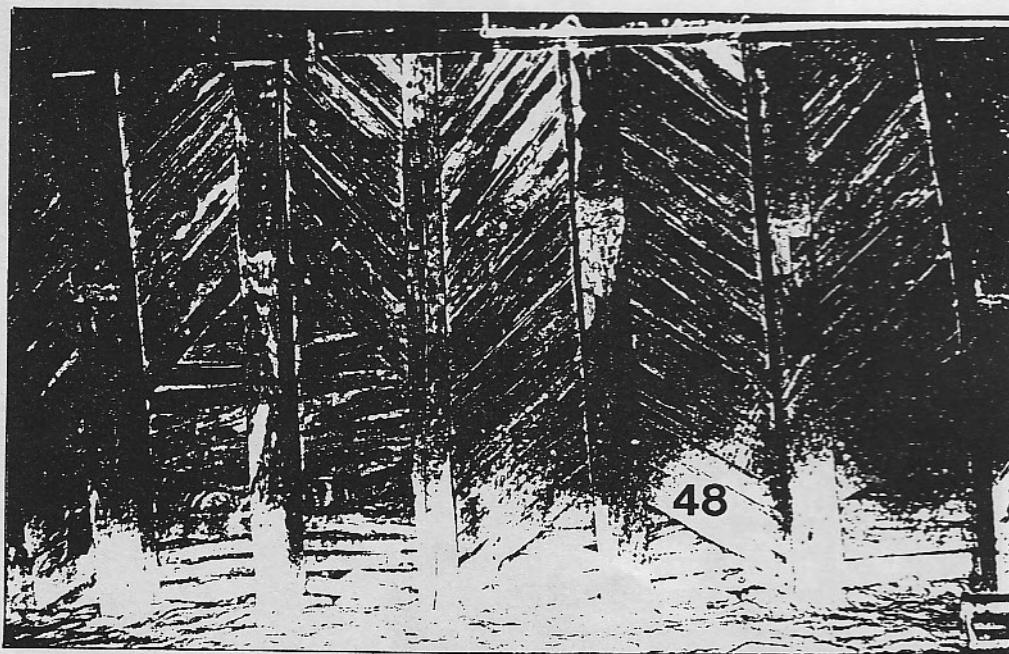
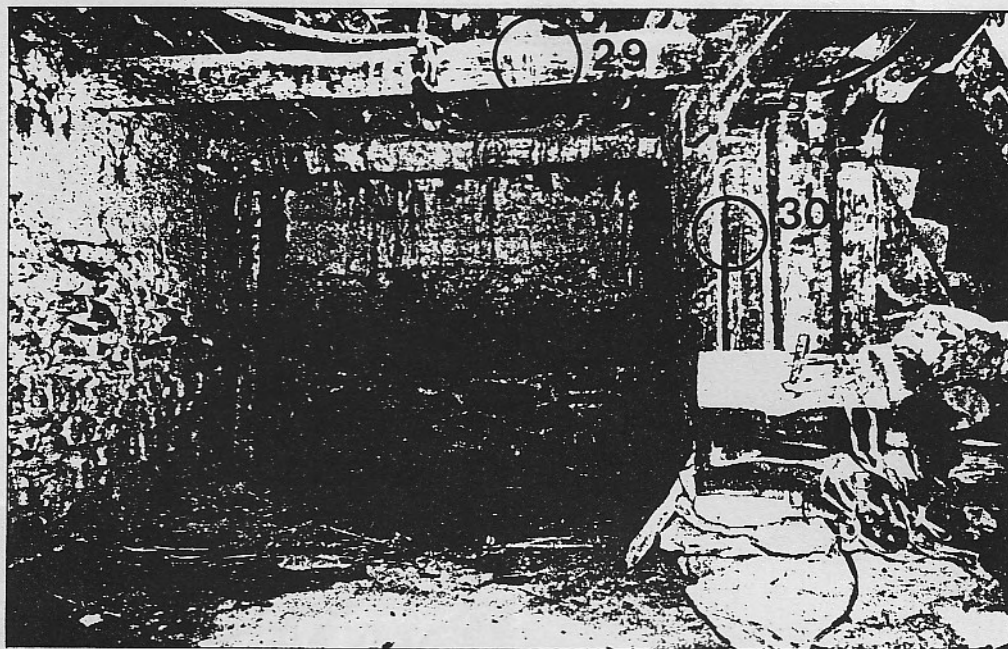
**Kagbeni Castle, ground floor level :**  
Samples 1 and 2 (1993) : Core of two columns extending over two floors to support lintels of the upper level, dated 1586 and 1595.  
Sample 3 ( 1993) : Core of a ceiling joist, dated 1581.



