SOME SIMILARITIES ON THE MAKING OF THE TIMBER-FRAMED STRUCTURES IN EUROPE AND JAPAN VIA THE EXAMPLES WITH RIDGE-SUPPORTING POSTS

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ABSTRACT: This paper traces some similarities between Europe and Japan in terms of the making of the wooden structures particularly via the examples with ridge-supporting posts. The main similarities can be seen through the two transformations. The first is from 'Pfahlbau' to 'Schwellebau' in Germany and in Japanese from 'Horitate' to 'Dodai'. 'Pfahlbau' and 'Horitate' have posts that are fixed directly in the earth while 'Schwellebau' and 'Dodai' have posts that are on ground sills on the earth. The second is from 'Firstständerbau' to 'Stockwerksbau' in Germany and, in Japanese, from 'Munamochi' to 'Odachi'. 'Firstständerbau' and 'Munamochi' have posts that support a ridge or purlins directly on the earth while 'Stockwerksbau' and 'Odachi' has posts that support not a ridge but beams.

KEYWORDS: timber-framed structure, pile foundation, ridge-supporting post, ground sill, platform framing

1 INTRODUCTION

This paper traces some of the similarities between Europe and Japan in terms of the making of the wooden structures particularly via the examples with ridge-supporting posts. The central Europe is chosen that includes European Alps. The region has been supplying so many timbers that it has very long tradition of wooden structures. On the other hand Japan's central mountain region is chosen. The region has also been supplying so many timbers to buildings that it have very long one. Both the traditions at present belong to one of the peripheries where old structures can survive.

The paper shows that both the traditions have many similarities especially in terms of timber-framed structures that are in a part of wooden structures. The paper provides some examples of the similarities both in the two regions.

Firstly the paper refers to the academic papers especially of the general viewpoints that show transformation model from the old structure to the new one. A. Zeppelius and R. Weiss are chosen in the central Europe while K. Mita and T. Tsuchimoto are chosen in Japan. Secondly the paper depends upon the archaeological remains of houses and villages. Good examples can be seen in the archaeological academic reports from the paleolithic to the medieval. Thirdly the paper glimpses the remains of rock art. For examples in case of Europe the rock arts in Camonica valley located in the northern Italy suggest the pre-historic wooden structures. Lastly the paper depends much upon the architectural remains of vernacular ones that succeed the old structures from the past. It reports the surveys done not only in Japan’s mountain regions, that are located in the centre of the Japan’s main island, but also in the central Europe that includes southern Germany, Swiss, Austria and northern Italy. Particularly the good examples are provided from the open-air museums.

In conclusion the paper provides the hypothesis of the making of the timber-framed structures from the paleolithic to the contemporary both in the central Europe and in Japan. It stresses the high degree of the similarities between them. The main similarities can be seen in the two regions through the two transformations. In Germany one is from ‘Pfahlbau’ to ‘Schwellebau’ and second is from ‘Firstständerbau’ to ‘Stockwerksbau’. Such sort of long and wide viewpoints should be much required in the fields of wooden structures in order not only to understand the deep background of our traditions but also to create the new structures from our traditions.

2 SOME TRANSFORMATION MODELS

2.1 CENTRAL EUROPE

2.1.1 Model in the central Europe by A. Zeppelius

One of the oldest wooden structures in Europe is ‘Pfahlbau’. Aderhalt Zeppelius showed some transformation models of wooden structure from the oldest paleolithic time. Figure 1 has four types. Type a and type b relates to ‘Pfahlbau’ (building on stilts). Figure 2 is one of the reconstruction models of ‘Pfahlbau’. It depicts the posts standing in the earth support the ridge directly.

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Richard Weiss showed the transformation model from the ‘Ständerbau’. ‘Ständer’ is a post. Top of Figure 3 relates to ‘Pfahlbau’. The bottom of Figure 3 is ‘Fachwerkbau’ that has been evaluated from ‘Pfahlbau’. The first step is to take ‘Schwelle’ (ground sill) at the feet of each post.

He also showed the transformation model in terms of the making of the roof truss in Swiss. The bottom of Figure 4 is ‘Reines Hochstuddach’ that relates to ‘Firstsänderbau’. ‘First’ is a ridge. The posts in the bottom of Figure 4 stand on the earth and support a ridge directly. But in the middle of Figure 4 the post are not on the ground but on beams. It means that the original posts have been cut and the rest of the posts have remained on the beams.
Katsuhiko Mita showed the transformation model of figure 5 in 1942. The top of figure 5 has only a roof truss and two ridge-supporting posts at gable ends. The second of it has not only a roof truss but has a frame, and has three ridge-supporting posts. The third of it has three posts. Two of them at gable end are ridge-supporting posts but one of them are not a ridge-supporting post. It means that the post has been cut and rest of the post has remained on the ground.

2.2.2 Model in Japan by T. Tsuchimoto

Figure 6 is a transformation model in Japan by the author. The model deals only sections of the smallest house.

The model has two main structures at the beginning of transformation as the left of figure 6. One is the ‘sasu structure’ with ridge-supporting posts (left above). Another is the ‘sasu structure’ with no ridge-supporting posts (left below). First one, left above, has various evolutions while second one, left bottom, has only a simple evolution. The ‘sasu structure’ with ridge-supporting posts (left above) is similar to the top of figure 5 by K. Mita that has only a roof truss.

Later the structure (left above) has not only a roof truss but a frame but still has ridges-supporting posts. And then the ridge-supporting posts have been cut and remained in its roof truss. Lastly the structure has comprised a roof truss and a frame with no ridge-supporting posts. The last evolution is depicted in the right of figure 6.