Kagbeni Castle, ground floor level :

Sample 6 (1993) : Core of the foremost lintel of the western entrance, dated 1600.

Sample 7 (1993) : Core of the innermost lintel above the addition to the western entrance, dated 1683.



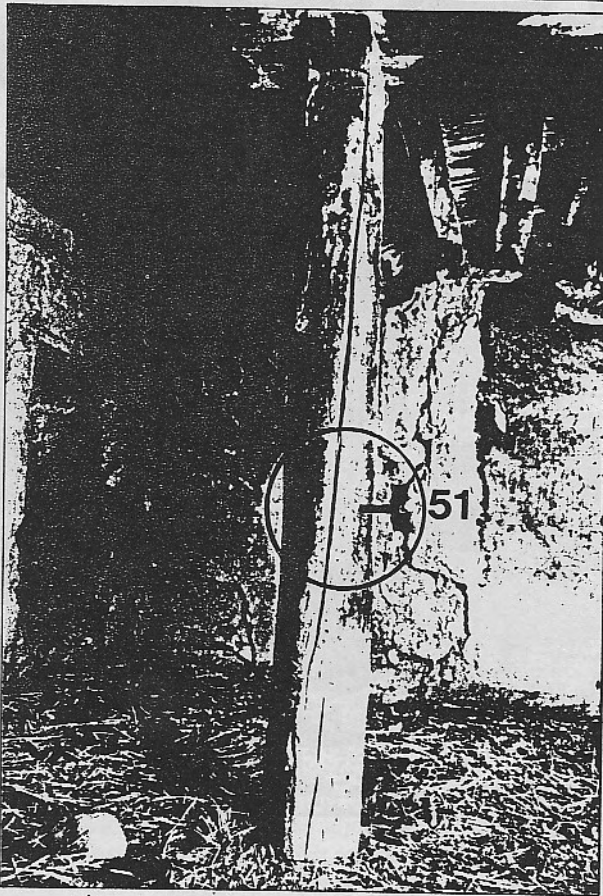
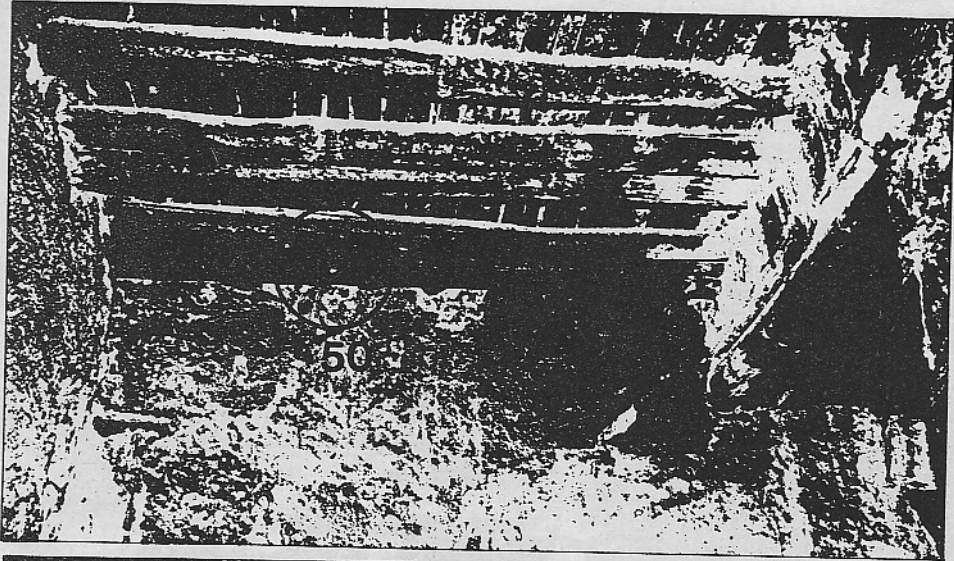
**Kagbeni, Pema Drolkar's house (called Red House) :**

Sample 29 (1993) : Core of a tie beam at ground floor level, dated 1843 (+/- 10 years)

Sample 30 (1992) : Core of a column at ground floor level, dated 1887.

Sample 48 (1992) : Board of the ceiling above the ritual chamber of the second floor level, dated 1859.

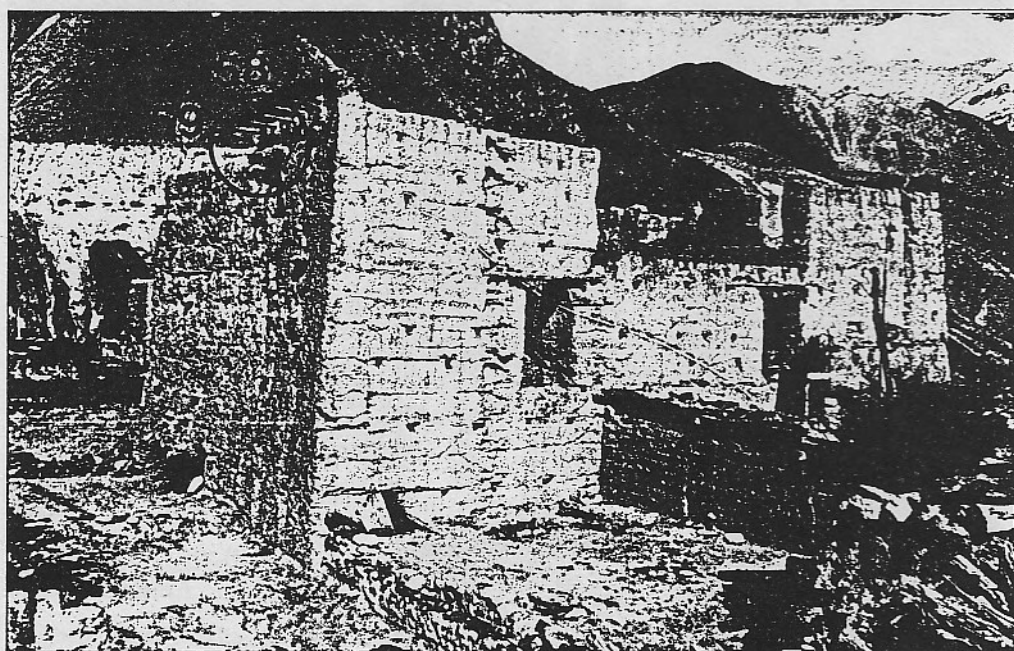
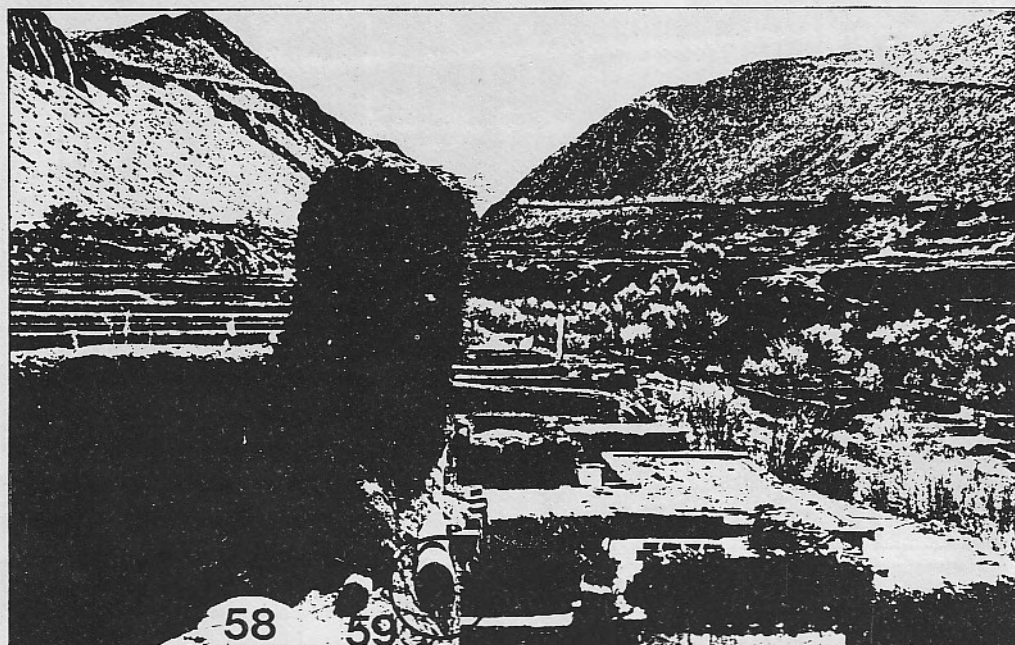