On the other hand, the other structure (left below) has transformed directly to the structure comprising a roof truss and a frame only with no ridge-supporting posts (right below).

3 TWO MAIN TRANSFORMATIONS

3.1 'PFAHLBAU' to 'SCHWELLEBAU'/ 'HORITATE' to 'DODAI'

The transformation from ‘Pfahlbau’ to ‘Swellebau’ is one of the two main transformations in the central Europe. The transformation from ‘Horitate’ (pile foundation) to ‘Dodai’ (ground sill) is also one of the two transformations in Japan.

These two transformations in the central Europe and in Japan have similarities that relate to the foot of each post. Both the transformations are dynamics from the posts of fixed end on ground to posts of hinged end on ground. ‘Pfahlbau’ and ‘Horitate’ have posts of fixed end on ground while ‘Swellebau’ and ‘Dodai’ have posts of hinged end on ground. In other words, ‘Pfahlbau’ and ‘Horitate’ have posts that are deeply in ground at the bottom of them, while ‘Swellebau’ and ‘Dodai’ have posts that are on sill on ground at the bottom of them.

3.2 'FIRSTSÄNDERBAU' to 'STOCKWERKSBAU' / 'MUNAMOCHI' to 'ODACHI'

The transformation from ‘Firstständerbau’ to ‘Stockwerksbau’ (platform framing) is the other of the two main transformations in the central Europe. The transformation from ‘Munamochi’ (ridge-supporting post) to ‘Odachi’ (king strut on beam) is also the other of the two main transformations.

These two transformations in the central Europe and in Japan have also similarities that relate to the
ridge-supporting posts. Both the transformations are
dynamics that the ridge-supporting posts are
disappearing step by step. ‘Firstständerbau’ and
‘Munamochi’ have ridge-supporting posts only while
‘Stockwerksbau’ and ‘Odachi’ have no ridge-
supporting posts. In other words, ‘Firstständerbau’ and
‘Munamochi’ have posts that support a ridge from the
ground directly, while ‘Firstständerbau’ and
‘Munamochi’ have posts that support a ridge not on the
ground but on beams.

3.3 SIMILARITIES IN BOTH REGIONS

The similarities between in Europe and in Japan
depend upon the two main transformations. The first
ones depend upon the evolution from the fixed end to
the hinged end at the bottom of posts. Second ones
depend upon the evolution from the structure with
ridge-supporting posts to the structure with no ridge-
supporting posts.

4 EXAMPLES

4.1 PREHISTORIC FORMS

The examples in the prehistoric periods remain both in
the central Europe and in Japan.

Firstly rock art in the central Europe depicts the
prehistoric houses. Some of them show a small house
with ridge-supporting posts. Figure 7 is an example in
the northern Italy. The two houses in it have ridge-
supporting posts.

Secondly in Japan the depictions on the bronze bell
called ‘Doutaku’ show an upper-class house with
ridge-supporting posts. Figure 8 depicts a house that
has two ridge-supporting posts. The depiction is an
important document that suggests the existence of
ridge-supporting posts during the prehistoric periods in
Japan.

4.2 ARCHAEOLOGICAL REMAINS

Archaeological remains suggest the plan of houses and
the condition of the end of each post.

Figure 9 is one of the examples that show post pits.
The building at the right bottom has the post pits at the
centre. The plan suggest that ridge-supporting posts
stand in the buildings. The post pits themselves suggest
the condition that the bottom of each posts are fixed
end in the ground. The building of right bottom has
ridge-supporting posts with fixed end.

Figure 7: Rock art of Foppe di Nadro in Italy from E.
Anati (1976)

Figure 8: Building on ‘Doutaku’ (bronze bell) in Japan

Figure 9: Archaeological remains in Germany from
Thomas platz (2008)
Figure 10 is one of the examples that show both layout of buildings and post pits in Japan. There are a lot of small buildings. Most of them suggest the existances of ridge-supporting pots with fixed end.

Figure 10: ‘Archaeological remains in Iiyana, Japan

4.3 ARCHITECTURAL REMAINS

4.3.1 Architectural remains in Central Europe

The architectural remains are so important that they show the structure of the buildings.

Figure 11 is an example of storage in Beuren, Germany. It has sills on the ground and ridge-supporting posts.

Figure 12 is an example of vernacular houses in Kölliken in Swiss. Sills on the ground and ridge-supporting posts can be seen.

Figure 11: Franken in Germany from Über die Entwicklung des bäuerlichen Hausbaus in Württemberg (2000)

Figure 12: Kölliken in Swiss from Bauernhäuser der Schweiz (1989)

4.3.2 Architectural remains in Japan

Figure 13 is an example of vernacular house in Japan. Sills on the ground and ridge-supporting posts can be seen in the section of the house. The house is the most typical example with ridge-supporting posts on ground sill in the field of mountain area in the central Japan.

Figure 13: Fuefuki-rever area in Japan from T.Tsuhimoto (2005)
5 CONCLUSIONS: ORIGIN OF WOODEN TIMBER-FRAMED STRUCTURE

Origin of wooden timber-framed structure has several roots in the world. Yet, dominant origin belongs to the structure with ridge supporting pots fixed in the ground. The main reason why the structure can be said to be dominant origin is that the structure can be seen both in the central Europe and in Japan from the very early prehistoric periods. The structure has been existing on the continent of Eurasia that comprises Europe and Asia. The Eurasia continent has been a big stage for making of the timber-framed structure.

The very long tradition on the continent seems to have been created through the succession and spread from men to men.

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