Kagbeni Castle, third floor level :

Sample 50 (1993) : Core of a ceiling joist, dated 1596.

Sample 51 (1992) : Core of a column supporting a tie beam, dated 1572.



**Kagbeni Castle, fourth level (top floor) :**

**Sample 58 (1993) :** Cut end of a secondary lintel, dated 1779.

**Sample 59 (1993) :** Cut end of a horizontal raft above a window lintel, dated 1779.

Despite it having been heavily destroyed by erosion, so that only small portions of the cave chambers had been preserved, the work in this cave system proved to be quite successful. We were nevertheless able to document some new types of features - for example, passage and tower described above - and other finds which shed more light on the different functions of the cave systems.

Furthermore, evidence was found of a ritual use in the remains of a cave chamber, where we uncovered a large hearth. In its fire-pit we found, apart from charcoal and animal bones, several metal objects and three wooden phurbas (Fig. 16 below). Special finds were fragments of paper with Tibetan script and drawings. In the adjacent floor we excavated fragments of twelve small images made of unburnt clay depicting horses, measuring 3-5 cm (Fig. 16 above). The tibetologists D. Schuh and C. Ramble think that all these objects could be the remains of a fire ceremony carried out in this cave. As for the dating of this event, we received a radiocarbon date from the charcoal in the fire pit ( $AD\ 1008 \pm 24 = calAD\ 1012 - 1028$ ).<sup>14</sup> Thus, our finds belong to the oldest sources of Tibetan script in this region.

We cannot yet date the largest find hitherto discovered by us (measuring 1.75 m), which was excavated in the settlement site in front of the caves. It is a stone image of a bodhisattva (Padmapani), which was probably placed at the former entrance of the ancient village. It was almost totally buried by debris but still standing in situ with a paved area in front of it. Traces of paint show that the image was originally painted.

### First results of our 1992 fieldwork

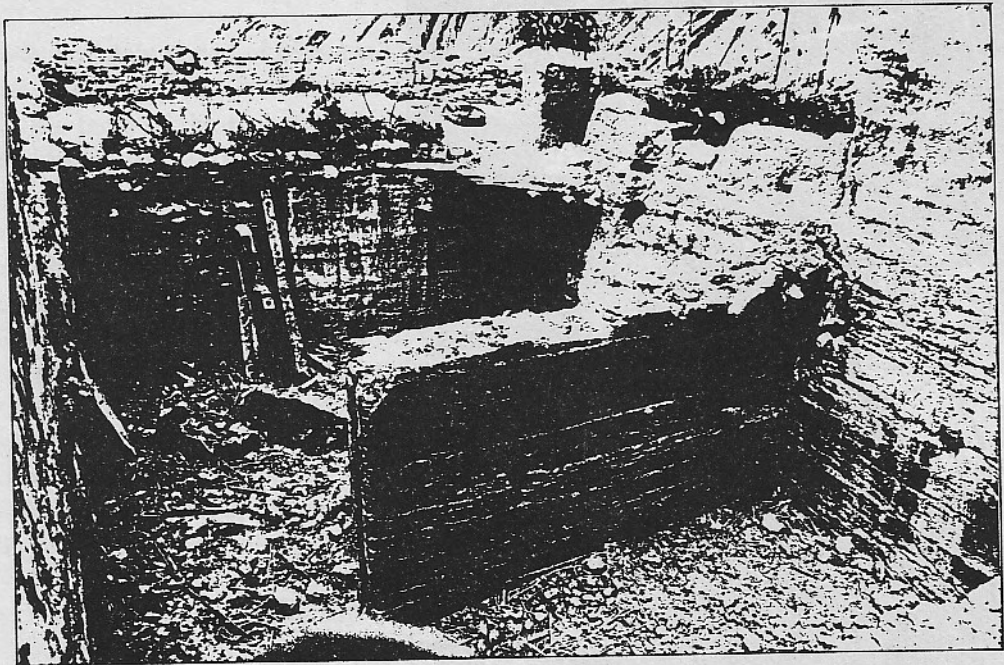
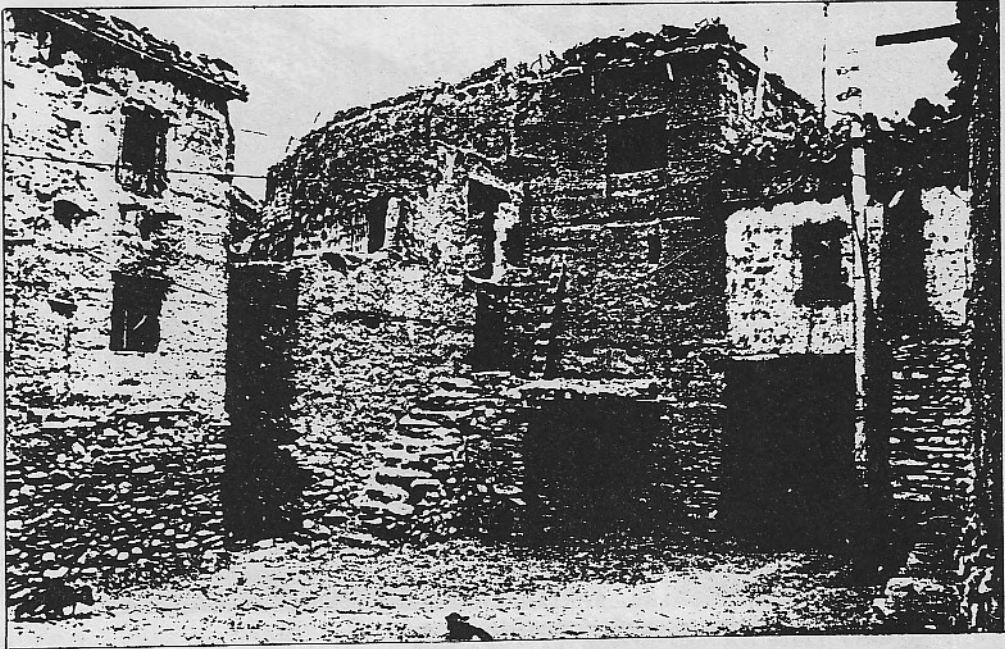
This year's field campaign has yielded first answers to our questions concerning the different stages of utilization of the cave systems and their position in their environment:

- (a) They were used mainly as settlements where everyday life took place. Radiocarbon dates and a number of finds suggest that during the earliest occupation period there were connections to the funeral caves in the Thakkhola.
- (b) The caves provided shelter during attacks by enemies.
- (c) In the last stage they probably acted as the quarters of hermits who lived and worked there.

The radiocarbon dates suggest a long period of occupation from about calBC 800 to calAD 1500, presumably with alternating periods of settlement and abandonment. The adjacent ancient settlement and village sites proved to be partly contemporary and related to the cave systems; they furnished dates from about calBC 350 up to calAD 1650.

Nowadays, the cave systems in Mustang are archaeological monuments representing mere relicts of the former settlements once furnished with elaborate wooden galleries, staircases, and porches.<sup>15</sup> The galleries and buildings in front of the rock faces collapsed a long time ago and the wood has been reused or covered by debris. Because of the heavy erosion only portions of the former cave chambers and very few remains of galleries with walls and supporting wooden beams are preserved.

From future excavation work, notably in the well-preserved and partly monumental cave systems in Northern Mustang, we hope to obtain addi-



**Kagbeni Village:**

Demolition of ancient houses adjoining the village square (Te). Above house 5 (Mingmar "A") with ceiling beams dated 1770 (first and second floors), below the demolished third and fourth floors of house 6 (Samdruk) with lintels and ceiling joists dated to 1572 at first floor and pillars and joists dated to 1771 on second floor level. Both were demolished in May 1993, foto June 15, 1993.



**Kagbeni, house south of the square :**  
**Sample 8 (1993) : Core of a lintel above an opening between two rooms, dated 1680.**